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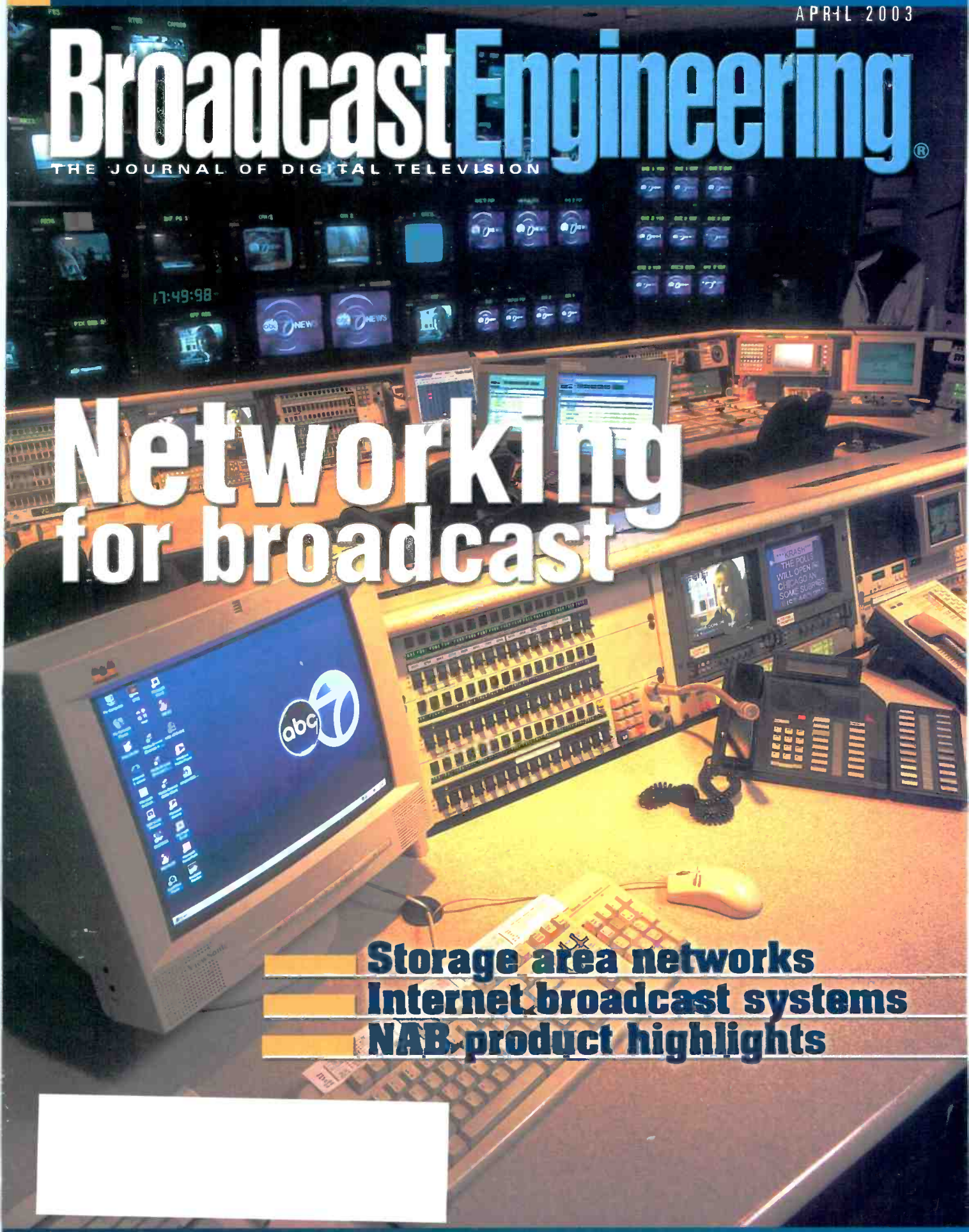


# Networking for broadcast

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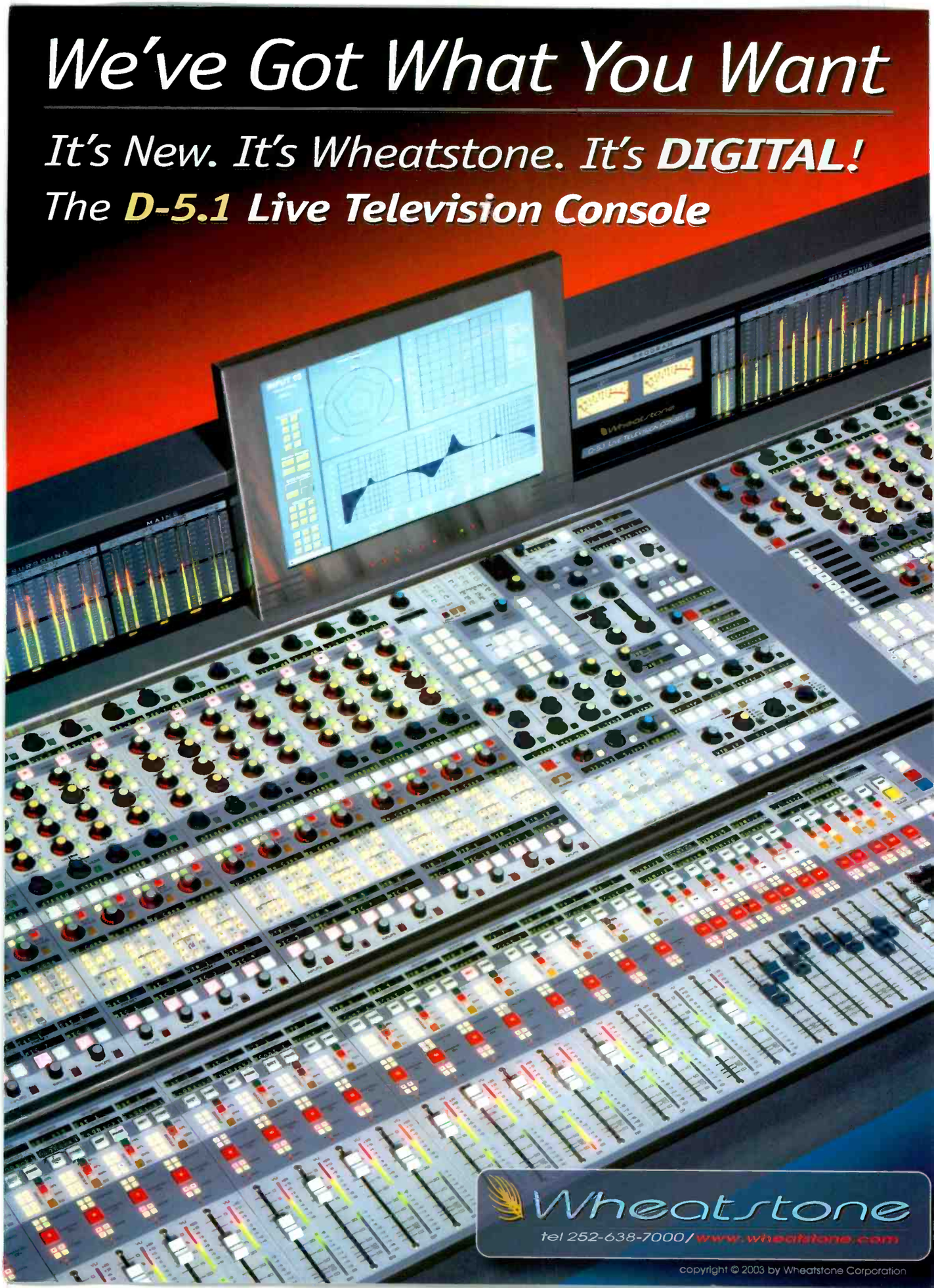
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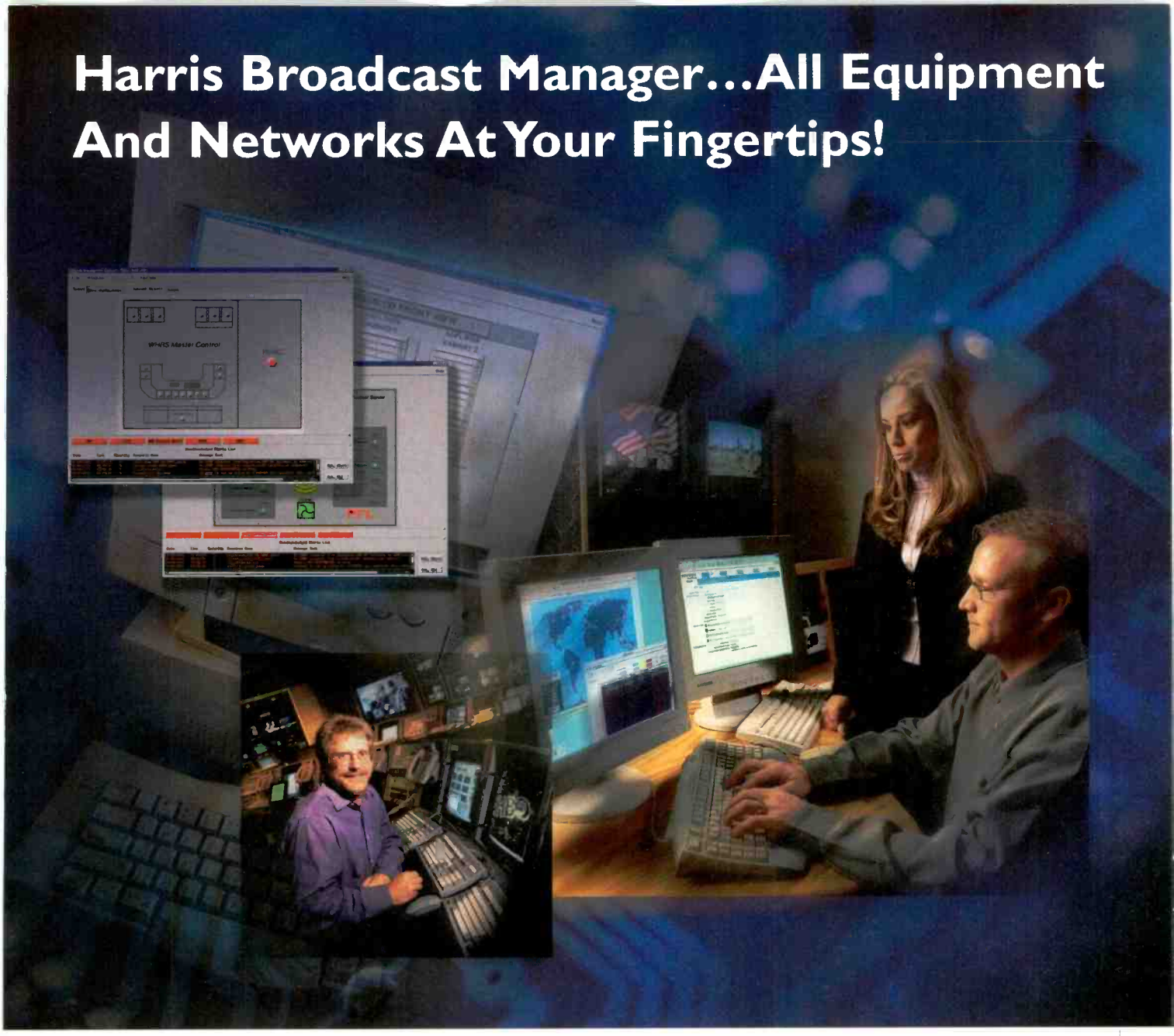

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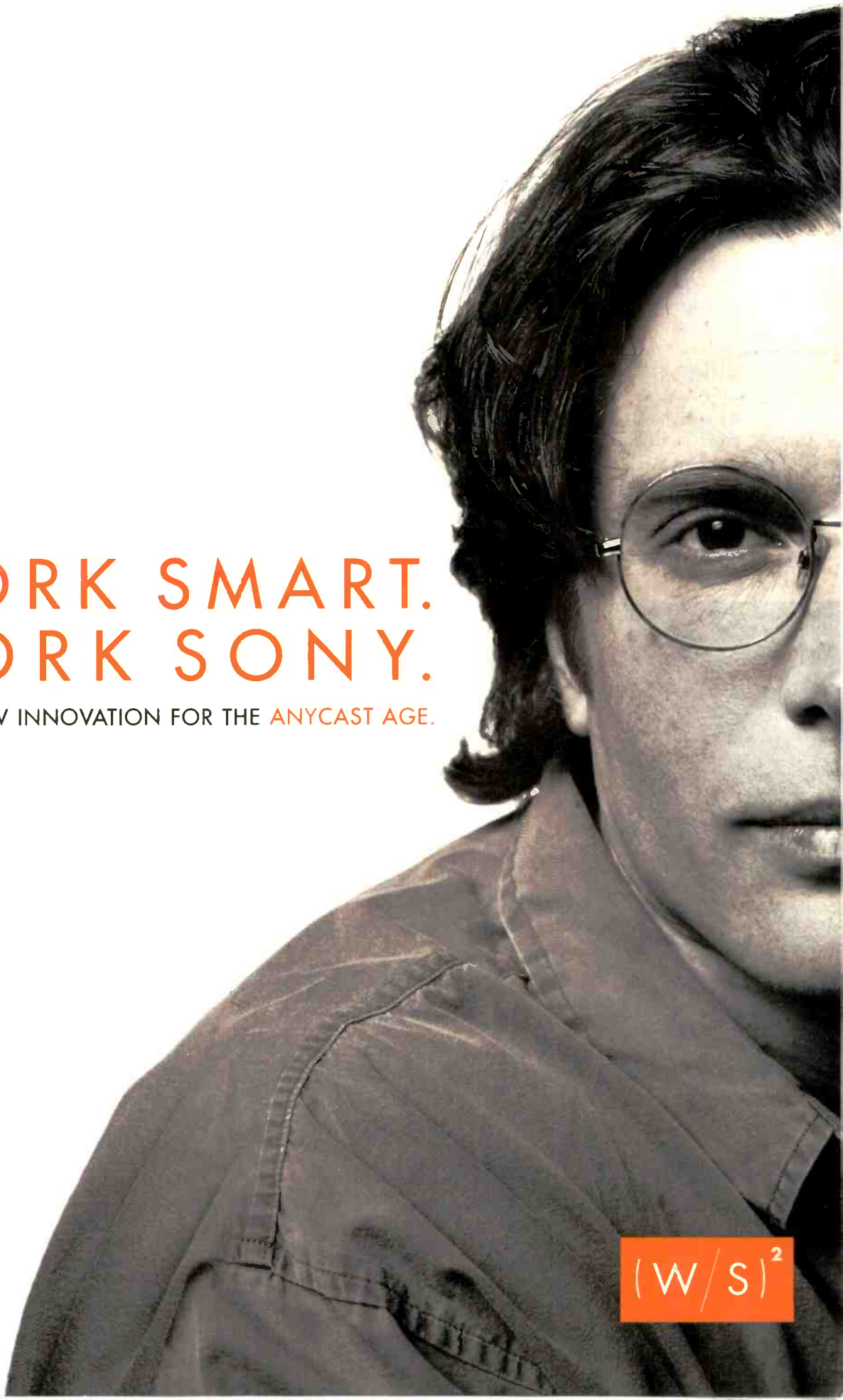

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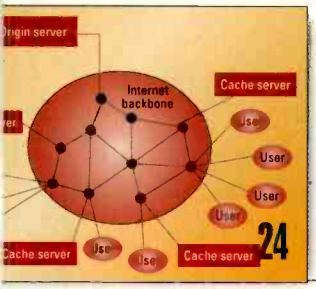


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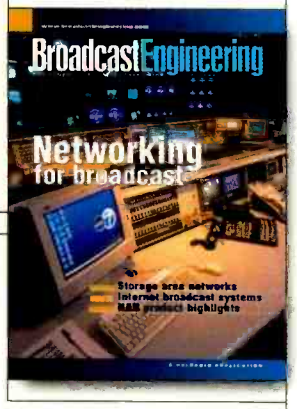
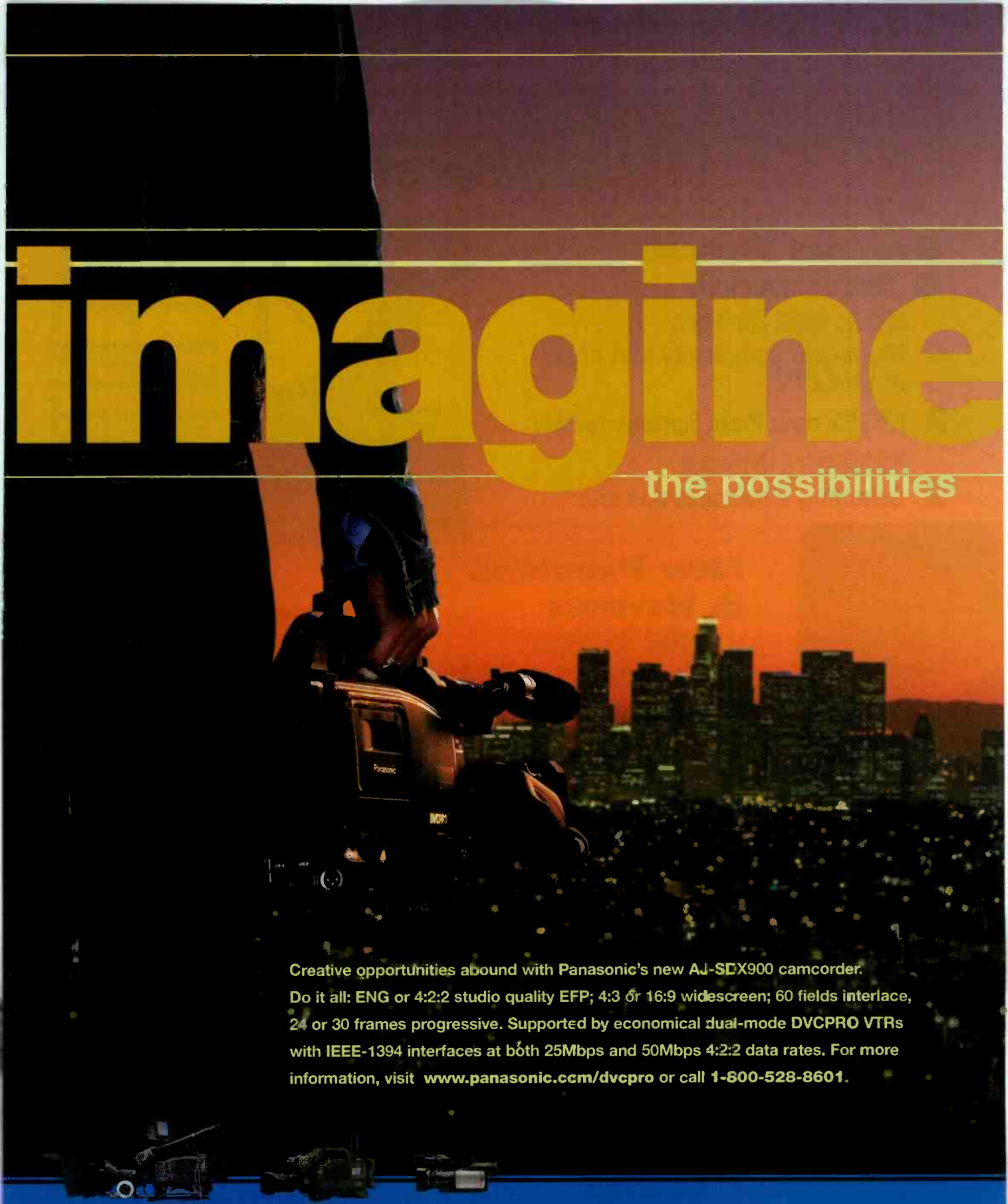



**ON THE COVER:** WLS-TV's newsroom in Chicago. The facility features technology from Digital News Technology solutions. Photo by Frank Pedrick of Pedrick Photography.

(continued on page 8)

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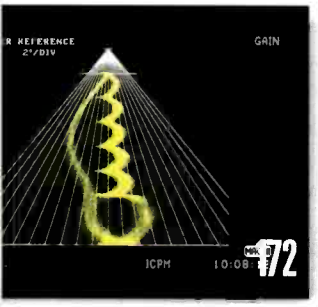

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## Name the tape formats

In the ten-year period from 1971 to 1981, new tape formats were introduced, it seemed, almost yearly. Name the formats introduced during this period and the companies proposing each of them. All correct entries will be eligible for a drawing of the new *Broadcast Engineering* T-shirts. Enter by e-mail. Title your entry "Freezeframe-April" in the subject field and send it to: bdick@primediabusiness.com. Correct answers received by June 17, 2003, are eligible to win.

# What company gives studio pros the most technologically advanced media possible?

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# Mobile 8-VSB?

*Broadcast Engineering* was recently privy to a series of secret tests on the latest improvements to 8-VSB chips for mobile reception. These new chips have been specifically designed to improve the capture and display of 8-VSB signals in mobile environments. Let's look at just a couple of the test results. (Glossary of terms below.)

The first mobile reception test was designed to measure the Barrington Angular Reception Factor (BARF) constant. A human reception model, shown here, was used to avoid any metal reflections from the automobile. The subject engineer was loaded with about 42 pounds of electronics and wore a head-mounted antenna to minimize body shielding. This was required to minimize the constant Zenith BARF noise.

The test subject then walked a 16:9 grid pattern and at each crosspoint a series of tests were conducted and results logged. The images were displayed on a new portable TV set displaying FFHD images.

The first video test focused on measuring the Circular Radiation and Polarization (CRAP) factor. This analysis looks at how effective reception is when the person or vehicle is moving in a clockwise direction. The same test is useful when the receiver moves counterclockwise, but that wasn't measured in these tests. The results were as expected. On the CRAP scale of 1 to 10, the new ATSC improvements rated a strong 10.

Unfortunately, the electric component of the magnetic sinusoidal waveform was often absent. This meant that the CRADT measurement went off the scale. At these locations, the engineer was instructed to apply first the HYB correction mode for 30 seconds. If that didn't improve the reception, the HAP correction mode was applied for 60 seconds. Unfortunately, these corrections seldom worked. These test locations were identified on the test grid as CRADT 1 through 22.

Because of the high number of CRADT results, a second round of tests was conducted. These tests were restructured to just measure CEGADS, sometimes called "C-GADS." Researchers felt that this was probably going to be a bottom-line performance measurement anyway, so identifying it early might prove beneficial.

Test results, while encouraging in flat-plain environments like parking lots, were less so anywhere near a building, tree, light pole or moving dog. Also, as the subject walked clockwise around the grid, the FFHD image was visible, but it also rotated clockwise. The only way the image could be stabilized was by walking counterclockwise around the grid. Finally, if the test subject passed near any building or car, the CRAP hit the fan and even FFHD was unviewable.

We are awaiting a new round of tests to be conducted just after the NAB convention.

Glossary:
Barrington Angular Reception Factor (BARF)
Fox-Fake HD (480 line) (FFHD)
Circular Radiation Angular Polarization (CRAP)
Can't Receive A Damn Thing (CRADT)
Hold Your Breath (HYB)
Hope And Pray (HAP)
Can't Even Get A Digital Signal (CEGADS)

I hope readers enjoyed my April Fool's story.

Brad Dick
**editorial director**

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## On the Hollywood scene

Brad,

Thanks for your views on the current status of HD in America. Every article that mentions "Hollywood" and "HD" that I've read recently points to the fact – Hollywood is setting back the rollout of HD in America. After all, what's a great format without any native content to watch?

With today's computer technology, I can't see how anyone feels comfortable with old boys like Jack Valenti hanging around trying to keep control of Hollywood's precious content, while trying to deprive consumers of their rights. I bet Mr. Valenti can't even set the clock on his VCR, or change the IP address of his computer – people who don't understand technology should NOT be in charge of what the future holds or nothing will ever change!

I've been in the television business for over 17 years, and have been waiting for HD since 1986. The last thing we need is for Hollywood to obsolete every piece of HD "ready" equipment already sold. Consumers love spending $3000+ on HD sets that will either turn into very expensive NTSC displays, or doorstop. Hollywood has known HD was coming for more than 15 years. Why didn't they think about content protection before this point?

I agree to pay for content all the time, but I expect to watch it when I want and on whatever format I choose. It's up to me, NOT Hollywood, what my viewing options are. I'll be sure to let my Congressman know as well.

Thanks again for standing up for the consumer's rights.

DAVID C. PALMER

Mr. Dick,

Please don't sugarcoat it; tell us how you really feel. Any consumer that has had an iMac barf up the latest purchased music CD can condense your entire page to a common two-word phrase coupled with that ubiquitous and universal one-finger hand salute, and it doesn't mean "You're number one with me!" The entire industry brain trust of legislators, regulators, lawyers, engineers and executives are no match for even one pissed-off techie/geek/nerd consumer. If Hollywood wants to raise the broadcast flag in the battle, they can expect to hear in reply a soul-chilling cry from the legions of 12-year-olds with money and time: "Dude! I got a Dell!" I can

see it now... droves of soccer moms hauling the kids to court, the legal kind. It will be more entertaining than the current fare Hollywood serves up.

M.A. EDWARDS

WELL SAID!!! I was so happy to read your response to that moron from FOX. As a consumer who already spent $12,000 on my HD-capable system, the last thing I want is for my 50-inch plasma to not display HD any more because it's not HDCP-compliant, or my $2250 SDI-modified DVD player to not work because it has an unprotected digital output. But it figures that stance comes from FAUX, the same company who aired Star Wars in 480p, (they had to actually DOWNCONVERT to do that!) and refuses to do ANYTHING in HD. I record HD all the time with my computer because I'm never home to watch the shows when they air. Who is Scott E. Hamilton to tell me how I can or can't use the content in my own home? I'm glad not everyone in this industry is a greedy extortionist. We need more vocal people like you.

BOB ZAJKO, CBT
SATELLITE TRUCK ENGINEER

Well, I sent letters regarding copy protection (and my concern about the neutering of my recently purchased plasma without DVI—>HDCP connections) to about half of the members of the Committee on Telecommunications and the Internet (have to insert and stamp the remainder). It's been three weeks and I have not heard a reply from anyone. I didn't expect a flood of responses, but thought by now at least one staffer would have sent me a "thank you for the letter" reply. So at this point, I'm not sure how concerned they are about public response to this issue.

MICHAEL FAULKNER
UNIVERSITY OF COLORADO AT BOULDER

## Freezeframe winners

November Freezeframe:

Name the brand and model number of this handheld ENG/field camera. It weighed 16 pounds including lens and viewfinder. Weight of the backpack was not specified.

The correct answer was the Ampex BBC-2 portable camera.

Winner:

Dale Rhodes, Videolines

December Freezeframe:

Name the brand and model number of this handheld ENG/field camera. It weighed 15 pounds and was part of a series of cameras called "Decade Two" by the manufacturer. The correct answer was the Philips LDK 11 portable cameras, which was a battery- or AC-powered camera featuring full production control either remotely or at the backpack.

There were no correct entries. BE

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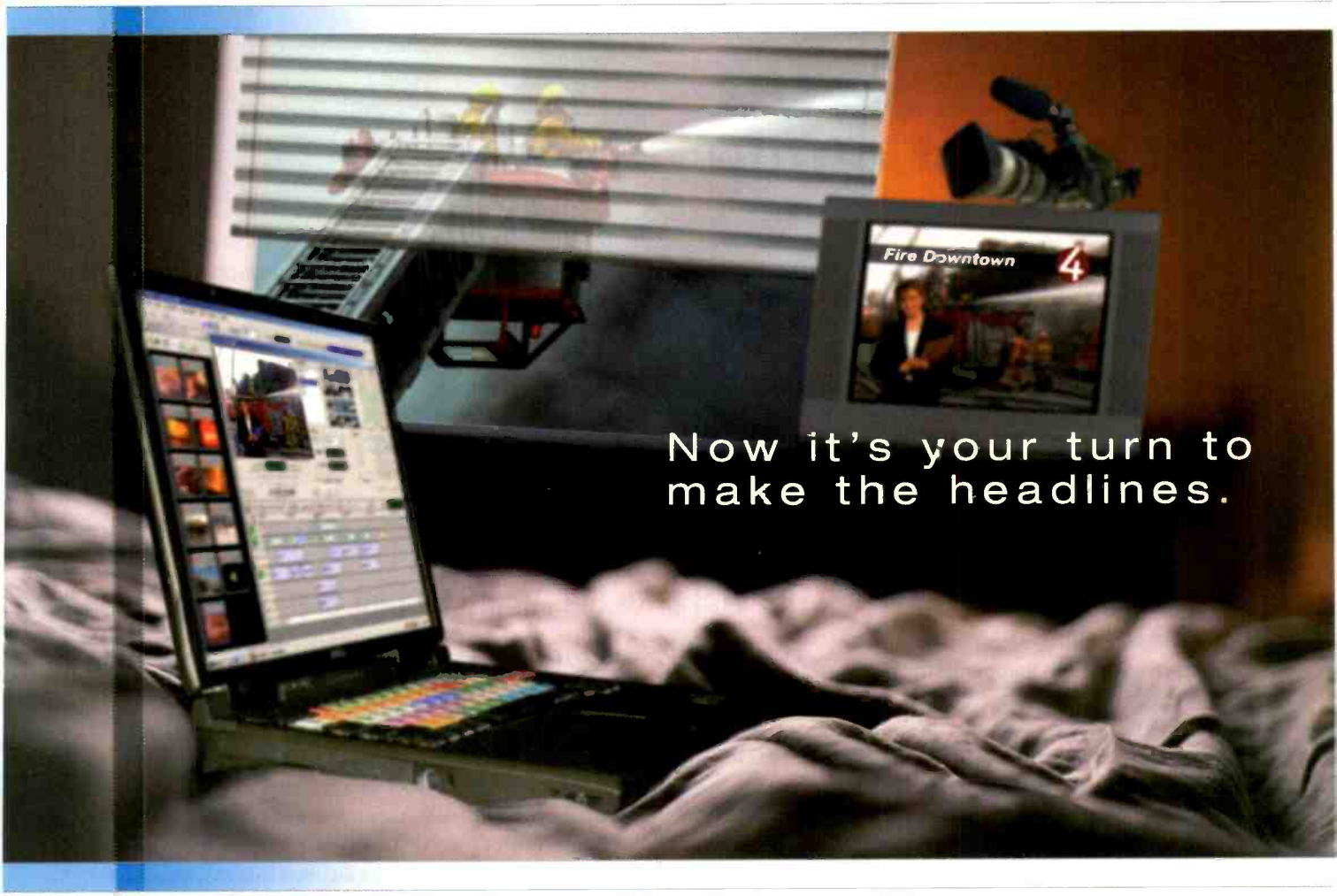


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# The new DTV food chain

BY CRAIG BIRKMAIER

In a food chain, each organism eats a smaller organism, and is eaten by a larger one.

Over the past five decades, TV broadcasters have seen their position in the media food chain evolve dramatically. In 1950 the big fish was the local movie theater; for most Americans, home entertainment meant gathering the family around a console radio. But the little screen soon emerged as the big fish in the media ocean, and the motion picture industry scrambled to preserve its food supply.

It can be an informative exercise to examine what has happened to the motion picture industry and broadcasters after five decades of evolution driven by rapid advances in analog, and now digital, technology.

Hollywood adapted to competition from TV. It widened its horizons, focusing on the entertainment experience. Saturday morning serials and the newsreels became extinct in theaters. The pictures got wider and the sound got better. And Hollywood embraced TV and commercials to extend its market reach.

The premiere of a major motion picture on the little screen became a big event; the networks got into bidding wars for the rights to the most popular movie titles. And the Hollywood content machine soon started churning out entertainment programming optimized for the little screen.

Broadcast TV entered its golden era, feeding the masses hungry for news and entertainment, huddled around the little screen in the living room. Hollywood developed an appetite for "free TV," setting aside artistic concerns about the interruption of their stories to make room for the commercials that paid for the content.

Then technology threatened Hollywood and the broadcaster once again. The consumer electronics industry introduced the personal videotape recorder, and satellites revolutionized the distribution of television programming.

In 1982, testifying before a Congressional committee, Jack Valenti, president of the Motion Picture Association of America, delivered a dire warning:

"Now we are facing a very new and a very troubling assault on our fiscal security, on our very economic life, and we are facing it from a thing called the videocassette recorder and its necessary companion called the blank tape.... I say to you that the VCR is to the American film producer and the American public as the Boston strangler is to the woman home alone."

**"The VCR is to the American film producer and the American public as the Boston strangler is to the woman home alone." [Jack Valenti]**

Even as he spoke, however, Hollywood was leveraging this new technology to its advantage, to create a new food chain that threatened the TV broadcaster's food supply. The VCR enabled Hollywood to bypass broadcasters, reaching directly into American homes. Families gathered around the color TV and VCR to watch movies without commercial interruptions.

Meanwhile, the cable industry drew power from satellite distribution, which brought an end to the dominance of over-the-air broadcasting and its programming oligopoly. Equally important, cable deployed a critical new technology and

## FRAME GRAB A look at the issues driving today's technology

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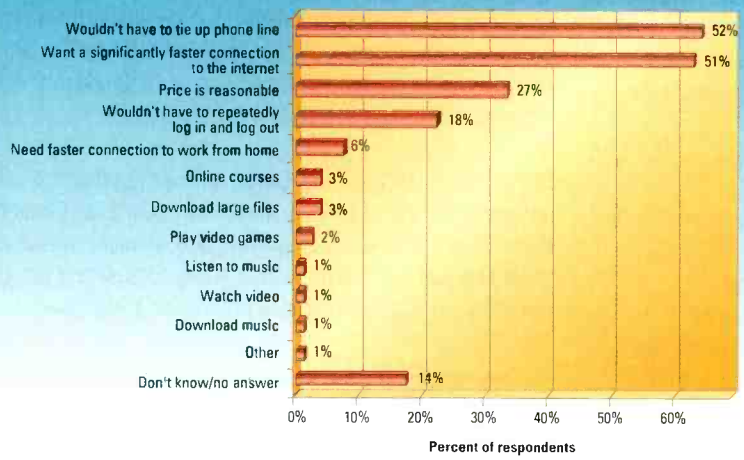


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the infrastructure to support it. The cable set-top box, equipped with conditional access technology, enabled commercial-free premium channels, and the customer support infrastructure collected the subscription fees that paid for the content.

The new premium cable networks turned to Hollywood for the original movie content needed to fill these channels.

The term "original" is critical. In the context of premium movie channels it means uninterrupted, uncut, uncensored. Cable delivered the juicy fillet; broadcasters turned movies into hamburger.

Today, theatrical release is the big fish, then hospitality release (hotels and airplanes), then home video release (sales and rentals of tapes and DVDs), then premium cable distribution, and then first-run broadcast, followed by general broadcast release. Only in the broadcast release is the movie edited for TV and filled with commercial interruptions.

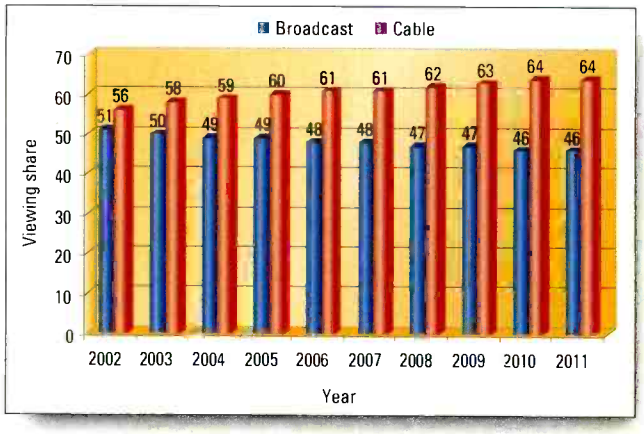



**Figure 1. Alternatives like cable are increasingly threatening broadcasters' audience. By 2011, cable is expected to have captured almost two-thirds of American viewing shares. (Total viewing shares exceed 100 due to multiple-set households.)**

## Steak and hamburger

Over the past five decades, television has split in two – over-the-air and subscription (cable and DBS).

Over-the-air broadcasting has evolved from black-and-white to color to stereo. For a few early adopters it is digital, sometimes HD. But 85 percent of American homes now get most of their TV fare via a subscription service, with about one-third of those homes subscribing to a digital TV service. Broadcasters still command about half the total audience, but they no longer compete on a level playing field.

Premium subscription content, on the other hand, has evolved down a different path. The premium channels that originally provided only movies – HBO, Showtime and others – now produce made-for-TV programs. These programs are uninterrupted, uncut, uncensored and increasingly delivered in HD. And this content is then released on tape and DVD – bypassing over-the-air broadcast. (See Figure 1.)

This has not gone unnoticed by the broadcast networks. They are coming to the realization that they are serving hamburger to the masses, not steak. That's not going to change, at least not for local TV broadcasters. DTV does not change a thing, except the power bill. Broadcasters can offer HDTV – but with commercials, and without the juicy content.

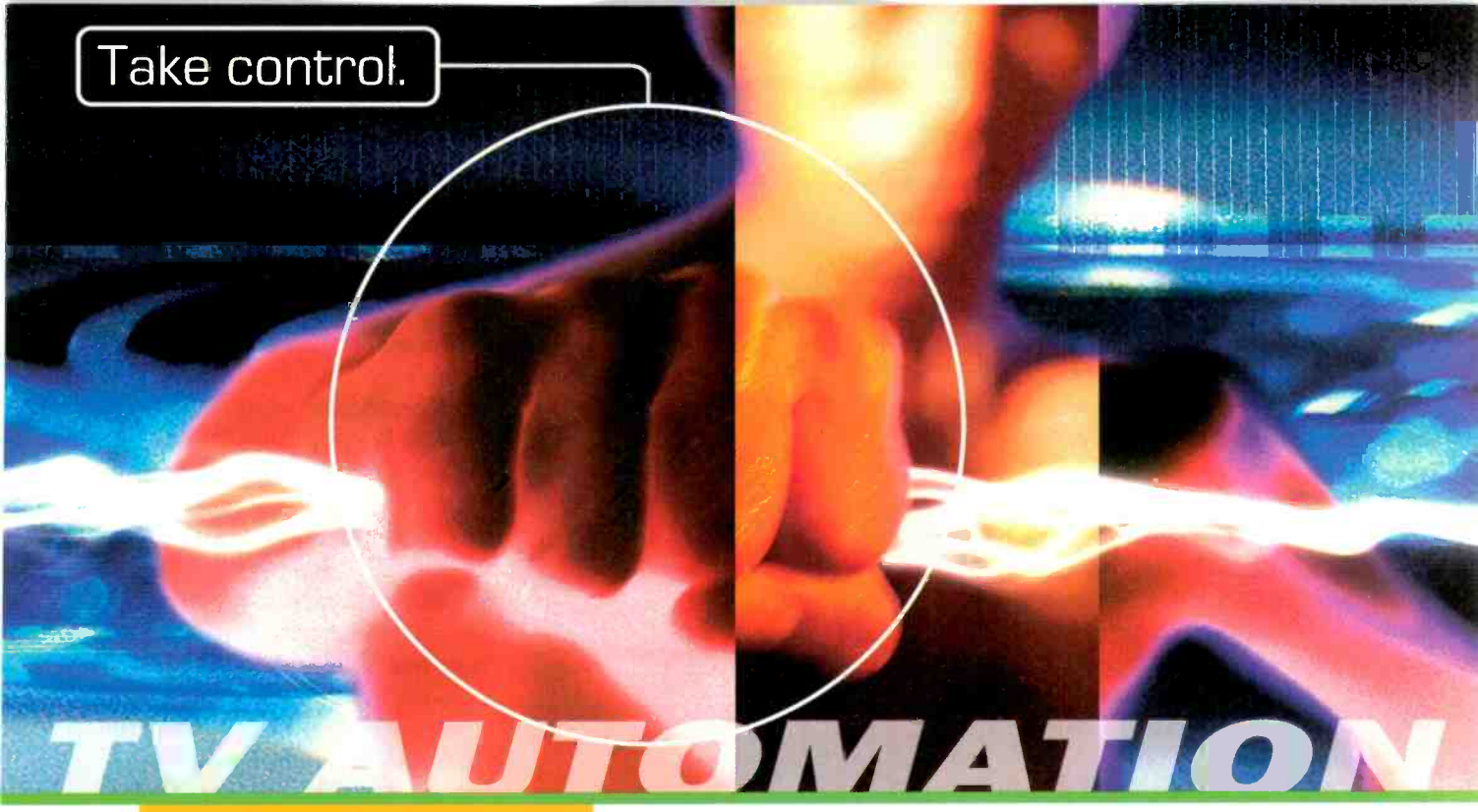
Technically, DTV broadcasters could deliver anything, as long as they encrypt it, figure out a way to get paid for it, and give the government five percent of the revenues generated. But that would require a significant investment in infrastructure, and a transmission system that works as reliably as cable and DBS. And it might mean backing out on the promise that got them the second DTV channel – delivering HDTV to the masses.

**Cable delivered the juicy fillet; broadcasters turned movies into hamburger.**

Throughout most of the Advanced Television standards setting process the focus was on the delivery of HDTV. The original request from broadcasters to the FCC in 1987 was to open a proceeding to determine the requirements for delivering HDTV. The networks in particular were pushing for HDTV. After the process turned digital in 1992, HDTV became an even greater imperative, since digital compression made it possible to deliver a single channel of SDTV in 2MHz of spectrum or less, and there were concerns that Congress might decide to allocate only enough spectrum to each broadcaster to duplicate their NTSC offering. So the emphasis was placed on HDTV, since it required an entire 6MHz channel. Support for SDTV formats was added to the standard in July of 1995, but the networks continued to promise that they would deliver HDTV. After the standard was approved, Preston Padden of ABC made a public statement that ABC might not use the new channels for HDTV, but rather to deliver multiple channels of SDTV, including some premium channels. He was immediately hauled in front of a Congressional hearing, where he backed down and recommitted the network to HDTV.

CBS is now using the broadcast flag issue as a possible end run from their commitment to FREE HDTV. They are saying that they cannot continue to offer this valuable content unless it is protected. This may well be nothing more than an excuse to move HDTV content to premium cable where the networks can charge for the extra quality, and more importantly, include content (sex, language, violence, etc.) that they cannot broadcast because of content restrictions on broadcasters.

So, bottom line, it looks like CBS and

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possibly the rest of the networks may back out of their promise to deliver HDTV so that they can turn it into a premium niche service (which is what it always has been and will be for years).

By now it should be clear that in the world of techno-politics, what people say and what they mean are not necessarily the same thing. Mr. Valenti is at it again, with dire warnings about the digital threat. Meanwhile CBS is demanding that the government protect HDTV content or they will stop delivering it via free-to-air broadcasts.

Both are being disingenuous. Both are big fish trying to protect their interests. Both want to control the food supply.

Are there legitimate DTV business opportunities? Certainly!

Are broadcasters interested? Apparently not.

To be fair, today's broadcasters lack the resources to compete with big fish like Viacom, GE, Disney and FOX. If these big media conglomerates get their way with removal of the ownership caps this year, many broadcasters may have no choice but to let themselves be bought out.

The truth is that the big fish can survive, with or without over-the-air broadcasting. They can have their steak and the hamburger too. With that in mind, here's what the new television food chain may look like in a few years.

First-run shows will be delivered via cable and DBS in premium packages. They will be uninterrupted, uncut, uncensored. They will be in HDTV with surround sound.

After premium release, programs will be edited for content, cropped and downconverted to fit the 4:3 SDTV screen, and filled with commercials for the broadcast network release.

**High equipment costs and increased competion from premium services have left small-market broadcasters unable to compete with the big fish.**

Then, packaged media versions of the uncut first-run shows, with added content about the shows, actors, e-commerce, etc. (just like DVD movies) will be released.

Finally, syndication release will have less content and more commercials.

There are alternatives to this view of DTV evolution.

After an initial failed attempt to compete in the subscription TV marketplace, digital broadcasting is beginning to hook viewers in Great Britain. The Freeview service launched last fallalready has 1.4 million viewers. It provides about 30 channels of programming supported by UK license fees (BBC) and advertising; all one needs is a digital receiver that costs about $120. This is equivalent to about three months of extended basic cable bills here in the United States.

In Germany, cable TV never got off the ground, in large part because the broadcast infrastructure evolved to deliver multichannel programming. Now it is going digital. All the analog transmitters in Berlin will be shut down by August 2003, and the service is robust enough to support mobile reception.

Perhaps the time has come for U.S. broadcasters to take control of their destiny.

Local broadcasters need to tell Congress that free-to-air broadcasting will soon become extinct if the politicians let the big fish continue to gobble up everything in sight. They need to tell the American public that they should not be forced to pay twice for "free TV." The cost of advertising is passed onto the consumer at the checkout counter. This is why Coke costs much more than the store brands. And consumers pay again when they subscribe to multichannel services like cable and DBS that are advertiser supported, as is virtually all of extended basic cable. Broadcasters could deliver the equivalent of extended basic cable without the subscription fee. Then consumers would pay once for a receiver, and continue paying for TV at the checkout counter.

With local cached storage, broadcasters could use off-peak hours to download programming for consumption on demand. And with a real conditional access system, rather than broadcast flag waving, they could even deliver movies, uninterrupted, uncut and uncensored. Broadcasters can provide 30 to 60 channels of commercially sponsored programming, without the monthly bill, and they can deliver the steak too. BE

## Reader wins AKG C 4500 microphone

David Sluberski was declared the winner in the *Broadcast Engineering* AdPlus study by Paramount Research. The study examined readers' information needs and provided a forum for subscribers to share their opinions and offer details about their future resource needs.

Mr. Sluberski will receive an AKG studio C 4500 microphone. He is a senior audio producer at WXXI-TV in Rochester, NY. BE

## Web references:

Testimony from 1982 Congressional Hearing on Home Recording of Copyrighted Works
cryptome.org/hrcw-hear.htm

*Craig Birkmaier is a technology consultant at Pcube labs, and hosts and moderates the OpenDTV Forum.*

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# CNN's remote studios

Since the 1980s, CNN has been expanding their international news organization beyond their original Atlanta location to include facilities around the globe. The latest move involved the renovation and construction of two facilities in New York City to accommodate news shows built around Connie Chung and Paula Zahn. The Systems Group was appointed to help plan and execute the project, which included the renovation of the CNN facility at 5 Penn Plaza and the construction of the new street-front studio located in the Time Life Building in midtown Manhattan.

Early in the planning process for the 5 Penn Plaza project, CNN announced plans to create the new studio facility in the former Time Life building and have it controlled remotely from the 5 Penn location.

The Time Life studio was designed to give the news shows dedicated, high-profile studio space, with two sides of glass for public exposure to Sixth Avenue and the associated plaza. Sony HDC-950 video cameras mounted on Vinten Quattro studio pedestals are employed to provide the studios with HD capability for the future, as well as SD quality for the initial launch. A Yamaha O2R digital audio mixer fulfills the audio production duties.

The Systems Group and CNN engineering teams worked together to upgrade two production control rooms and expand the routing connectivity feeds to two smaller existing studios. Thomson Grass Valley 4000 three-M/E production switchers were chosen for the facility, deployed along with a Thomson Trinix SDI video router with a 256x256 channel matrix and active carding for a 192x192 matrix.

A Venus analog audio router with active carding for a 256x256 matrix was also installed. Sony PVM and BVM video monitors using Telex KP32 intercom key panels for communication were installed in the two facilities.

The new systems were cut into the existing on-air operation in a highly coordinated manner with no impact to the home viewer. Each room in Penn Plaza was transitioned individually and tested, allowing the engineers to shadow the signal path for both analog and digital systems while remaining on the air. BE

**CNN's new street-front studio provides high-profile studio space for news shows built around Connie Chung and Paula Zahn.**

## Design team

CNN:
- Jeff Gershgorn, director of engineering, CNN New York/ CNNfn
- Jesse Spilka, engineering manager, CNN New York
- Dave Slack, VP, implementation and planning, CNN Technology Development
- Tim Sloan, technology implementation manager, CNN Technology Development

The Systems Group:
- John Zulick, engineer
- John Holt, senior engineer
- Paul Rogalinski, senior project manager
- Darwin Clermont and D.J. Rice, installation supervisors
- Steve Losquadro and Hemant Ganesh, lead technicians

## Equipment list

Thomson Grass Valley
- Trinix SDI video router 256x256
- Venus analog audio router
- three-M/E production switchers

Yamaha O2R digital audio mixer
Vinten Quattro studio pedestals
Telex intercom key panels KP32
Sony
- HDC-950 cameras
- PVM and BVM video monitors

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# New tax certificate program proposed

BY HARRY C. MARTIN

Senator John McCain (R-Ariz.), Chairman of the Senate Commerce Committee, has introduced a bill that would bring back "tax certificates" for those who sell communications companies, including broadcast stations, to qualified small businesses. Tax certificates allow the seller to defer paying a portion of the taxes related to a sale. For many years tax certificates were granted to those who sold broadcast stations to minorities but, due to abuse, the program was eliminated by Congress.

Senator McCain's bill, entitled "Telecommunications Ownership Diversification Act of 2003," is designed to encourage companies to sell communications properties to women and minorities, and to financially assist women and minorities to purchase the properties. Some believe the tax certificates would encourage large broadcast companies, which would otherwise trade stations with each other to avoid taxes, to sell for cash to women and minorities who have few or no stations to trade. They also believe the lower taxes provided by the tax certificates would allow sellers to sell broadcast properties at a lower price, making it easier for women and minorities to enter the broadcast business.

While the apparent goal of the legislation is to benefit women and minorities, the bill's language avoids the terms "women" and "minorities," and instead speaks of "economically or socially disadvantaged businesses." This circumlocution is likely intended to avoid the argument that the legislation constitutes improper "affirmative action" or "reverse discrimination."

The term "economically or socially disadvantaged business" is not defined in the bill; instead, the bill leaves that particular hot potato to the Secretary of the Treasury. The only indication of that term's intended meaning is the requirement that the "economically or socially disadvantaged class" be "underrepresented in the ownership of the relevant telecommunications business." Of course, the notion of "underrepresentation" is problematic because it can be argued that any effort to establish a level of supposedly adequate "representation" may be deemed a constitutionally impermissible "quota."

The bill does make clear that the businesses it seeks to benefit are not necessarily "small" businesses. For example, an entity could still be eligible if it owns television stations with an aggregate national audience reach of up to five percent. On the radio side, otherwise eligible entities could own as many as 50 radio stations nationally. McCain introduced similar bills in the past two Congresses and neither moved out of the Finance Committee.

## FCC filing system requires multiple IDs

You need a series of account numbers and passwords to navigate the FCC's electronic application filing system. First, you need an FCC registration number (FRN). To get an FRN, you need your taxpayer identification number (TIN). To obtain an FRN, go to "CORES" under "E-Filing" at the top of the first page of the FCC's Web site (www.fcc.gov).

Once you get an FRN, you will designate a password to be associated with that FRN. Without the password you cannot use the FRN. When it comes to the actual filing, you also will need to set up a CDBS (short for "consolidated database system") account with its own CDBS account number and a separate password, both of which you will need to have on hand when you try to file anything. To open a CDBS account, go to "CDBS Login," again under "E-filing"on the FCC Web site. BE

**For many years tax certificates were granted to those who sold broadcast stations to minorities, but, due to abuse, the program was eliminated by Congress.**

## Dateline

May 1 is the deadline for DTV construction by noncommercial TV stations. June 1 is the deadline for biennial ownership reports for stations in Arizona, Idaho, Maryland, Michigan, Nevada, New Mexico, Ohio, Utah, Virginia, Washington, D.C., West Virginia and Wyoming.

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

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# The future of Internet broadcasting

BY BARB ROEDER

The Internet has become a valuable means for retrieving information and accomplishing tasks once limited to the "normal business hours" of commercial industries such as banks and retail stores. Consumers enjoy the benefits of pulling content for their perusal at their convenience. Broadcasting, on the other hand, is a means of pushing content from one point of service to many viewers simultaneously. So how does Internet broadcasting combine the two so that a diverse audience can pull content that they want to see, whenever and wherever they want to view it?

Two modes are available today for Internet broadcasting: live event Webcasting and video-on-demand services. This article focuses on the delivery of streaming media, not downloadable content that is saved to a user's computer. Each model is applicable to different circumstances and utilizes somewhat different technological advances.

Live Webcasting is modeled after the traditional broadcast, whereby viewers log into an event simultaneously. Consumers benefit because they can see and hear corporate announcements, sporting events and concerts no matter where they are, and are not restricted by local channel broadcasts. Broadcasters benefit with a wider geographical reach, including niche markets, for more targeted advertising.

Live Webcasts, as well as traditional broadcasts, may also be offered as video-on-demand streams. These programs are captured and archived in one or more streaming media formats and placed on a streaming media server. Consumers can then access a Web page that links to the media, allowing them to watch an event, the news or a television show at their convenience.

But why bother streaming television programs if higher quality can just as conveniently be recorded and time-shifted with conventional consumer electronic devices or new digital video recorders? Here are reasons to consider Internet broadcasting as a viable business:

1. The VOD model capitalizes on the "anytime, anywhere" habits of the Internet consumer.

2. Advanced codec technology and the growing availability of broadband connections to the home translate into streaming media quality that approaches or exceeds VHS.

3. According to a recent study conducted by Arbitron and Edison Media Research, users spend more time online with higher connection speeds, and less time with traditional media.

**Technology advances will give Internet broadcasters the tools and resources to create and deliver more interactive content to their audience.**

With new models for advertising and new technology to deliver rich media to broadband users, the broadcasting world can keep the doors open to these consumers. For instance, content that engages the user and activates their clicking fingers will draw them in and keep them coming back. Advertising may be made more subtle, but just as effective, by embedding product endorsements and URL links into the content.

Technology developments now underway will help fuel the growth of Internet broadcasting. In terms of production, companies such as Anystream, Thomson Grass Valley and Pinnacle have developed systems capable

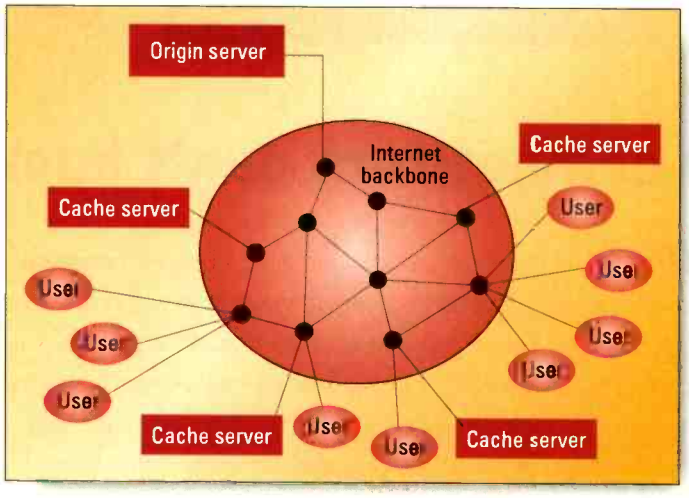


**Figure 1. The edge network of a content delivery network caches or replicates media for more efficient delivery to multiple users. When one server gets overloaded, the client requests can be moved to another server on the network.**

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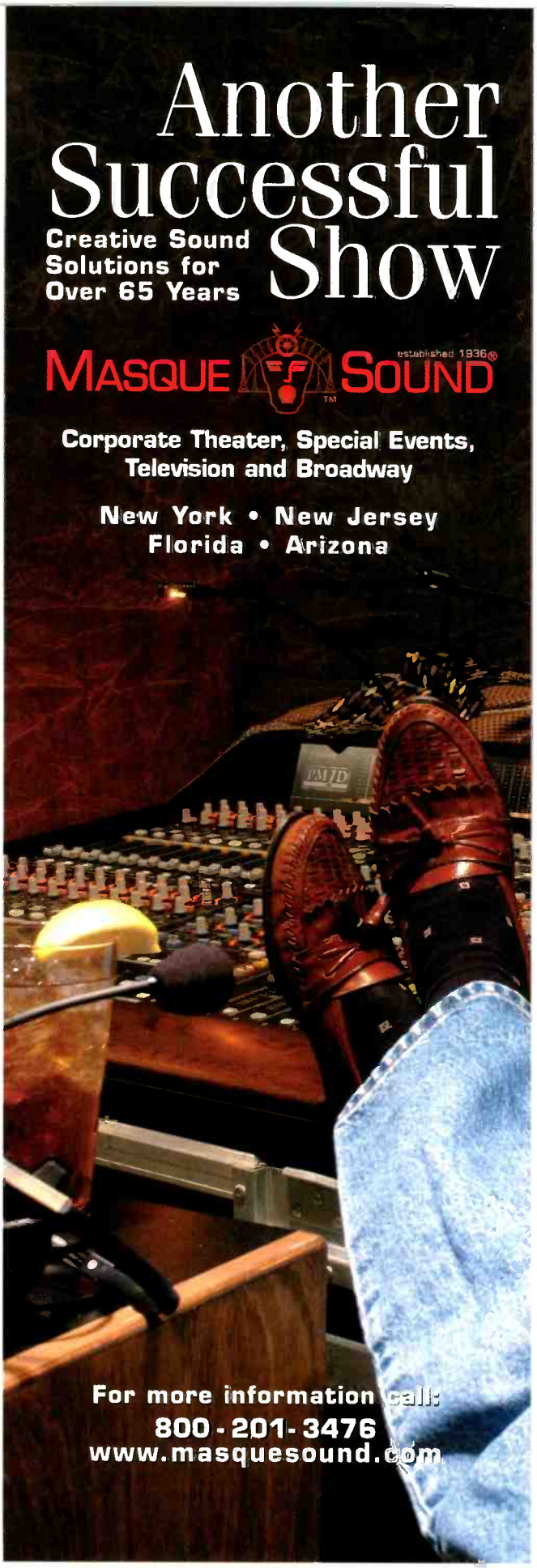
of ingesting audio and video content and making it available in multiple Web formats and at multiple bit rates to accommodate different user connections. These systems help automate the process of repurposing regular television broadcasts for the Internet audience. Future developments will also need to incorporate embedded advertising, URLs and product endorsements that can dynamically target a particular audience or even individual viewers.

Reliable content delivery networks (CDN) have also built out the infrastructure to deliver quality of service (QoS) streams to Internet audiences. They have developed edge server network topologies and advanced network monitoring capabilities so that streams are delivered without buffering or interruptions. Figure 1 illustrates this edge-serving technology, which balances the load of delivering streams across many servers located closer to the point of delivery.

Content producers still need to pay for point-to-point usage of their streams, but bandwidth charges today are half of what they were last year, a trend that will continue as market demands increase. In addition, Internet broadcasting can take advantage of the content management services offered by some CDNs. In this manner, advertisers can tell who's watching what, and even how they are interacting with the streams, in a much more direct way than traditional broadcasting allows. Niche markets and targeted advertising to diverse locations and audiences can actually have a higher ROI if the tools are in place to take advantage of them.

Technology advances will give Internet broadcasters the tools and resources to create and deliver more interactive content to their audience. In the coming year, the development of MPEG-4 applications will offer a broader base of tools for the interactive media production environment. Delivery platforms and devices will continue to expand the market for "anytime, anywhere" consumers retrieving content over many different connections. With the continuing broadband buildout, and new devices and standards on the horizon, perhaps we will finally see true digital convergence in Internet broadcasting. BE

*Barb Roeder is president of Barb Wired LLC, a technology consultancy specializing in the formatting and delivery of digital media. She can be reached through her Web site at www.barb-wired.net.*



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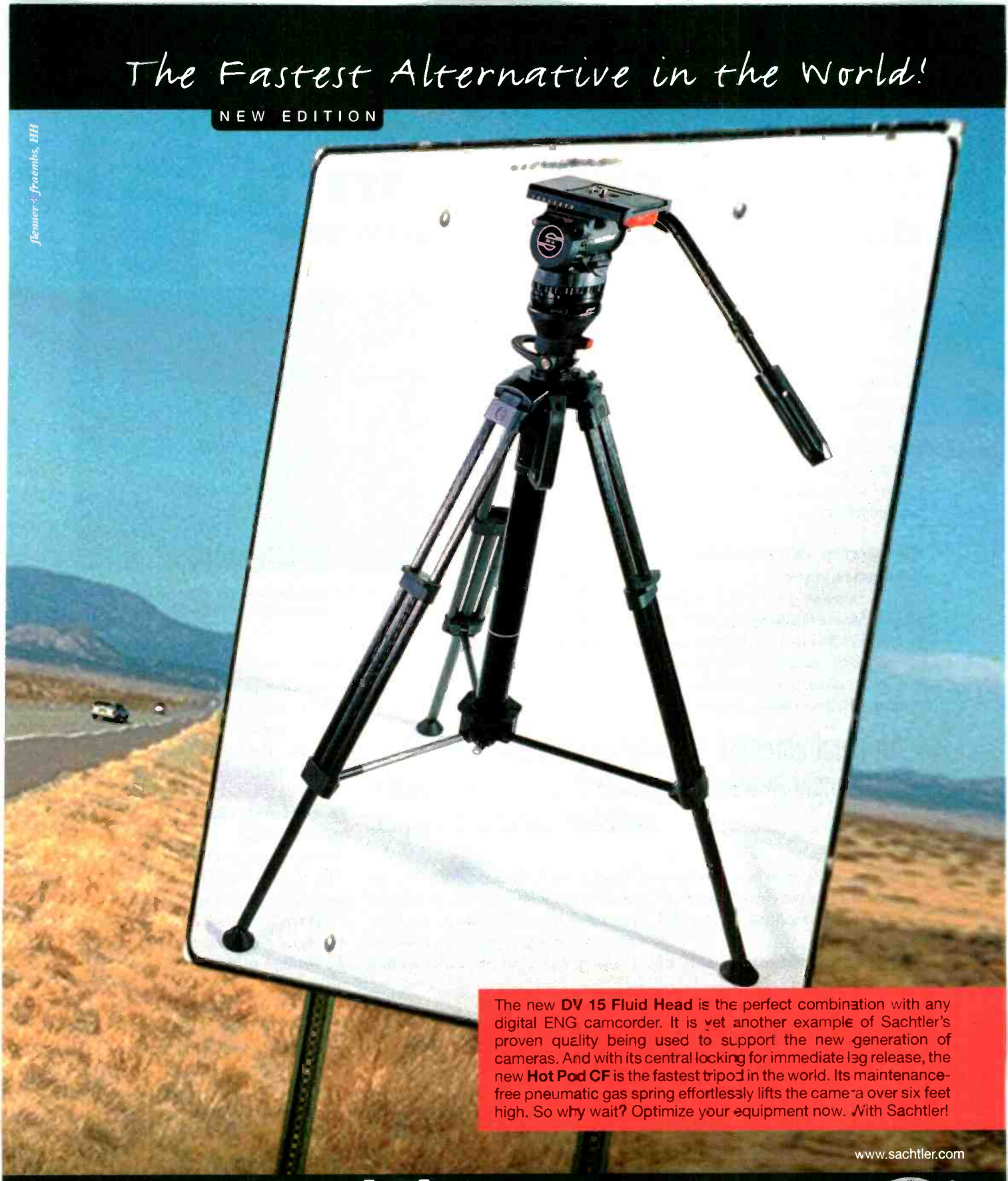

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# Monitoring in a digital video environment

BY MICHAEL ROBIN

For a long time to come, analog component and composite video signal sources and equipment will coexist with fully digital equipment and a digital bit-serial distribution complex. In this environment video monitoring has two aspects: monitoring of the bit-serial transport layer and monitoring of the video information carried by the transport layer.

## Monitoring the bit-serial transport layer

As discussed in our December 2002 article, "Measuring digital systems performance," the bit-serial digital signal present at the output of the "generator" (e.g. camera, production switcher, routing switcher, character generator, VTR, etc.) needs to meet several basic performance requirements with regards to launch amplitude, rise and fall times, and jitter.

Waveform monitors capable of carrying out such tests are readily available but are engineering and maintenance tools rather than operators' signal monitoring tools. Such tests are therefore carried out when accepting equipment or a complete system.

Monitoring the bit-serial digital signal beyond the originating point, at the input of the receiver (digital DA, production switcher, etc.) following a long coaxial cable, is misleading. The digital signal may be buried in noise but, if properly equalized and reclocked, will provide an excellent reconstruction of the original signal. It would be beneficial to be able to measure the bit-error rate at every input using the EDH concept. An ideal situation for large installations would be to incorporate EDH processors at every routing switcher input and output. This would allow the integrity of all input and output signals to be checked, and the results reported to a central diagnostic computer. But EDH is not universally implemented.

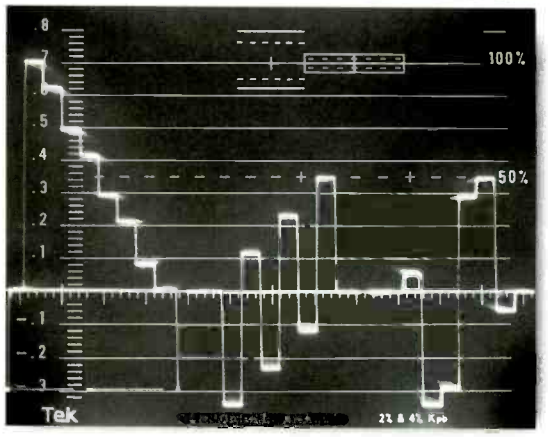


**Figure 1. This sequential display shows a 100/0/100/0 color bars signal in the $E'_Y$, $E'_{B-Y}$, $E'_{R-Y}$ format.**

**An ideal situation for large installations would be to incorporate EDH processors at every routing switcher input and output.**

## Monitoring video information

In a component digital environment, if the original component analog signal meets the relevant quality requirements, it will not be degraded after converting to a digital representation. This leads to the concept of source accountability, which means that the signal-generating equipment (e.g. CCU, CG, VTR and production switcher) operators need to verify that the analog information carried by the bit-serial "carrier" meets the requirements. The requirements fall under two distinct categories:

**Legal signals:** A set of component analog video signals is considered legal if each component signal is contained within the specified range of the format (e.g. 0mV to 700mV for $E'_Y$, $E'_G$, $E'_B$ and $E'_R$ or ±350mV for $E'_{B-Y}$ and $E'_{R-Y}$). Even if the signal is within the specified voltage range of one format,

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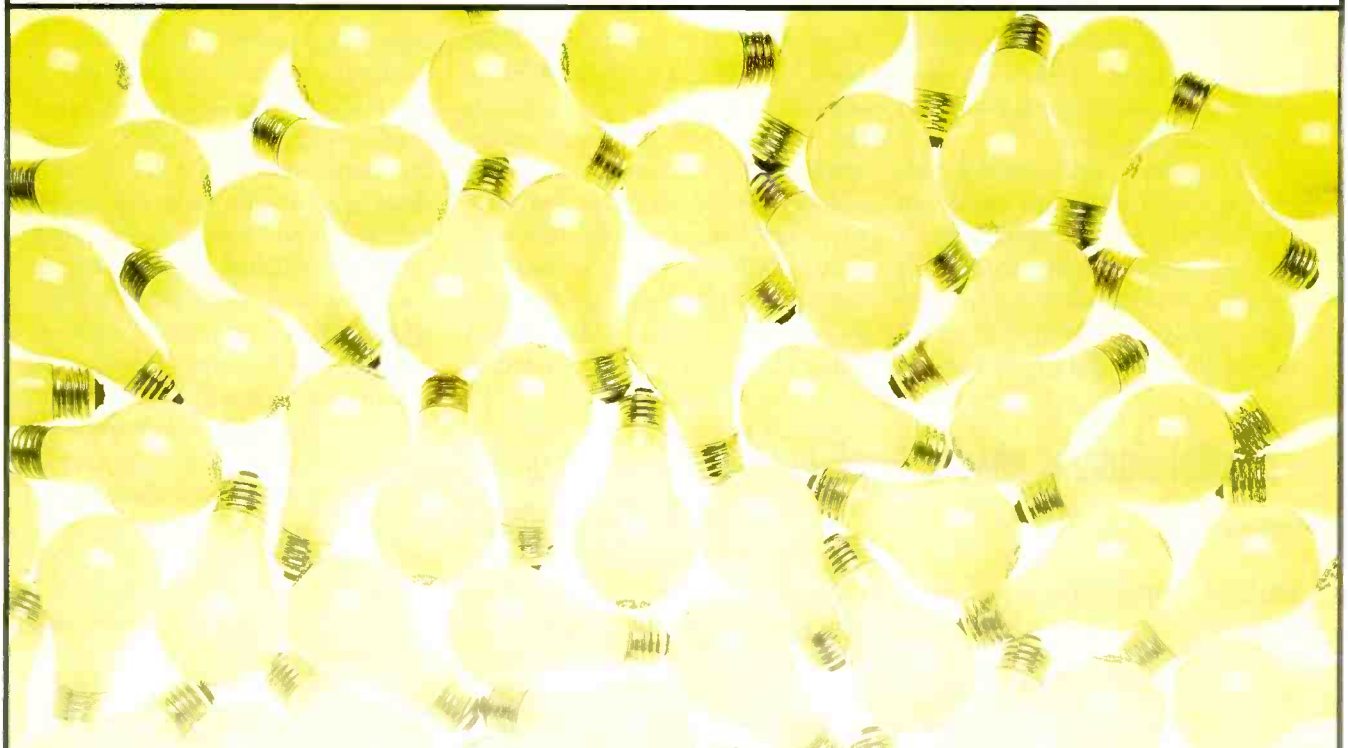
**Digital households* worldwide expected to more than double by 2008**

| Worldwide digital TV households | | | | | | |
|---|---|---|---|---|---|---|
| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
| Number of households (Millions) | 121.5 | 153.3 | 190.4 | 232.6 | 279.8 | 328.1 |

*Source: Strategy Analytics* www.strategyanalytics.com
**Note: includes all digital TV platforms - terrestrial, satellite, cable, DSL and other.*

# Functionality Beyond the Conventional



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it can exceed the limits when translated to another format. Component signal distribution channel gain errors will result in illegal signals.

Valid signals: A video signal is considered valid if it remains legal when translated into any other format. If properly generated, processed and distributed to compatible equipment, these signals reach but do not exceed the set limits. A valid signal is always legal, but a legal signal is not necessarily valid.

**A valid signal is always legal, but a legal signal is not necessarily valid.**

For example, a legal set of $E'_G$, $E'_B$ and $E'_R$ signals can be encoded into an NTSC 100/7.5/100/7.5 color bars signal. This signal is perfectly legal but creates problems with NTSC analog transmitters. This is due to a major flaw of the NTSC system. When the NTSC color standard was developed in 1952-53, the transmission concept of analog terrestrial transmission was already well-entrenched. The basic characteristics were negative modulation with sync (-40 IRE) at 100 percent of carrier modulation, blanking (0 IRE) at 75 percent of carrier modulation, and white (100 IRE) at 12.5 percent of carrier modulation. This allowed for 12.5 percent headroom before carrier cancellation (at 120 IRE video signal amplitude), which was perfectly acceptable. Color television consisted of the addition of chrominance information transmitted as sidebands of two suppressed color subcarriers in quadrature phase. Even with reduced (by scaling) color difference signal amplitudes, a 100/7.5/100/7.5 color bars signal would result in a 131 IRE video signal amplitude for full-amplitude yellow and cyan bars, and video carrier cancellation accompanied by intercarrier buzz. The fathers of NTSC color television determined high-intensity yellow and cyan colors are not encountered in real life, so video carrier cancellation is unlikely to occur unless the camera is misadjusted. To avoid video carrier cancellations, the color bars signal to be used with video transmitters is 100/7.5/75/7.5. So 100/7.5/100/7.5 color bars are illegal.

Illegal signals were relatively rare until the appearance of digital character generators that could generate synthetic full-amplitude yellow and cyan colors, leading to transmitter overload and audio intercarrier buzz.

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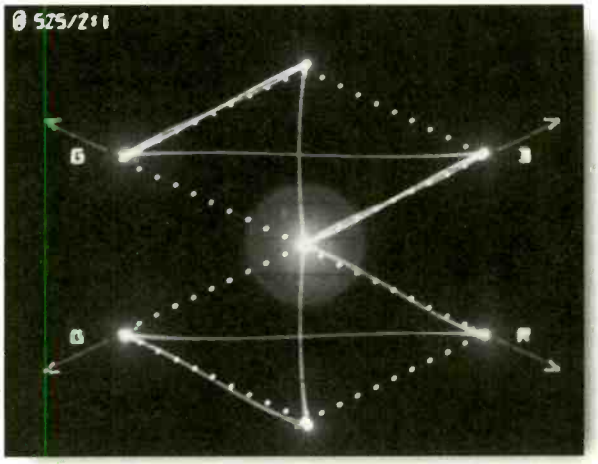

**Figure 2. In a diamond display of a legal 100/0/100/0 color bars signal, the vectors are contained within two diamond-shaped electronic graticule patterns.**

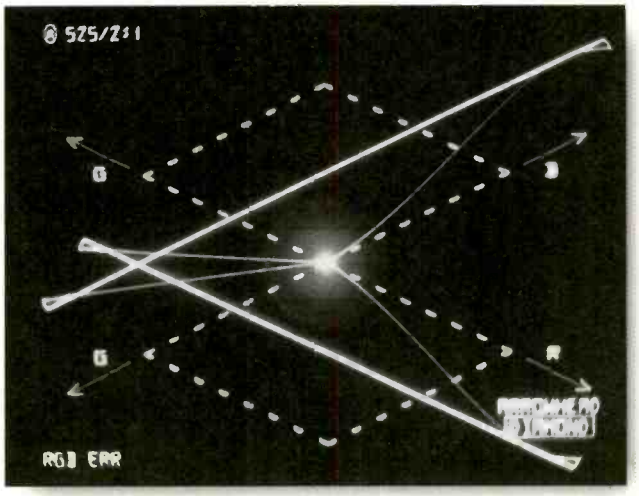

**Figure 3. The vectors of an illegal signal exceed the boundaries of the diamonds on a diamond display.**

Contemporary illegal signal problems occur when component digital signals (Y, $C_B$, $C_R$) are converted into G, B, R or analog composite NTSC or PAL. When operating in a composite analog environment, the use of NTSC or PAL waveform monitors can warn the operator that an illegal signal was generated. In a digital component environment, this is not possible unless the signal is converted into NTSC or PAL and an analog waveform monitor is available, which may not be the case.

## Proprietary monitoring solutions

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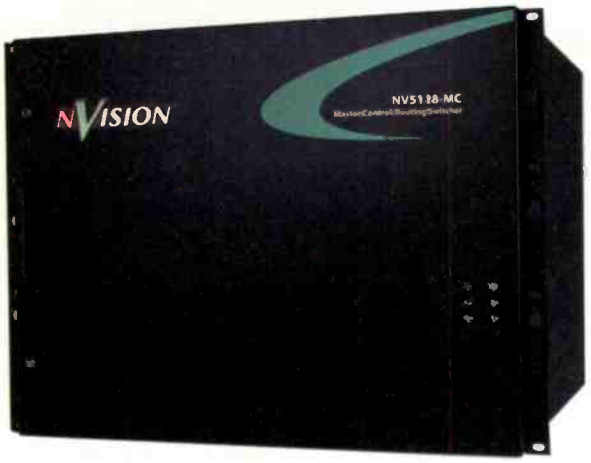


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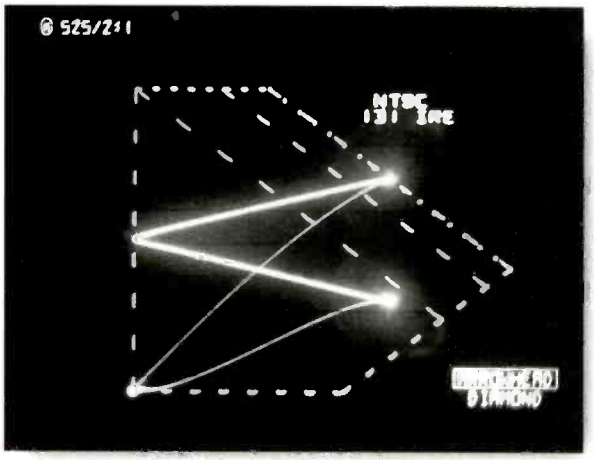


**Figure 4. The signal in this arrowhead display has an excessive yellow chrominance level reaching 131 IRE.**

(WFM 601) that tell the user if the signal is legal or illegal. Two specific displays are available. The *diamond display* is a component vector display designed for the GBR format. Valid GBR signals generate vectors that are contained within the two diamond-shaped electronic graticule patterns. B-G errors affect the top diamond display and R-G errors affect the bottom diamond display. Figure 1 shows a sequential display of a legal 100/0/100/0 $E'_Y$, $E'_{B-Y}$, $E'_{R-Y}$ analog component color bars signal. This signal is legal when converted to $E'_G$, $E'_B$, $E'_R$ format, and the vectors in Figure 2 are contained inside the two diamond boundaries. Figure 3 shows a situation when the signals are not legal and the vectors exceed the diamond boundaries.

The *arrowhead display* plots the luminance on the vertical axis and the chrominance on the horizontal axis. In Figure 4 there are three sloping lines. The outer line delimits 131 IRE, the one to its left delimits 120 IRE and the innermost line delimits 100 IRE. In this display we have a vector touching the 131 IRE line, generated by yellow letters from a character generator, and a vector barely missing the 100 IRE line, generated by blue letters. This display indicates transmitter overload and intercarrier buzz due to the illegal signal coming from the character generator. BE

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

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# Storage area networking

BY BRAD GILMER

Storage area networking or SAN is a server technology that allows the user to separate storage from processing and I/O. SAN frequently connects hard disks, tape drives and other peripherals to a host server. It also allows users to connect more than one server to the same storage peripheral. SAN software can provide elaborate monitoring, backup and load-balancing functions.

One can also use SAN to create a pool of virtual storage that a server treats as if it were local. SAN can comprise local storage on a number of machines, centralized storage or a combination of both.

Unlike a traditional network, a SAN does not involve file transfer; nor does it involve connecting to a remote drive on a server. Instead, a SCSI channel is mapped across the network to the remote device, making the device think that the storage peripheral is directly attached to the server. For this reason, the server treats the storage just as if it were hard-wired to the peripheral interface. A SAN typically operates separately from a local-area network (LAN) so storage-related functions do not slow LAN traffic.

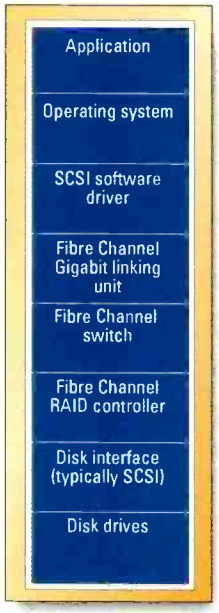


**Figure 1. A SAN separates computing and I/O functions from the storage itself.**

## SAN basics

A SAN consists of three basic components: an interface, interconnects and a protocol. The interface can be the small-computer-systems interface (SCSI), the enterprise system connection (ESCON) or Fibre Channel. The interconnects can be switches, gateways, routers or hubs. The protocol, like IP or SCSI, controls traffic over the access paths that connect the nodes. These three components plus the attached storage devices and servers form the storage-area network. While the SAN supports a number of interfaces, Fibre Channel – both Fibre Channel Arbitrated Loop (FC-AL) and Fibre Channel fabrics – dominates SAN implementations due to its flexibility, high throughput (up to 2Gb/s) and inherent fault-tolerant paths.

One way to think of a SAN is as a high-performance network on the "other side" of a server (see Figure 1). Many networks provide connectivity between a server and remote workstations. A SAN provides connectivity between servers and storage. The purpose of a SAN is to separate computing and I/O functions from the storage itself. Once the storage is separate from the processor, multiple processors or servers can access a pool of common storage, and additional disk storage can be added without having to add processors.

A large SAN system allows many workstations using multiple processors to have access to the same data at (almost) the same time. This lets users improve workflow and efficiency. In a news environment, multiple editors can access the same raw footage to create different packages. In the broadcast playout application, the same content can play out of multiple servers to multiple channels.

**If SAN is so great, why doesn't everyone use it?**

## Layer by layer

Figure 2 shows a simplified SAN solution employing Fibre Channel. This example illustrates the layers involved in a typical video-server application.

Generally, the application is not aware of the SAN. The application makes storage requests of the operating system and the operating system handles the details. When an application makes a storage-related request, the operating system communicates with the RAID controller through a Fibre Channel-switched network, typically referred to as Fibre Channel fabric, using standard SCSI commands. The SCSI drivers shown in Figure 2 are the drivers responsible for generating SCSI software commands, not SCSI physical connections. This is an important distinction. SCSI commands are still sent across the network. However, using Fibre Channel-switched fabric eliminates the limitations of SCSI hardware.

The gigabit linking unit (GLU), Fibre Channel switch and Fibre Channel RAID controller comprise the SAN. The GLU is similar to a network interface card (NIC) in an Ethernet system. It provides the physical and

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electrical interface to the Fibre Channel fabric. Once the SCSI commands reach the RAID controller, the controller saves or retrieves the data from the storage system based upon the configuration of the controller itself. From this point on, communication between the controller and the physical drives is typically SCSI. Since the controller is usually co-located with the disk drives, SCSI limitations are generally not a problem.

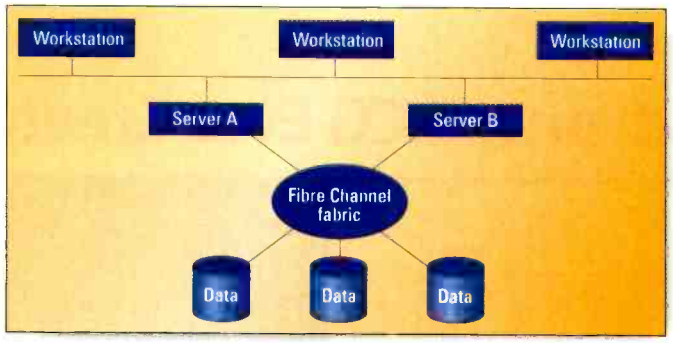


**Figure 2. This simplified SAN solution employing Fibre Channel illustrates the layers involved in a typical video-server application.**

As with any multi-user system accessing shared storage, conflicts can arise when two users request to write to the same record at the same time. Locking systems resolve these conflicts by allowing one user access to the data while temporarily locking access to the file for other users. These systems typically do not lock an entire file, but rather lock a particular record, row or byte of the disk data while it is being modified. Once the write operation is finished, the lock is removed.

In large SAN systems, redundancy becomes an issue since all of the material is stored in one large system. There are a number of strategies for dealing with the risk, but the most common approach is to provide two SCSI storage systems. This is relatively easy to implement since almost all Fibre Channel SCSI devices are dual port.

There is one important note about SAN hardware you should know. If you purchase a SAN solution, you might be surprised to learn that your installation does not use fiber-optic cable. The Fibre Channel specifications allow networks to be built with copper or fiber. Non-optical Fibre Channel (non-OFC) implementations are fully supported using coax as well.

While FC-AL remains popular for SAN, new technology is available that allows SAN traffic to travel over IP networks. This technology encapsulates the Fibre Channel into IP so that TCP/IP networks can carry the traffic. This solution may provide less performance than SAN over Fibre Channel, but it provides a solution for those with large TCP/IP deployments where some users need access to SAN peripherals but do not have ready access to Fibre Channel fabric.

## Design issues

SANs raise some interesting design issues. For example, a SAN allows a designer to specify that data be striped across multiple drives, or even multiple locations. If SAN data is not stored in a particular location and on a particular drive, how can it be adequately backed up? The answer is software. Some SAN solutions come with software that automatically creates two copies of any newly stored material. The system makes sure that the same data is not stored in the same location. Other SAN solutions stripe the data across multiple systems. If one server's local storage becomes unavailable, the SAN recreates the data using well-understood parity algorithms. But, be aware that some of these software solutions are vendor-specific, so you may not be able to get these features if you start mixing in different vendors' products.

Another issue in SAN design is bandwidth. SAN designers can ensure that the SAN does not fall over if all users on the SAN request data simultaneously in two simple ways. First, they can design the bandwidth of the SAN so that it has extra capacity. The extra capacity assures that the SAN keeps functioning even in times of extremely high demand. Some might argue that this is wasteful and drives up cost. The fact is that high-speed network hardware is falling in price, and is now such a small part of the total system price that this is no longer a consideration. Second, they can insist on careful control of connections to the SAN. If you grow a SAN in an unplanned way, peak-use conditions can exceed its overall bandwidth.

## Should you use one?

If SAN is so great, why doesn't everyone use it? First, interoperability issues still exist between vendors. Additionally, SAN may turn out to be more expensive when you are looking for a server system that has a low number of I/O channels, but lots of storage. Finally, SAN may not be the way to go if you are looking for a small system. Generally, stand-alone systems are less expensive.

So, where do SANs make the most sense? SANs are best used in larger systems where users want many I/O channels and want to access the same content. As storage prices fall, building one server with a huge amount of storage is not a problem. However, I/O still requires bandwidth inside the server. There are two common strategies for dealing with large I/O requirements. One is to build a large server with what amounts to a router inside it. The other is to connect a number of smaller I/O devices to a network. That is what SAN does. It allows you to break the connection between storage and I/O so that you can increase either of these as needed. BE

*Brad Gilmer is executive director of the AAF Association, executive director of the Video Services Forum, and president of Gilmer & Associates, a technology consulting company.*

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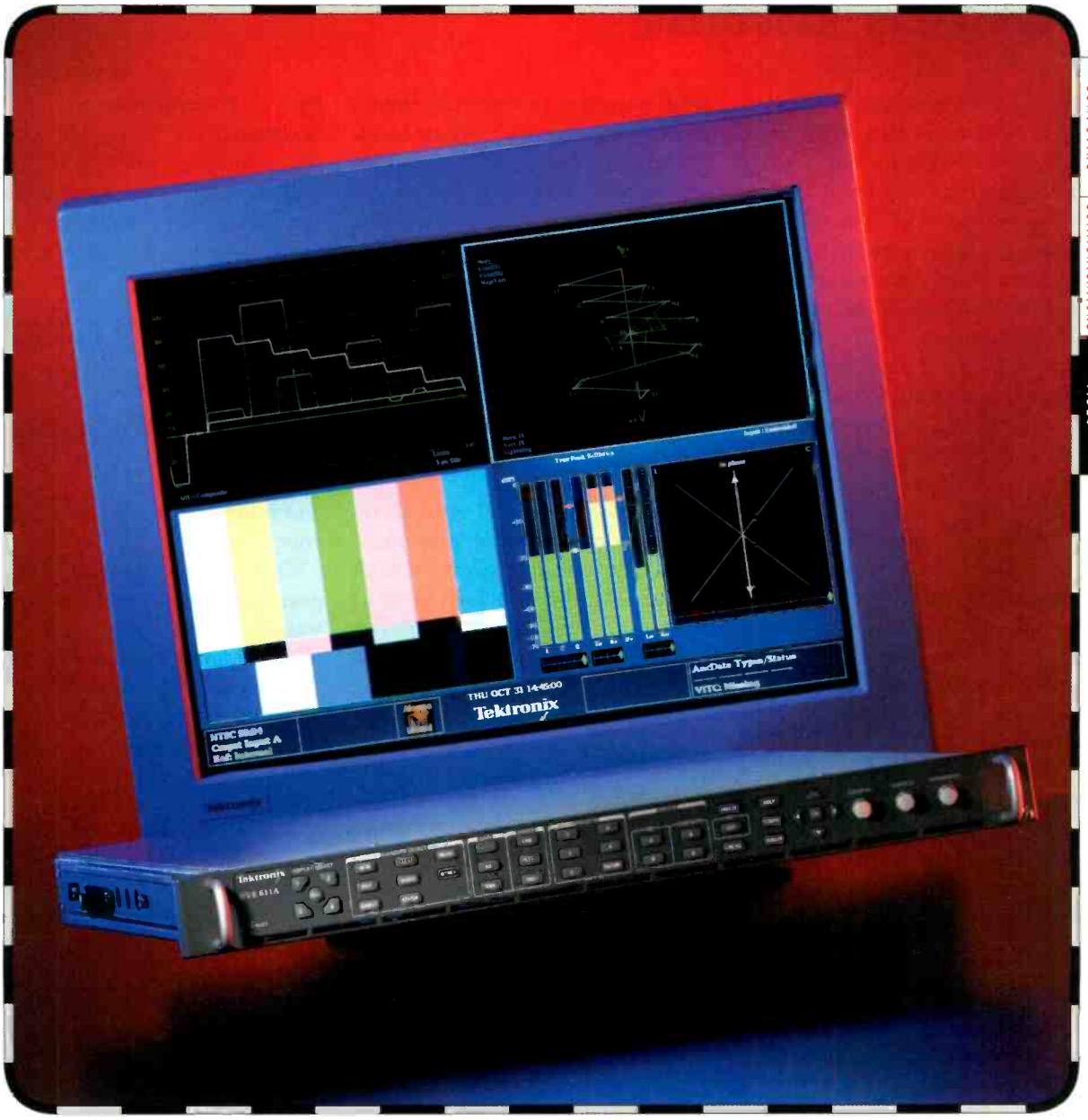


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# The shooter's double threat

BY BENNETT LILES

It's a jungle out there. Lurking everywhere are slick stair steps, sudden thunderstorms, baggage handlers having a bad day and cables snaking their way around light stands, just waiting to bring down your setup like a house of cards. But you don't have to tread into this wilderness unprotected.

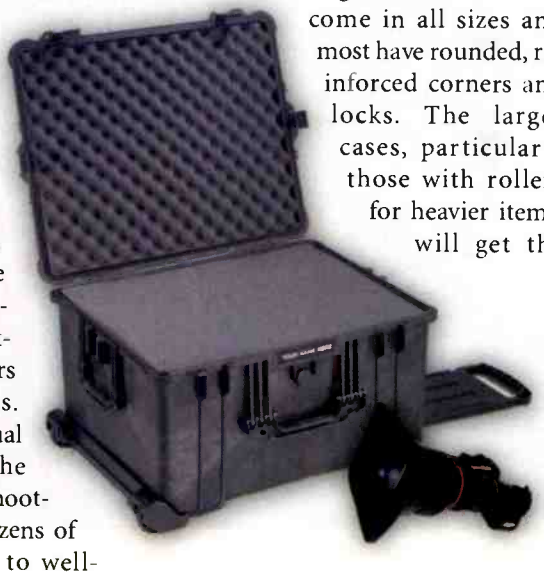
The two most common natural enemies of shooters and their gear are impacts and water. They will strike when you least expect it, so it's best to always be protected against this double threat.

While impacts do happen during camera- and sound-gear operation, particularly in ENG environments, the most frequent impact damage occurs during transport. The best protection involves forsaking makeshift solutions and getting tailor-made cases for each piece of equipment. Fortunately, there are road cases and rain gear available for a wide variety of makes and models of cameras, sound mixers, light stands, computers and rack-mount items. Most serve the same dual purpose of protecting the equipment and helping shooters keep track of the dozens of little widgets essential to well-equipped ENG/EFP crews.

Every professional video camera purchase should include a case with foam padding cut to precisely fit the camera shape. A problem here is that any accessories such as mounts, grips and other semi-permanent attachments can ruin the fit. The flexibility of dice foam can solve this problem. The foam is pre-cut into small squares so that you can remove one or more squares to create virtually any shape of padded cut-out inside the case. When you add new attachments to the camera or mixer, simply add or remove a few dice foam squares to maintain the snug fit required for maximum jolt protection.

The best protection involves forsaking makeshift solutions and getting tailor-made cases for each piece of equipment.

While the case interior must be soft and pliable, the exterior has to be tough. Aluminum cases come in all sizes and most have rounded, reinforced corners and locks. The larger cases, particularly those with rollers for heavier items, will get the worst banging around and scraping against other surfaces. This repeated action tends to knock off protruding fittings, so, with the larger cases, it is best to go with recessed handles, latches and jack dishes. High-level audio-monitoring equipment like that typically used on music video shoots can benefit from metallic speaker-grille covers to prevent tripod legs and other marauders from spearing your cones.



**The most versatile equipment cases have pre-cut dice foam squares that allow you to create virtually any shape of padded cut-out inside the case. Case photo courtesy of Pelican. Lens photo courtesy of Thales Angenieux.**

When you are toting your own gear, flexible canvas bags can save weight and time. Many of them also allow you to operate the equipment through the bag. This prevents water damage, dirty sound-mixing pots and scratched meter faces. You can fold nylon bags for tripods and light stands and store them in small spaces at the shoot. For shipping, when others will be doing the lugging for you, more rigid enclosures such as tripod tubes and molded cases are best. Look for equipment that conforms to the Air Transport Association specification 300, Category One standard for re-useable shipping containers.

Some EFP mixer cases allow you to operate them in a driving rainstorm. Each is made of rip-stop nylon, has a set of sleeves for the operator and bears a clear plastic window over the mixer controls. This type of cover should have a DWR (water-resistance) rating of at least 80 on a scale of 100. For cameras, storm coats are available with just the right openings for cables and attachments on specific camera models and perfect access to viewfinder and controls.

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### Getting organized

Another large challenge for field shooters is keeping up with the army of small gadgets they frequently need. Many of the canvas bags and carrying cases currently available include an array of pockets, elastic straps and Velcro patches for holding gaffer's tape, pens, tie wraps and other tools. One of the most popular carrier items is the video vest. This waterproof vest has compartments for every type of tool and accessory the field shooter needs, and it looks sporty, too.

Another useful nylon item is the Straddlebag for wireless-mic receivers. With this, you can sling any type of receiver across the brick bats on the rear of an EFP camera while keeping the antennas completely unobstructed.

**For outdoor events, it's always a good idea to have rain protection for the camera as well as for yourself. Photo courtesy of Jim Boston.**

For those situations where the shooter will want to share the same protected environment as the camera, there is the rain cape that has a flexible plastic bubble top with enough room so that the shooter and the shoulder-mounted camera can operate in what is essentially a walking tent.

**Some EFP mixer cases allow you to operate them in a driving rainstorm.**

Soundman ponchos provide the same environment and use a transparent front so you can see and operate the chest-worn mixer. Rounding out the shooter's wish list are fingerless gloves that provide protection and allow you to operate tiny controls.

The endless array of specially designed rain gear and cases gives today's ENG/EFP crews a formidable defense against the relentless challenges of impacts and water. BE

*Bennett Liles is a writer and TV production engineer in the Atlanta area.*

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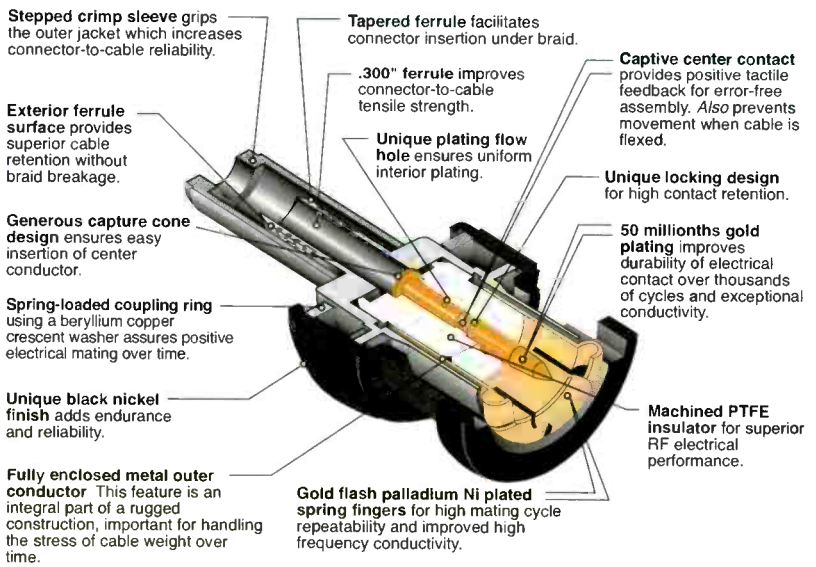


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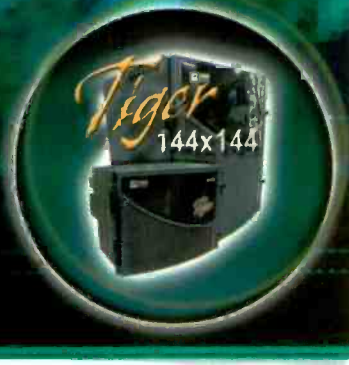

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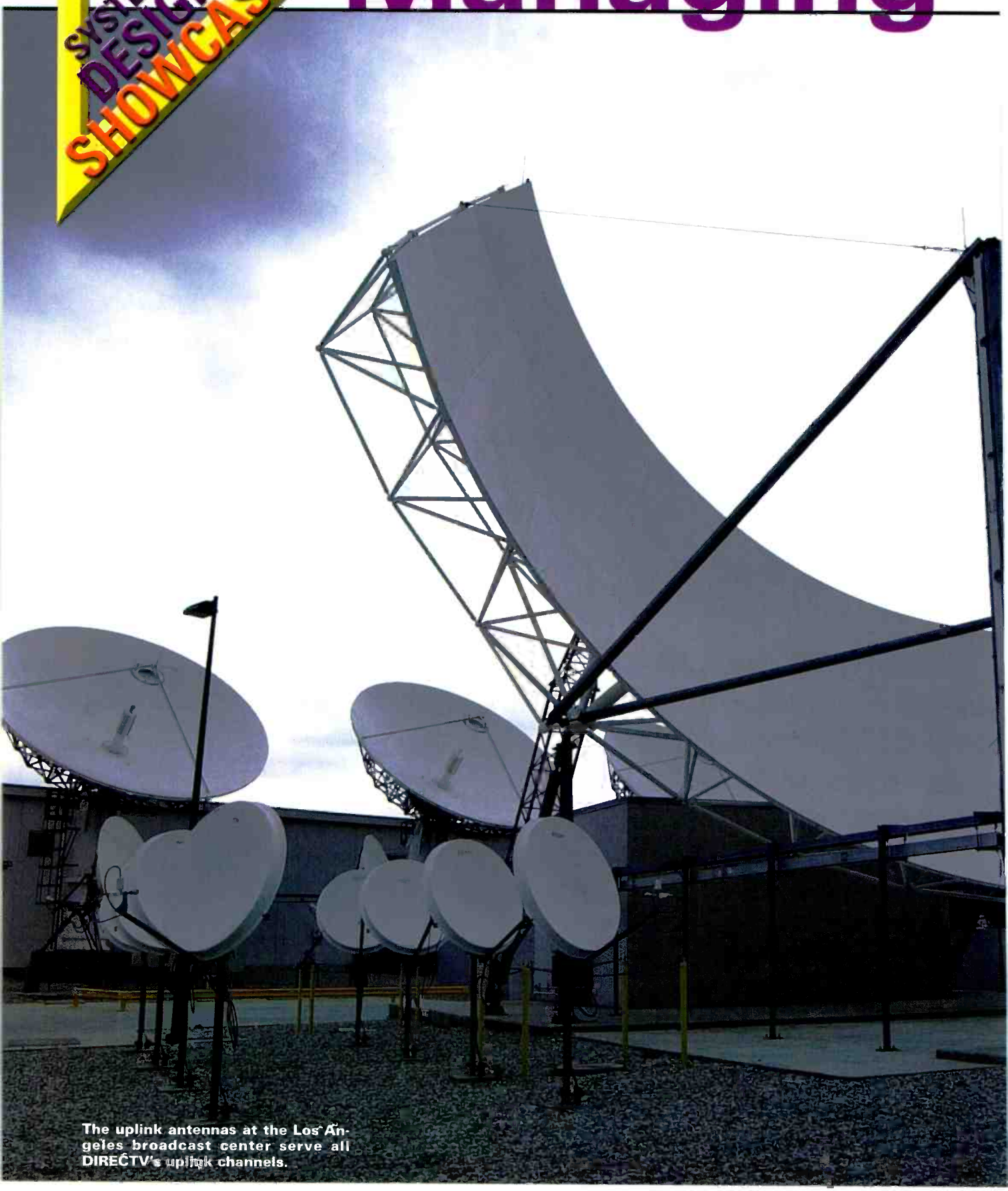
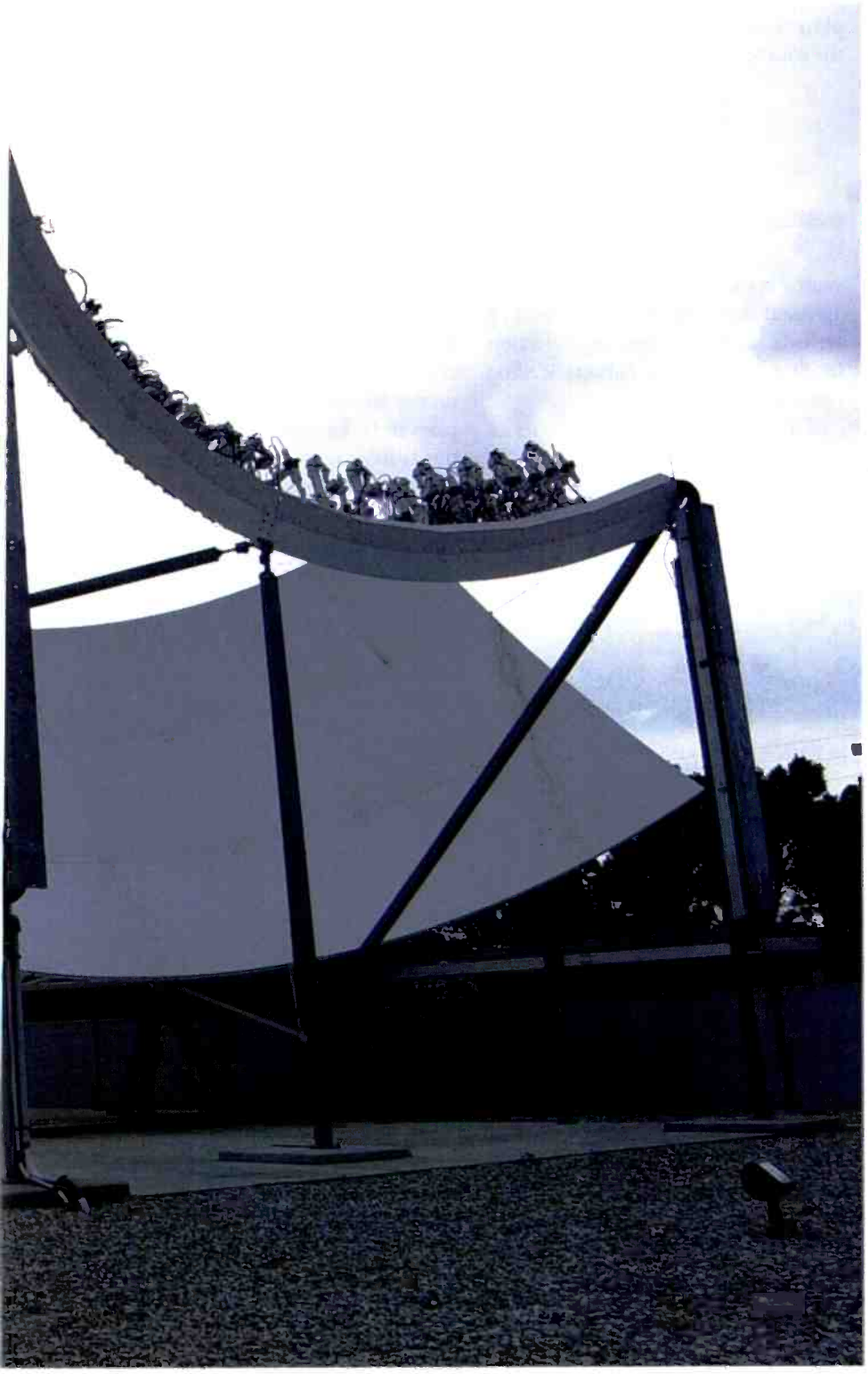


The uplink antennas at the Los Angeles broadcast center serve all DIRECTV's uplink channels.

# complexity and costs at DIRECTV

BY DAVID BAYLOR



DIRECTV, a U.S. digital satellite television service, began the new millennium with the significant challenge of collecting local channels from cities throughout the United States for rebroadcasting to its customer base without significantly increasing its operating costs or sacrificing broadcast quality.

More than 12.7 million subscribers in the United States and Latin America receive programming using 18-inch satellite dishes and set-top boxes from a variety of vendors including Mitsubishi, Panasonic, Philips, RCA, Sony, Toshiba and Zenith. Customers of the service get access to digital programming, including 225 channels, as well as up to 36 music channels and a wide variety of Spanish-language services. The widespread launch of local channels would allow direct broadcast satellite companies to give cable a run for its money, but only if they could ensure that it maintained the same picture quality, broadcast availability and general reliability as their existing programming.

The solution would require the assistance of the recently established commercial technology division of the BBC. BBC Technology's broadcast engineers and consultants crafted a solution for the satellite provider based on its broadcast network control solution, a suite of standards-based networking technologies and interface design tools used by the BBC itself.

## Expanding requirements

Digital satellite systems initially suffered in comparison to cable because of their lack of widespread local programming. All this changed in December of 1999 when Congress recognized

the need for local broadcast stations' coverage by Direct Broadcast Satellite services by passing the Satellite Home Viewer Improvement Act (SHVIA). The result of this legislation was the eventual rollout of local channel service to 52 television markets.

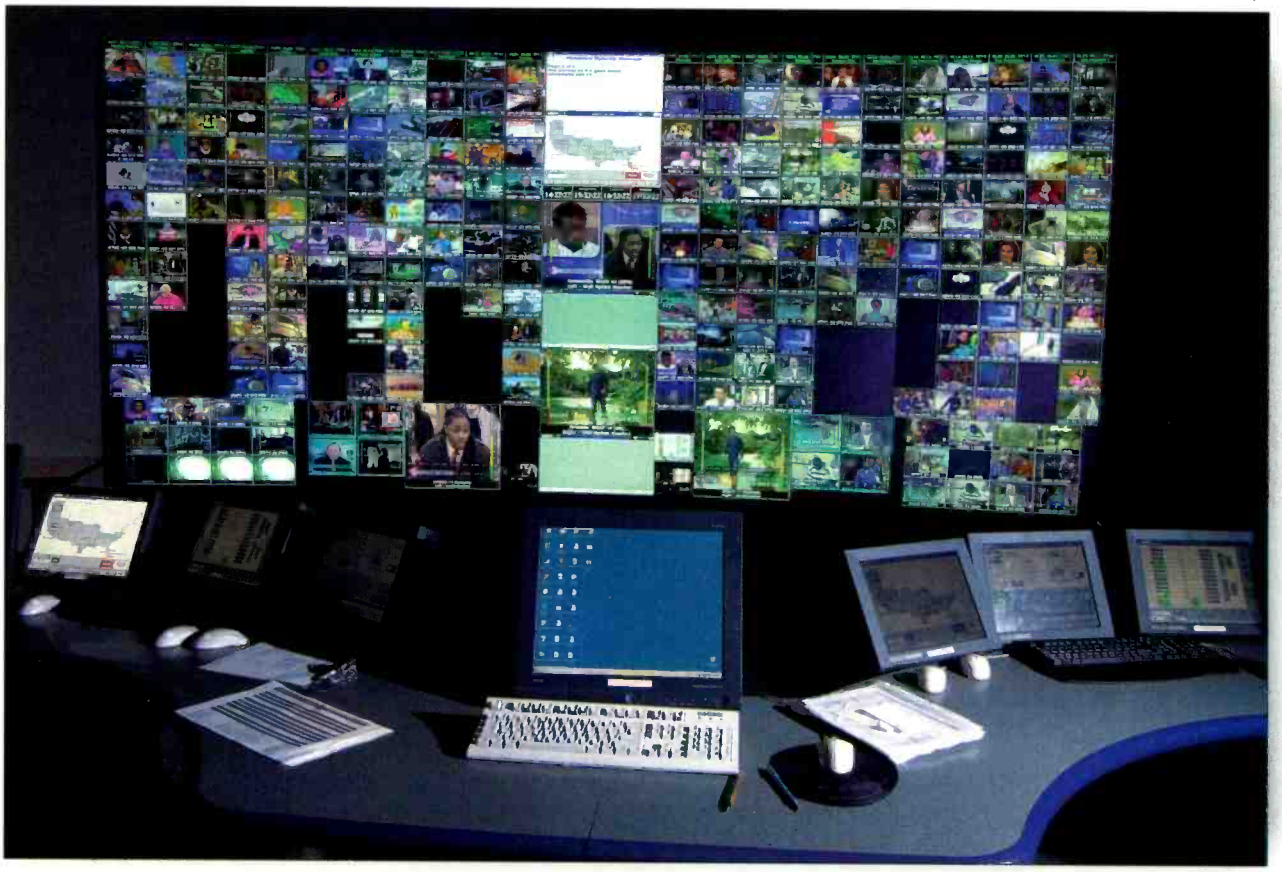
One of the most important steps in DIRECTV's plans for local channel distribution was the launch of a new Boeing 601HP satellite, the first spacecraft in the satellite provider's fleet to use highly focused spot beam technology. Spot beam technology allows satellite operators to re-use frequencies on a geographic basis by focusing the beams into small "spots," thus multiplying the services transmitted, allowing the same frequency to be used multiple times across the country. Apart from a more efficient use of frequencies, spot beams are also used to concentrate the satellite signals to areas where higher traffic is expected to be generated. This new satellite provided DIRECTV with the capacity to deliver more than 300 additional local channels to its 41 local channel markets and meet the "must-carry" requirements of SHVIA.

Having the capacity to broadcast local programming was only the first step, however. The satellite provider also had to have an infrastructure in place to capture local programming at the source and transfer it back to their central broadcast facilities. Thus, management made the decision to build a series of local programming collection facilities in 41 of the nation's leading television markets.

Each of these facilities consists of antennas, local loop connections to TV stations, and other equipment that captures and encodes local broadcast signals. The programs are then transported via terrestrial fiber (a process called backhauling) to one of the company's two central facilities in Castle Rock, CO, and Los Angeles. Once there, the signal is transcoded into proper broadcast format and uplinked for distribution.

In order for this system to be cost-effectively deployed, the facilities needed to be unmanned. It would cost a great deal of money to maintain permanent staff at more than 40 regional centers. However, it also costs a lot of money to send crews out to make repairs and adjustments. So even though the system would be unmanned, it needed to maintain the utmost standards of serviceability and reliability.

**Digital satellite systems initially suffered in comparison to cable because of their lack of widespread local programming.**



**The broadcast operations center in Los Angeles (shown above) has control over more than 100 local channels. An additional 100 channels or more are controlled at the broadcast operations center in Castle Rock, CO.**

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To make this system work in a reliable and cost-effective manner, a monitoring and control system was needed that would enable the company to carry out quality control checks at their distant sites – without taking staff away from their normal tasks.

**Peter Vellos, operation supervisor at the broadcast operations center in Los Angeles, benefits from the Broadcast Network Control solution, which allows single-operator control and monitoring of equipment.**

## Remote management and control

When evaluating the possible solutions for this complicated control requirement, DIRECTV researched BBC Technology's software-based broadcast network control solution. The fact that its software runs on standard PC hardware and operating systems meant that it would be both cost-effective and simple to install. So DIRECTV approached BBC Technology for a custom-designed version for their unique requirements.

The phrase "control system" is a loose term that can be applied to many things, from a simple feedback loop to an extremely complex group of interrelated subsystems. In the broadcast domain, the most complicated architectures are found in studios, control rooms and central technical areas. They must communicate with all the controlled elements via whatever physical connection is offered and present timely and relevant information to the users regarding status, progress and available options. They must arbitrate between concurrent users sharing resources, assist cooperative working and deliver fully automatic, semi-automatic and manual control in the way that different users require at different times.

**To extend its reach, DIRECTV needed to be able to capture local programming at the source and transfer it back to its central broadcast facilities. Local programming collection facilities in 41 markets can be monitored and controlled from the company's main broadcast centers.**

The BBC broadcasts many national and regional television and radio channels. As such, it has many large-scale and diverse control requirements, so it set out to create a system that would meet its needs. For the past seven years, most of the BBC's audio and video transfers and contributions, as well as much of its broadcast plant, have been controlled by the broadcast network control solution.

The solution runs on standard PC hardware. User-friendly, touch-screen technology provides the interface to the system and allows single-operator control and monitoring of many pieces of equipment at multiple locations – including remote and unstaffed areas. This greatly reduces the amount of equipment – and therefore space – required to support multiple channels and broadcast streams.

The solution has the ability to control multiple systems/devices from a single workstation including cameras, codecs, integrated receivers/decoders, ISDN terminal adapters, routers, satellite receivers, upconverters, video disks, video mixers, VTRs and much more. In fact, it supports the full combination of hardware from any manufacturer used in the broadcast communication chain.

**The phrase "control system" is a loose term that can be applied to many things, from a simple feedback loop to an extremely complex group of interrelated subsystems.**

It integrates otherwise incompatible devices into a single, coherent control system using a simple WAN or Intranet connection to control multiple systems at different sites. It can provide a status display of every device at every remote facility, providing useful information

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SYSTEMS DESIGN SHOWCASE

such as status of a video feed or Web page. Status display screens also provide systemwide fault logging and alarms management from a single, intuitive display.

To help assess how the software could be customized to meet the satellite provider's specific needs, BBC Technology installed simulator systems at the main broadcasting centers. At each site the simulator system consisted of two PCs with monitors and one touch-screen control panel – all running the control software and linked to the existing computer network.

Throughout the trials, BBC Technology's engineers worked closely with the facility's engineering staff to develop a system that matched the broadcaster's existing infrastructure and working practices. Once satisfied that the system could do what had been promised, an advanced control environment was installed across five different U.S. cities where local programs are collected, as well as at the company's two main broadcasting centers. As a readily expandable control platform, the solution could then easily be rolled out to the other centers in the network – as indeed it was.

**Having contributed to the successful launch of 220 additional satellite channels for the U.S. market, the BBC Broadcast Network Control solution provides monitoring of almost 400 channels.**

**The BBC Broadcast Network Control solution today provides remote monitoring of almost 400 channels, allowing program outages to be easily identified and rectified.**

The control solution has now been installed in remote facilities across 41 cities on the network, and the customized software allows staff at its main broadcasting centers to monitor and control the entire operation. In total, DIRECTV can now control up to 50 devices per local collection facility (LCS) and approximately 600 devices at each of the two broadcast centers – for a total of almost 3000 devices including routers, demodulators, integrated receiver decoders, DVB decoders, EPI crates and more.

### Clear results

Because channel collection facilities are physically scattered throughout the United States, the control technology from BBC Technology has enabled DIRECTV to provide the high-quality service efficiently.

Having contributed to the successful launch of 220 additional satellite channels for the U.S. market, the BBC Technology broadcast network control solution today provides remote monitoring of almost 400 channels, from the point of acquisition to uplink, and finally, the integrity of the downlink. This allows program outages to be easily identified and rectified without staff needing to visit the sites directly.

The touch-screen panels have provided the operators with an intuitive user interface, and since this was developed to closely match existing operational processes, the solution has also minimized the company's need for expensive user training.

### Next steps

Once the system had been up and running for a number of months, DIRECTV placed another order with BBC Technology to expand the system across 10 additional U.S. cities during 2002.

Plans for local programming continues to expand. The company currently offers local broadcast channels in 52 markets. With the successful launch of a new Space Systems/Loral (SS/L) 1300 spot beam satellite in the fourth quarter, and using advanced digital compression technology, DIRECTV will provide local broadcast channel service in approximately 100 markets by year-end, representing roughly 84 percent of U.S. television households. BE

*David Baylor is the executive vice president of DIRECTV.*

## Design team

BBC Technology:
Julian Williams, pre-sales and product marketing
Shannon Kim, VP, sales
Peter Watson, lead architect
DIRECTV:
Gary Loo, sr. mgr., engineering
Rick Purpura and Frank Hironaka, sr. directors
Mitchell Linden, sr. VP, North American Operations

## Equipment list

Boeing 601HP satellite
Space Systems/Loral (SS/L) 1300 spot beam technology
Barco large screen display wall
BBC Technology solution for broadcast network control

grass valley

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# KPSP's new Palm Springs facility

By Dwight Crumb

The master control room is separated into an ingest area and an air feed section. From the latter, KPSP continually feeds either a true HD feed from CBS or its own upconverted programming.

For the first time in 35 years, the Palm Springs market has become home to a new television station. KPSP-TV, locally owned by Desert Television, is the first CBS affiliate local to the market. The new, multi-million-dollar facility successfully integrates standard- and high-definition capabilities and a wide array of new broadcast and production equipment. The station is also a multichannel environment set up to handle four standard-definition streams. Digital System Technology (DST), a systems integration firm based in Irwindale, CA, provided a full range of integration services.

The station owners also hired Weyercliff Century, a consulting and engineering firm based in Cathedral City, CA, just before contracting with DST, to help with the equipment-selection process.

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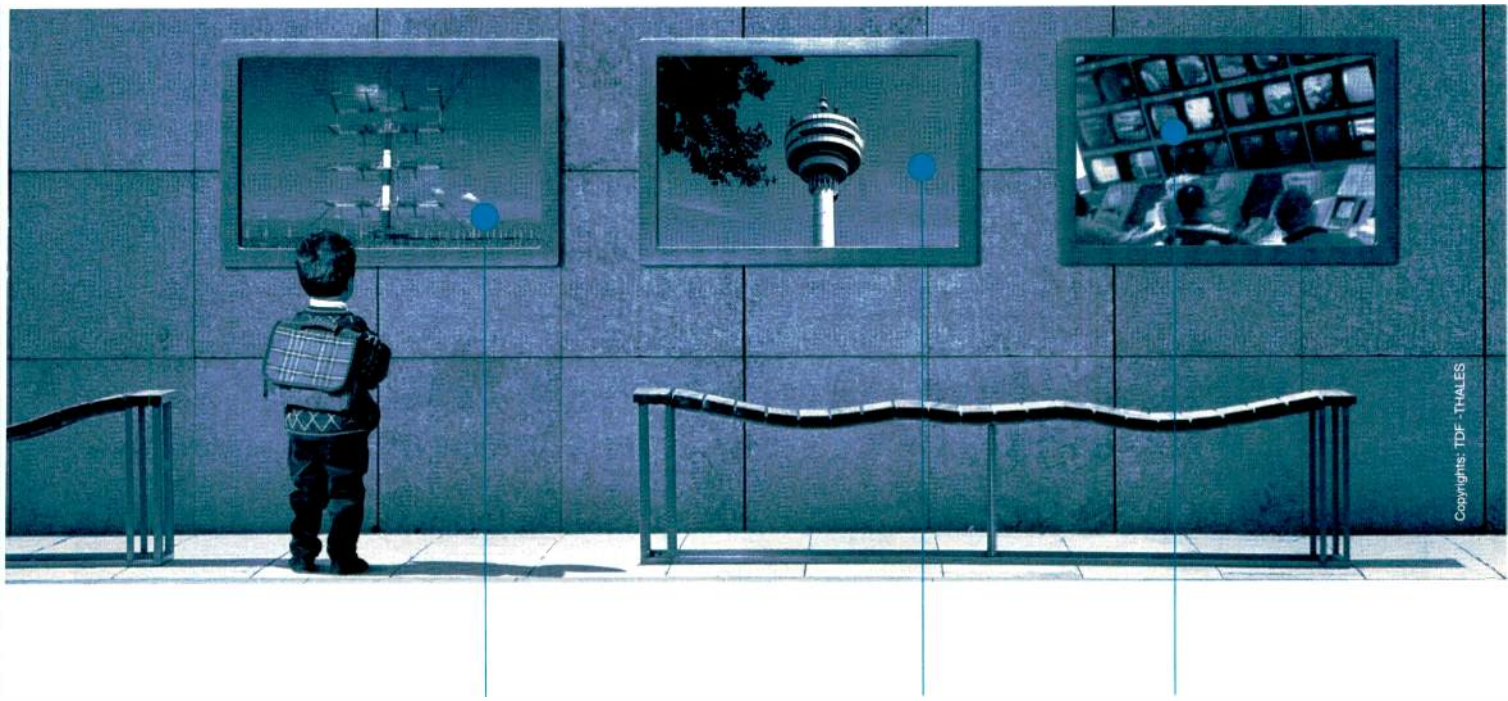


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SYSTEMS DESIGN SHOWCASE

### Master control

Much of the equipment within the station is HD-ready but operating at standard definition. The master control room features about 20 racks of equipment and is divided into two segments: an ingest area and an air-feed section.

The air-feed portion features Sundance automation for equipment control, with twin Thomson Grass Valley Profile 1100 series servers for play-to-air. This is set up as a storage area network (SAN) so everything on the main server is backed up thoroughly. The automation system enlists a list-sync feature, which rolls both the main and backup simultaneously. If one unit fails, the push of a button switches to the second.

A Thomson Grass Valley M2100 switcher serves as the main master control switcher and is controlled through the automation system. A manually operated Leitch 16x1 switcher serves as backup to the M2100 in case of failure. Zandar multi-viewers are fed into 50-inch Panasonic plasma display, which allows them to dynamically change the control room monitoring.

The signal display provides the same color temperature for each image. The multi-viewer provides 18 images to the screen as well as trouble alarms and, eventually, will provide audio monitoring. Modules can be inserted into several open slots for high-definition monitoring. A Pinnacle HD Deko 500 CG and Thunder still store serve graphics production.

A sliding glass door separates the air-feed portion of master control from the ingest section. Several racks with Panasonic and Sony VTRs comprise the interformat part of the ingest area. DVCPRO50 and other machines convert commercials and other short-form programs before the servers ingest them. Nearby, a Sundance IntelliSat system connected to automation controls the satellite receivers for recording incoming program feeds.

Integration of standard- and high-definition capabilities has become easier as networks have made the breaks within programming coincide between the two realms. CBS feeds a variety of high-definition programming, mainly during prime time and live sporting events. A 12x2 high-definition Evertz switcher communicates with the automation system, which switches to true HD programming when available from the network. When not available, the station feeds an upconverted version of its standard-definition programming using a Snell & Wilcox 5200 upconverter. Thus, the station is continually feeding either a true HD feed from CBS or its own upconverted programming.


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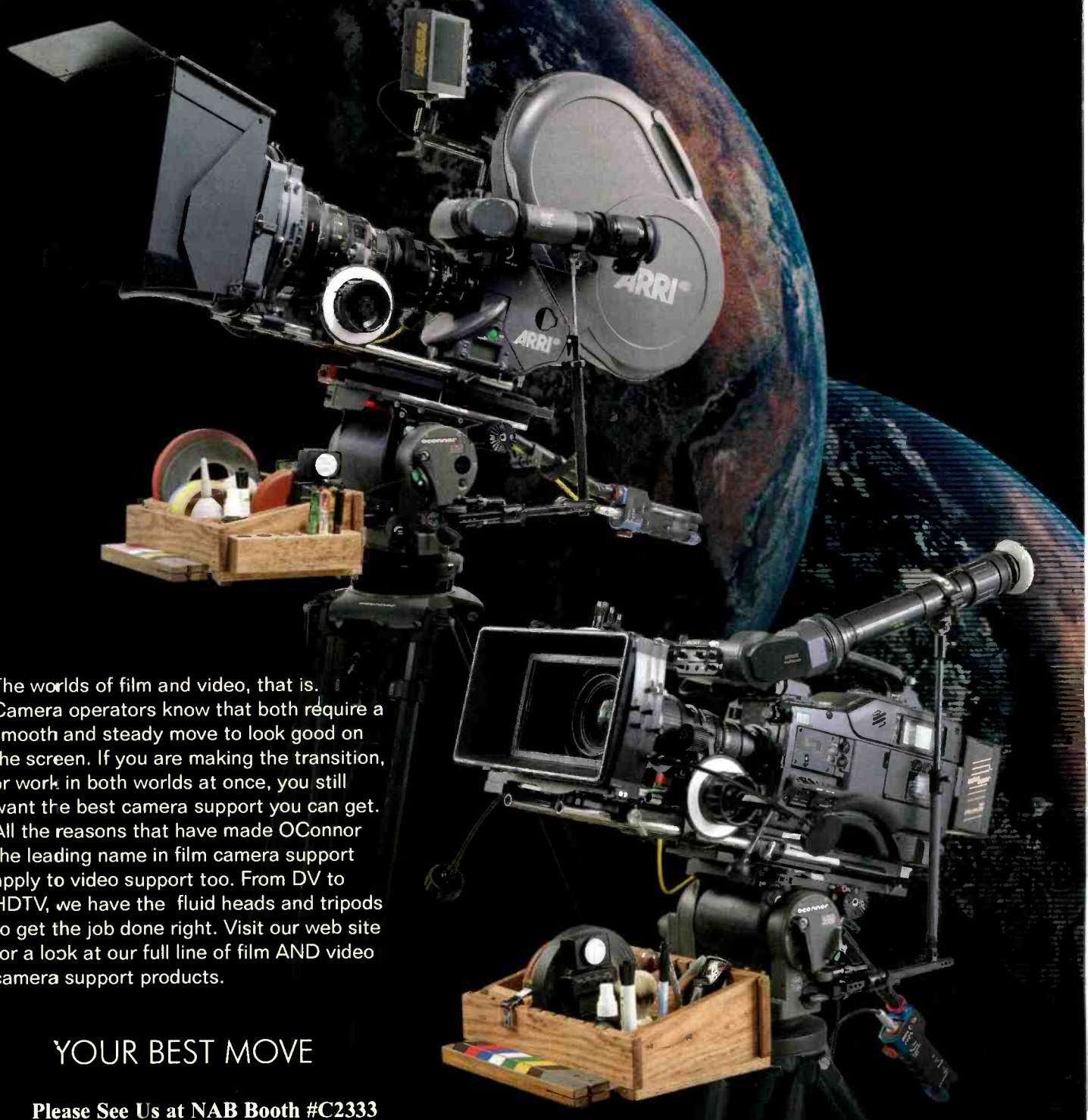


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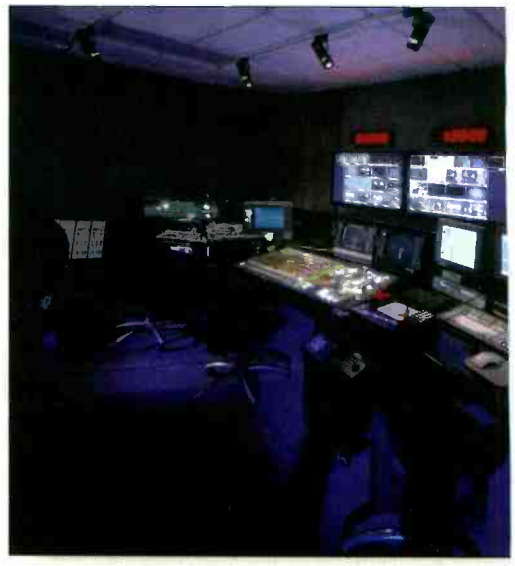
To lower costs, the Evertz switcher provides two feeds: One output feeds the program into a high-definition downstream logo generator and out to the local cable company, while the other output provides monitoring for incoming CBS feeds. The high-definition programming that enters the building is frame-synced by Snell & Wilcox IQ Modular equipment and fed into the switcher. The station plans to set aside room to install an HD M2100 when feasible. At that point, the Evertz switcher will become the backup.

### Production

The production portions of the facility are more focused on digital standard-definition equipment. A Thomson Grass Valley NewsQPro interface between NewsEdit nonlinear editors and Profile servers creates a tapeless environment for news production. Editors edit stories on the nonlinear editors before the stories transfer to the server as files. An AP newsroom system automates scripts. The integrator secured two terrestrial ENG trucks through manufacturer ENG Mobile for the station's field coverage.

To assist in news production, all of the newsroom's hardware and software communicates through MOS and ActiveX protocols. This allows the production crew to cost-effectively produce a newscast with a staff of six, without automation, while achieving a clean, high-end look.

A Pinnacle FXDeko CG and Thunder still store serve graphics creation. The integrator chose a Thomson Grass Valley Kalypso production switcher for its upgrade path and ability to accept high-definition frames. This, along with four Thomson Grass Valley LDK 6000 high-definition cameras, represents the depth of the HD-ready equipment in production. The station can add high-definition recorders for a



**The Thomson Grass Valley Kalypso production switcher in KPSP's production room was chosen for its upgrade path and ability to accept high-definition frames.**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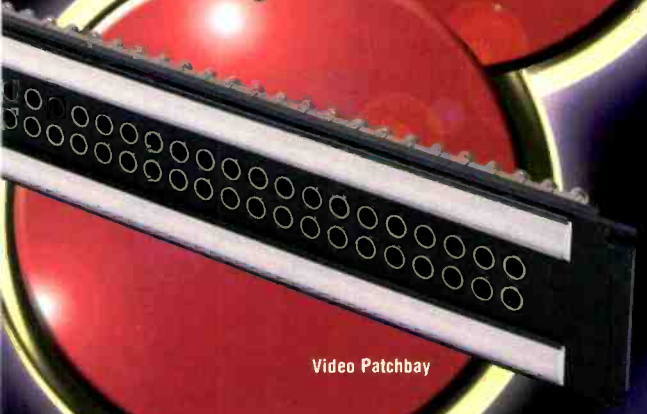


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full high-definition shoot. Four nearby promotional edit bays feature FinalCutPro nonlinear editors running on Apple G4 computers, which the station can upgrade for high-definition productions.

An audio control room also sits nearby to support production control. Because space was particularly tight within this area, the integrator employed a truck-style installation. A Studer 928 audio console serves as the centerpiece of this room and is partially sunk into the console. Wiring runs underneath the board. The equipment racks in the audio room feature unique patchbay connections. The patchbays are harnessed against the wall and connected to sources on the bottom half of the racks to fix the connections. The top half of the equipment racks hinge open for access to any audio support equipment on the rack's upper half.

## Design team

DST:
- Dwight Crumb, design engineer
- Ken Stanton, project manager
- Janet Crumb, installation manager
- Bill Hodson, Simon Sheperd and Patrick Daly, installation
- Donna Gramlich, director of purchasing
- Chris Cuitino, purchasing

Weyercliff Century:
- Tom Mann, consultant

KPSP:
- Bob Hoffman, senior broadcast consultant
- David Gray, chief engineer

## Equipment list

- Sundance FastBreak automation
- Thomson Grass Valley:
  - Trinix and Jupiter router control
  - Profile 1100 series servers
  - NewsQPro interface
  - NewsEdit nonlinear editors
  - M2100 master control switcher
  - Kalypso production switcher
  - LDK 6000 HD cameras
- Snell & Wilcox IQ Modular equipment
- Evertz 12x2 HD switcher
- Leitch:
  - 16x1 analog QC switcher
  - DPS575 frame synchronizers
- Pinnacle:
  - FX Deko and HD Deko CGs
  - Thunder still store
- Zandar virtual monitor wall
- Canon HD and SD lenses
- Panasonic VTRs and monitors
- Ikegami video monitors
- Ward-Beck audio monitors
- Tektronix test and measurement
- Hitachi HV-D30, HDV15 and JU-Z2 robotic cameras

### The core

The station's central area houses all of the electronics and core equipment. This area provides feeds to the local cable company and low-power transmitter, and steers the satellite antenna. As of today, only 70 percent of the space in the central core area is occupied, which means there is much room for expansion. The first three racks in the core area are empty. This is the space where the station would install equipment for channels 2, 3 and 4 for a multichannel system.

Much of the equipment within the core area is HD-ready. A 128x128 embedded SDI Thomson Trinix 2000 router with Jupiter control is the heart of the station's equipment, connecting to nearly every source in the building. An Encore interface to the M2100 and Kalypso switchers provides communication between the switchers and the Jupiter control.

Snell & Wilcox IQ Modular equipment handles the majority of the processing and distribution chores throughout the facility. The modules are fitted into IQ enclosures that feature a number of additional slots for future upgrades. The tasks these modules perform include encoding, decoding, aspect-ratio conversion, audio and video distribution, analog-to-digital and digital-to-analog conversion, audio delay, audio embedding and de-embedding and, finally, synchronization. An Ethernet connection ties together all IQ frames for error reporting.

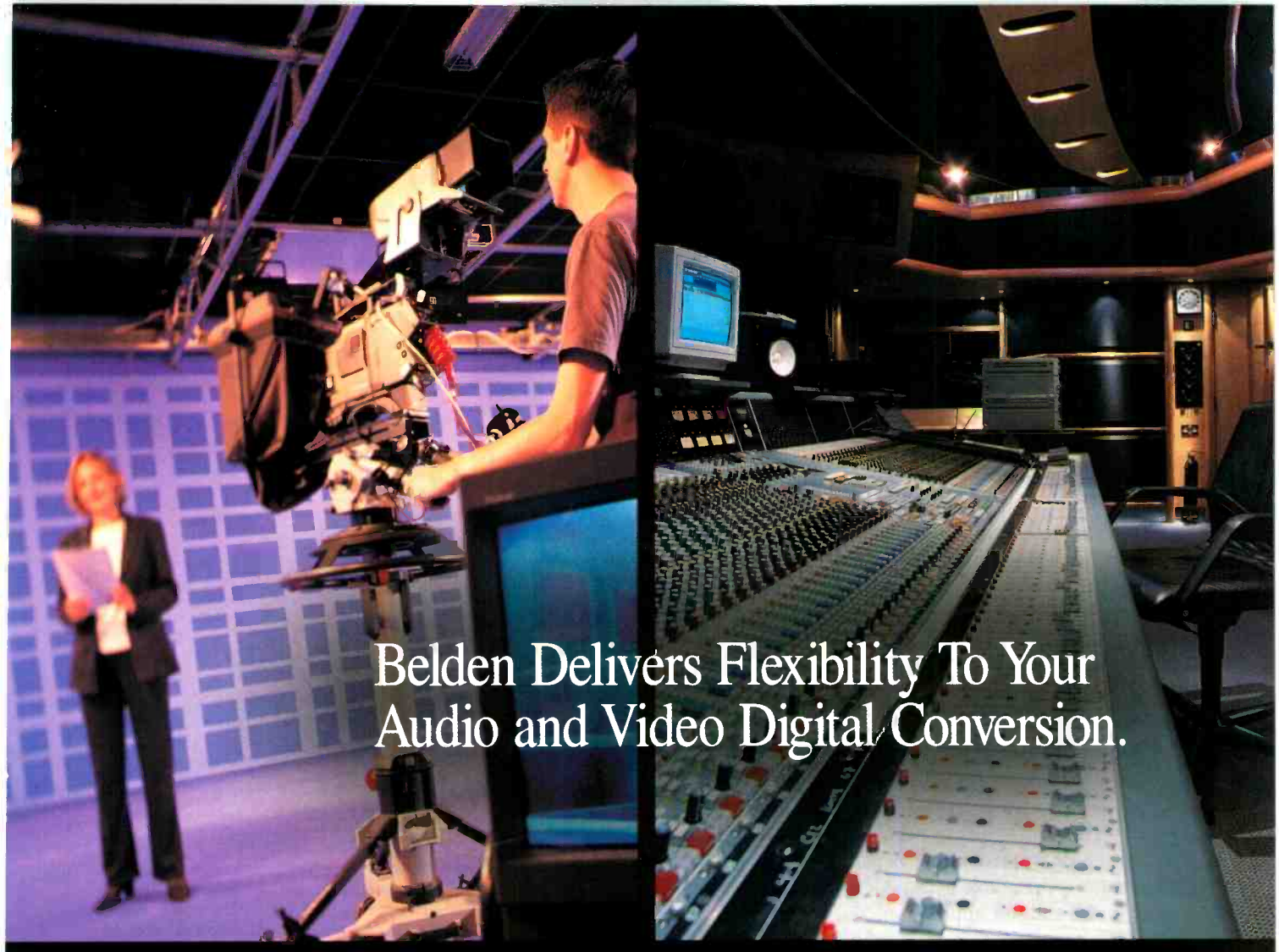
**The news set at KPSP features Thomson Grass Valley LDK 6000 high-definition cameras. One of the station's biggest challenges was producing a small-market newscast with a big-budget look.**

The station can upgrade the Snell & Wilcox equipment to HD by adding modules. Some high-definition modules for frame synchronization currently operate within the enclosures next to standard-definition modules. Other high-definition backbone equipment includes Tektronix TG700 sync generators.

### Icing on the cake

One final setup features a total of seven Hitachi digital broadcast cameras for bumper shots, three of which feature Eagle pan-and-tilt robotics. Four of the cameras are located within the newsroom and production control. One camera is attached to the roof and robotically controlled from production control, providing a clear shot of freeway traffic. The second outdoor camera is a Hitachi HV-D30 positioned at the top of a tram that reaches altitudes of 6000 to 7000 feet and is robotically controlled over a microwave link. This provides a view of snow-capped mountains overlooking the desert valley. The third robotic camera is located in the newsroom for stand-ups. BE

*Dwight Crumb is vice president of engineering at Digital System Technology.*



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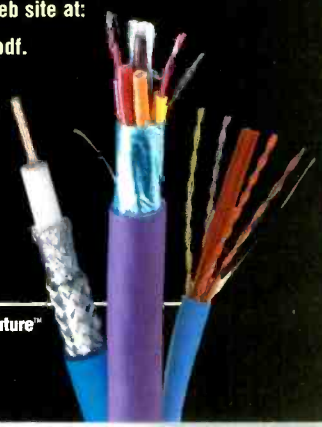

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# Selecting a transmission site

BY DON MARKLEY

Let's assume that you've allocated money for a new transmission site and it is time to apply for a construction permit. Or, as is increasingly becoming the case, the real estate around the old site has become as valuable, or more valuable than, the station itself. In any case, the time has come when you must find a new place for the tower.

## Map it out

A good way to start is to have the station's consulting engineer prepare a map showing the limits on the site based on spacing to other stations, allocations or applications. A fully spaced site is preferable because it results in the cleanest application. Yes, there are ways to overcome some short spacing, but they require more extensive engineering showings, they open the door to the possibility of objections to the application, and they may limit the station's facilities.

You should then transfer the spacing map to a large-scale map of the area topography. That allows you to analyze natural terrain obstructions that would limit the actual service of the station. Obviously, you shouldn't put a station in a location where high terrain exists between the site and the city of license. If possible, you should select a site where you can use natural terrain elevation to offset tower height above ground level. These facts would seem to be obvious. But, amazingly, some site-location decisions have been made more on the basis of saving a few bucks than on the long-term performance of the station.

Now that you have determined possible sites based on spacing requirements and topography, you need to identify any aeronautical considerations. In an area where there are few airports or none at all, this can be quite simple. You also need to consider the proposed height of the tower. For a very tall tower, the aeronautical considerations are usually too difficult for the average station engineer to calculate. In such cases, you can hire one of several good firms to prepare a detailed study of the factors that may limit tower height, such as airways, instrument-approach areas or visual flight paths. As a general rule, it is difficult to get FAA clearance for a tower more than 500 feet above ground level within two miles of an expressway or other significant landmarks for pilots flying under visual flight rules, including cross-country transmission lines, rivers, railroads or main highways. The decision to grant clearance in such cases is often a judgment call best made by someone experienced in flight patterns and FAA policy.

**After struggling with aeronautical and station-spacing issues, KMOS selected a site 55 miles away from its Warrensburg, MO, studios for its new 2000-foot tower.**

## Power

After the spacing, topographic and aeronautical considerations have all been drawn on the same map, if you are lucky there will be some areas left where you can locate the tower. You may not like these areas, but they are

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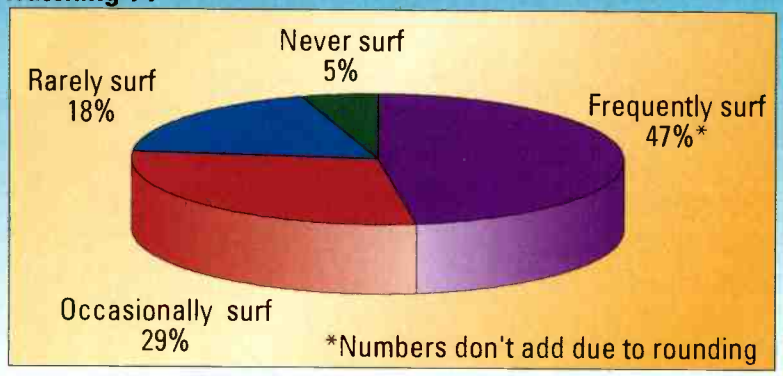


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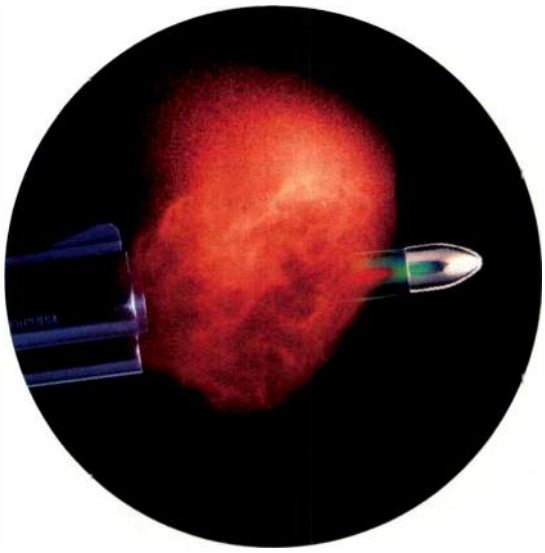

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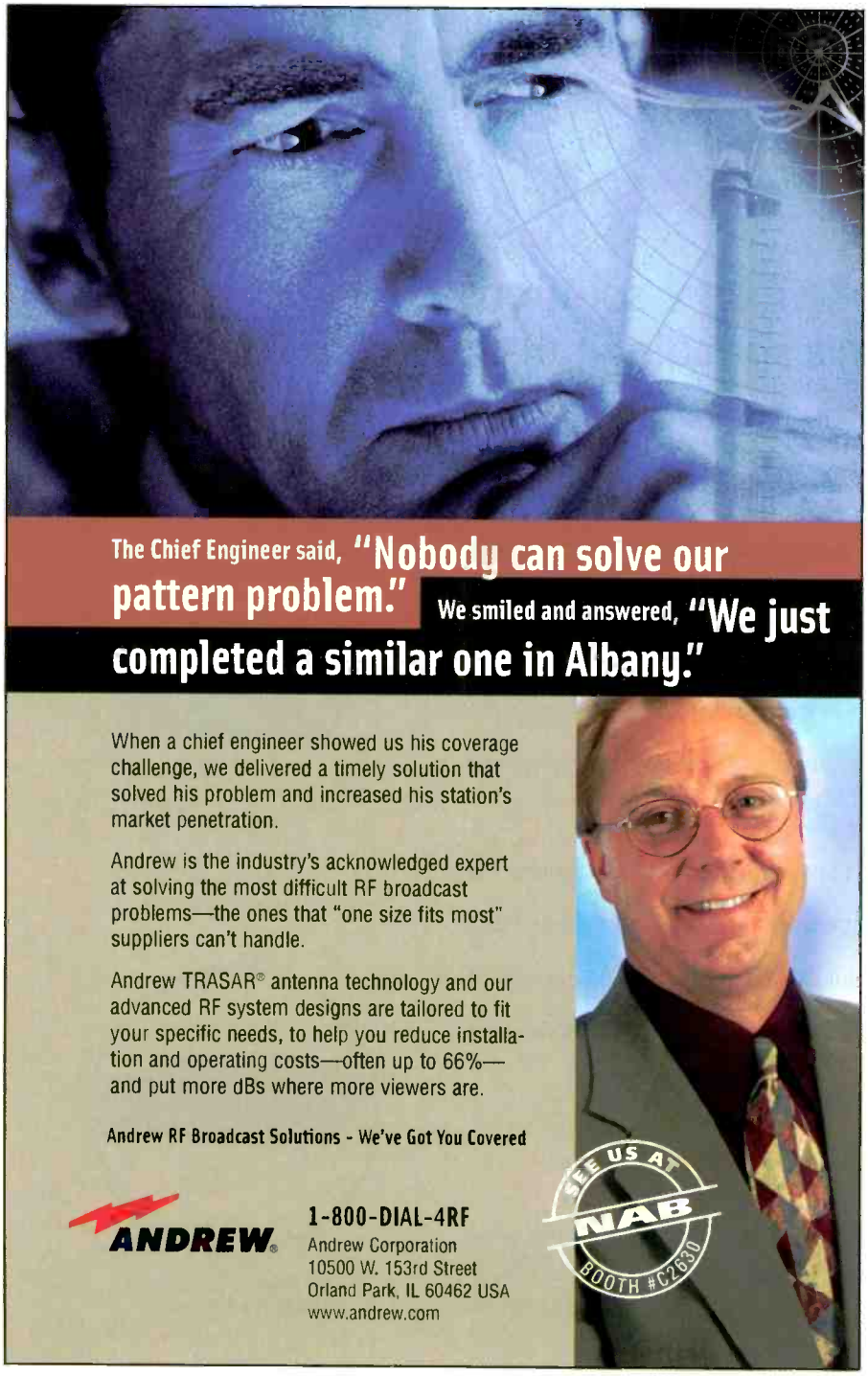
places where you may have a chance of getting a site that will work and be acceptable to the FCC and FAA. Now it's time to visit those areas, look for available property and evaluate the local conditions. For example, you should try to find property where three-phase power is already available. Running in new three-phase power can be prohibitively expensive. If your station's power demand isn't excessive, it is possible to generate three-phase power using a UPS system that will accept single-phase power input and provide three-phase power output. An alternative is to use electro-mechanical converters that generate three-phase power from a single-phase source. When connecting equipment to such a converter, some special considerations apply to avoid damage from transient conditions. Using a UPS after such a converter will eliminate those problems.




## Zoning

The ugly issue of zoning will probably come up at some point in your study. Although a recent court ruling may lead to some relaxation in zoning limits on towers, it is best to try to find a site where zoning is appropriate for towers or where approval seems reasonably possible. Usually, that means land zoned for agricultural or industrial use. Certainly, try to avoid land that is zoned strictly for residential use. The first step is to visit the local zoning authority to find out what their requirements are and to get some guidance as to how to proceed with your zoning requests. Another source of help would be a local attorney who practices or specializes in zoning and real estate.

The ugly issue of zoning will probably come up at some point in your study.

## Buy or lease?

Now it is finally time to start talking to land owners to nail down a site. The most desirable option is for the station to actually purchase the land. While site ownership is more expensive initially, it can help you avoid problems years down the road, especially if the value of the property goes up due to area development. But rural landowners seem to like to maintain ownership and are more likely to agree to a long-term lease. By long term, we mean at least 20 years, with options to extend the lease in 20-year increments for at least another three or four terms. Usually, such agreements are for a fixed annual rate that is adjusted annually based on the cost-of-living index. This is fair to all because it keeps the real cost the same as time goes by,

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regardless of the value of the dollar. In agricultural areas, the ground that a farmer leases for a tower site yields the best cash crop for the whole farm.

### A solid foundation

If more than one good site is available, look at the soil properties of the site itself. The civil engineering types are great at being able to design a system of foundations and guy points that can cope with about any situation. The problem is that the more exotic schemes are usually significantly more expensive. The preferred situation is good solid soil conditions with enough room to guy the tower at 80 percent of its height. If the space is smaller than that, you can bring the guying down to 50 percent of height without prohibitive costs. Guying distances shorter than that will raise the price significantly and you should avoid them if at all possible.

**If possible, select a site where you can use natural terrain elevation to offset tower height above ground level.**

To determine the actual foundation and guy point design for a large tower, it is advisable to have someone perform soil borings to analyze the existing conditions. This usually involves a boring at the tower base and one at each guy-point location. You can find companies that do this under civil engineering or soil testing in the phone book. The tower manufacturer should be involved in this process to ensure that everyone is on the same page in the design of the total system.

Finally, during tower construction, it is a good idea to have concrete samples taken and tested to ensure that they comply with the specifications listed in the foundation designs. Common practice is to take two samples from each load of concrete delivered to the site. After the samples have aged, usually for at least 28 days, an independent laboratory should test the samples. If the lab finds that some of the concrete was bad, the contractor should remove and replace the foundation or guy point involved. Obviously, no contractor wants this to happen. We are talking about some serious expense here. BE

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

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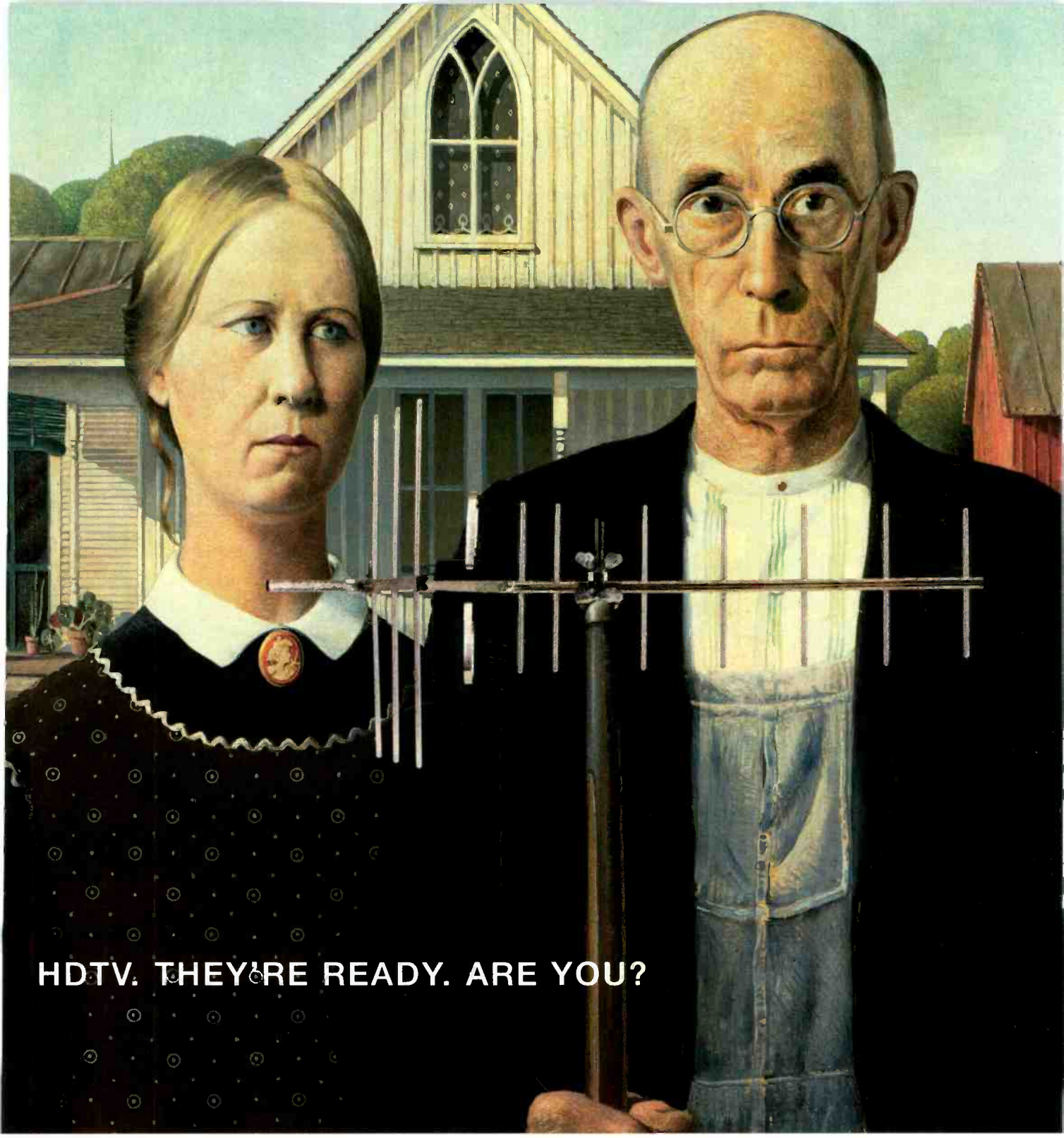


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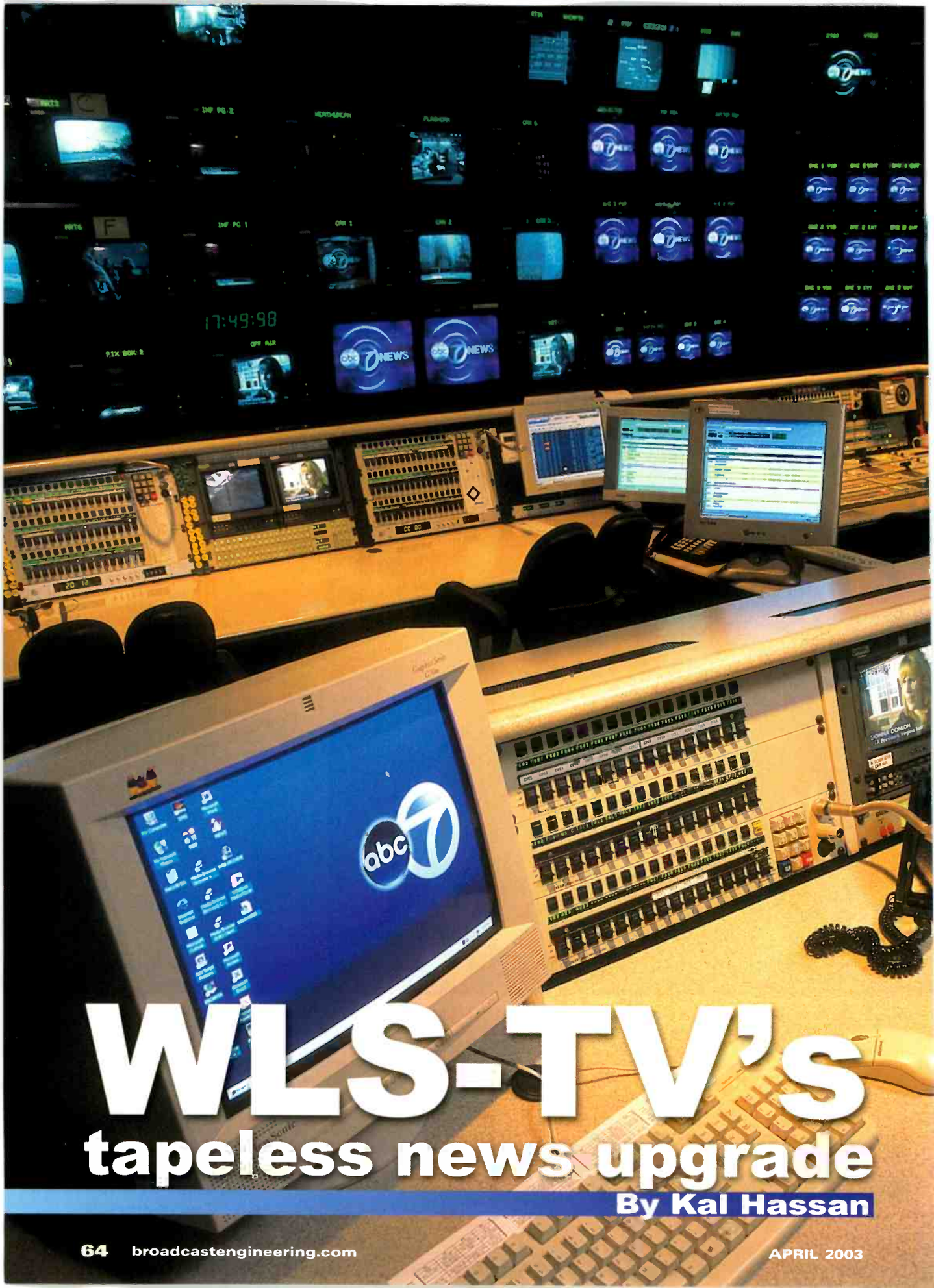



# WLS-TV's tapeless news upgrade

By Kal Hassan

WLS-TV's newsroom in Chicago features technology from Digital News Technology solutions. Photos by Frank Pedrick of Pedrick Photography.

As the number one-rated news station in the number three-ranked media market for the past 15 years, ABC-owned-and-operated station WLS-TV recently completed the transition of its tape-based news production workflow to a completely digital one. The success of this carefully orchestrated transition was based on a proven digital infrastructure already in place, and a collaborative effort between the news and technical staff to design a new digital workflow that fit the station like a glove.

While the concept of a digital news environment sounded promising to station management, it was critically important that transitioning to a networked server-based news production model did not become a stumbling block to the station's on-air progress – nor impact the ratings and revenue generated by its local news operation.

Before work began on its digital news production system, a solid digital infrastructure was already in place – one built around a 512x512 PESA Cheetah digital video routing system with a Thomson Grass Valley (formerly Philips) Jupiter control system, an NVision AES audio router, and a digital intercom system. This foundation was carefully designed to provide the station as much flexibility as possible as it introduced new workflows and pursued new revenue-generation opportunities. It was architected with future-proofing in mind to prevent costly conversions as future upgrades were put into place.

**The shift to a digital newsroom workflow at WLS was not unlike changing a fan belt on a car while driving 60 miles an hour down the highway.**

In 2001, the transition to a digital news production workflow began with the shift of two of the station's news production control rooms. The engineering staff upgraded the control rooms with Sony 7350 digital production switchers and Solid State Logic Aysis Air digital audio mixing consoles. As one room was completed, the news operation shifted into it so that the other could be updated.

At the same time, the station used Thomson Grass Valley Saturn master control equipment to overhaul its master control room to accommodate high-definition (HD) and standard-definition (SD) material. The station now has a multiformat, serial digital plant that is scalable and flexible enough to handle any type of audio or video signal.

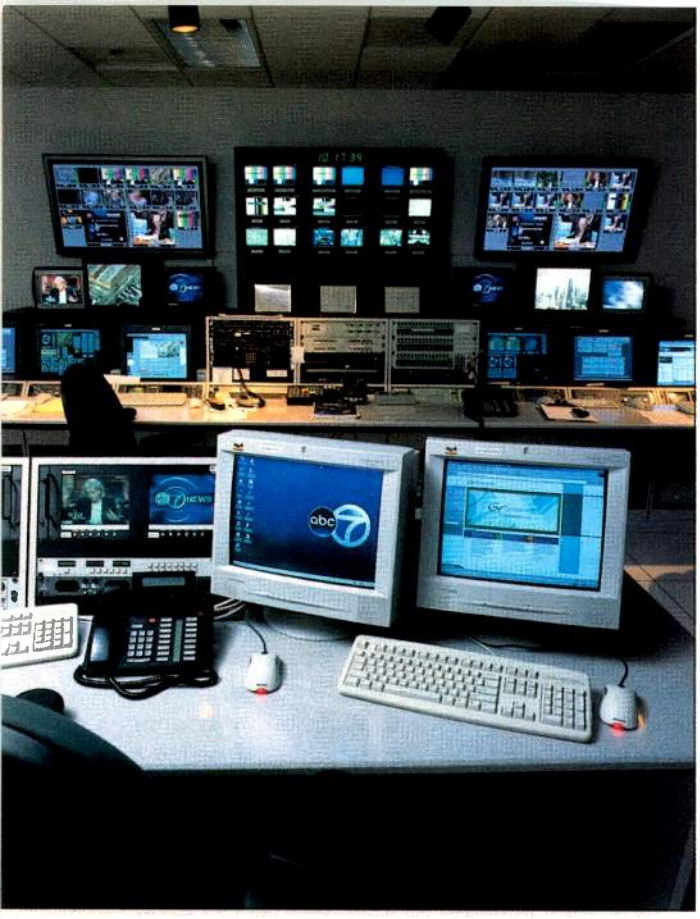
## Collaboration between news and engineering

The shift to a digital newsroom workflow was not unlike changing a fan belt on a car while driving 60 miles an hour down the highway. Popular newscasts had to remain on the air during the renovation, and the engineering and news staff had to make the changeover between the May and November sweep periods, avoiding the major revenue-producing winter and early spring months. Technical problems that could potentially interfere with the bottom line were not an option.

First, WLS-TV engaged in a collaborative transition-planning process involving its engineering and news departments. The teams invested more than two years studying the available digital news production options.

Having already made the transition to digital tape (Sony's Betacam SX format), the station wanted a digital news production (DNP) solution that would improve efficiency and help save on labor costs. It had to be fast, and it had to move the station away from linear production and provide more functionality.

It wasn't until NAB 2002 and a visit to the Grass Valley booth of Thomson Broadcast & Media Solutions that sta-



**The large monitor walls in the WLS-TV newsroom allow the staff to monitor multiple incoming signals, as well as the competition, all at once.**

tion management, engineering and news staff members were confident they had found a high-performance solution that would address their specific workflow issues – one that also had a decent chance of success.

WLS selected the Systems Manage-

**Having already made the transition to digital tape, WLS wanted a digital news production solution that would improve efficiency and save on labor costs.**

ment Group (SMG) of Thomson Broadcast & Media Solutions as the prime contractor for the installation. SMG and Toronto-based systems integrator AZCAR provided system design, configuration, planning and installation services.

The station chose a Thomson Grass Valley digital news production (DNP) solution, featuring 10 NewsEdit (previously called Vibrint) nonlinear edit systems, two FeedClip interactive feed capture systems, and 10 SCSI Fibre Channel-connected Profile XP media platform servers configured into two 30-channel redundant Thomson Grass Valley MAN systems. Each features 14TB, or approximately 1000 hours, of digital video storage at 18Mb/s of MPEG-2. Each is configured at 20 input channels and 10 output channels to support ingest from satellite and microwave feeds and from videotape machines. Playout channels are used for primary and redundant playout for news production.

The facility records the majority of its raw material onto the high-resolution MAN system, along with a low-resolution proxy through Telemedia SpectreView encoders set at 1.5Mb/s. This process is controlled by the iNews Mediabrowse capture manager application. The process preserves time code information for both the low-resolution and high-resolution materials. The advantage of this approach is that reporters and editors can browse low-resolution versions of high-resolution materials at their desktops without waiting for an edit bay to become available.

The majority of the news content (about 60 percent) is edited with the NewsEdit systems and then transferred to the MAN systems for playout. The rest of the material is edited from the iNews MediaBrowse desktop by low-resolution proxy and then conformed on the high-resolution MAN system for playout.

The first phase of the station's transition to digital news production was to update its existing newsroom computing system to the latest version of iNews NRCS. The next step was to replace its aging tape-based edit rooms with the new nonlinear editing systems and its traditional, tape-based playout systems with MAN systems controlled by the iNews Control Air application.

This system features automated ingest of 20 channels of 601 video as well as feeds from the ABC NewsOne service that arrive around the clock, providing a newsroom workflow that enables journalists and producers to create edit decision lists (EDLs) directly from their desktops. This approach has the potential to save time and manpower.

## Redundant playout

Playout is controlled via a redundant pair of iNews Control Air servers. The server engines receive the rundown from iNews NRCS and control playout under Profile's API from the MAN system's playout channels. The MAN system provides the additional benefit of being able to feed the graphics department with materials, as well as providing after-the-fact conversion of

**WLS-TV replaced its aging tape-based edit rooms with Thomson Grass Valley NewsEdit systems.**

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**TheThomson Grass Valley media platform servers feature a Fibre Channel-attached RAID storage system.**

high-resolution materials to low-resolution files (via scavenge channels).

Coupled with the Thomson Grass Valley Profile Network Archive, this system enables media managers to archive the news materials from workstations instead of manually managing their tape libraries. Media managers use the Contentshare explorer to archive news material through an Avalon AAM tape interface on to a StorageTek L700 robotic tape library populated with six 9940 drives.

A Telestream FlipFactory universal translator trascodes the ABC NewsOne feeds from Pathfire servers to the Open SAN systems. The translator monitors the Pathfire server and when new material arrives it stores, converts and then forwards this material to the MAN system, which can then play out the clip while iNews Media Browse scavenges a low-resolution copy for desktop review and manipulation.

## Digital news solution

The digital news production solution is a potent one. Reporters can preview video footage as it is being ingested onto the network. There's no waiting time like there is when trying to digitize videotape and material.

WLS-TV is also working with iNews to develop modules to automate MediaBrowse control over the Profile Network Archive system because archiving should be seamless to the person logging and storing video and audio assets.

The digital newsroom system has the potential to eliminate on-air errors. In a 30-minute newscast, the station uses from 40 to 60 pieces of video. The chances of a tape being played wrong from a VTR are high because the process is completely manual, and there is no backup system. However, with automated ingest, clip naming, clip registration in the rundown, and playout, the chances for error are greatly reduced.

The success of a tapeless digital news production environment is directly proportional to the interaction between the key decision-makers within the news and engineering departments. The most important thing WLS chose to do with this installation was make the news department a partner in the early planning stages. It's important that the news department buys into the system and provides

**WLS-TV chose SCSI Fibre Channel-connectedThomson Grass Valley Profile XP media platform servers.**

feedback about their desired workflow. These are the people who are going to use the system on a day-to-day basis. There have been many instances where engineering groups have failed to implement the right technology because they have a problem discussing technical issues with the non-technical side of the station.

To be number one, a station has to have good talent and an aggressive newsroom, but it also has to look good on the air and, through the use of digital newsroom technology, that's what WLS-TV has done. BE

*Kal Hassan is director of engineering for WLS-TV in Chicago.*

## Design Team

AZCAR:
- John Luff
- Andrew Cox
- Neil Sutton

Thomson Grass Valley:
- Larry Mast
- Mark Wagner

WLS-TV:
- CC Boggiano
- Tim Damm
- Jan Federenko
- Jennifer Graves
- Kal Hassan
- Dave Hewitt
- Craig Strom

## Equipment List

Thomson Grass Valley:
- MAN systems
- NewsEdit systems
- Feed Clip packages
- Profile Network Archive

iNews:
- NRCS newsroom (100 seats)
- MediaBrowse (70 seats)
- Control Air playout

PESA router w/ Jupiter control and Thomson Grass Valley modular distribution

Telestream FlipFactory conversion and distribution of NewsOne/ Pathfire ingested material

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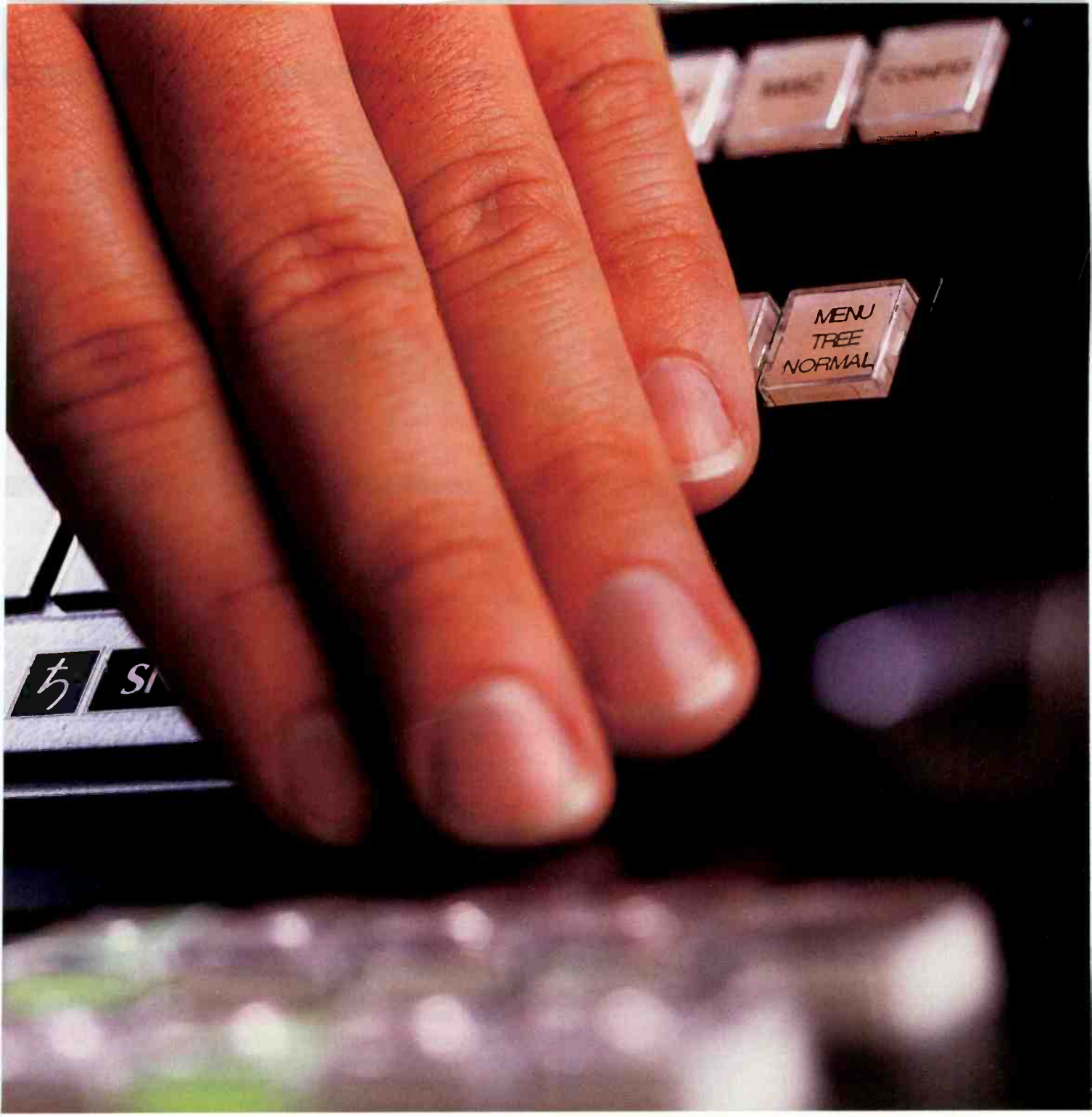


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# Video storage

BY JOHN LUFF

Most video content today is still recorded and stored on magnetic media, but storage technology has come a long way since the days of the quadruplex two-inch recorder.

When television technology was first beginning to emerge from the laboratory 75 years ago, the problems related to storing video were well understood. Clearly, producers could not transmit all programs from live sources. But the technology to save programs to a nonvolatile "memory" of some kind was, at that time, cutting edge at best.

Over the intervening years, clever and cost-effective strategies have evolved to record, store and archive content at ever-higher quality and steadily declining costs. The perfection and commercialization of practical high-quality analog video recording in the 1950s pointed the way to much of today's technology. Modern "digital" disk and tape recording technology is, at the fundamental physical level, an analog process. Modulating a carrier with a pattern that represents digital content and converting the representation back to digits requires sophisticated application of analog methods at the signal's interface with the media. It is an increasingly inventive application of physics, mechanical engineering and materials science.

## Linear media

In any case, the equipment we call analog recording hardware no longer dominates the market, but its installed base still represents a large segment of the industry. Over the last 20 years, manufacturers have delivered huge numbers of analog recorders for professional use. Several years ago, their numbers began to dwindle as digital recorders became ever more cost-effective, but they are far from gone. Indeed, it is only in the last few years that the last of the quadruplex 2-inch recorders first seen in 1956 were retired. As a result, today we see in common use a mix of old and new technology using radically different approaches, presenting challenges for those librarians who manage valuable repositories of content.

It is equally important to remember that television content is not all stored electronically. Film is as important today in television production as it was generations ago.

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It is likely that film will persist for a long time as a primary acquisition medium. The current market push to use electronic images that emulate the look of film in every aspect demonstrates the production community's deep reliance on film as a primary medium. And although much of the film shot for episodic and dramatic television today is finished on video, long-form film for theatrical release is still an important portion of the content delivered on television. Intermediate electronic processes, including special effects, have encroached on the traditional film market, though film schools still teach traditional methods for next-generation filmmakers. First and foremost, production is about capturing compelling content. And film will be critically important in recording that content for a long time into the future of television. It is valuable to remember that film was the only practical means of recording electronic video images in the early days of television, and those archives remain stable and easy to recover.

Nonetheless, most recordings today are committed to videotape, also affectionately known as "rusty mylar." The range of professional analog recorders in production today is quite small, though not zero. Clearly, digital recording and storage techniques are the norm today – indeed, they are the only commercially viable methods. The number of digital video formats in use today is quite staggering. These formats include Sony's Digital Betacam, DVCAM, Betacam SX, Betacam IMX and HDCAM; Panasonic's DVCPRO, DVCPRO 50, DVCPRO100, D-5 (standard definition) and D-5-HD; and JVC's Digital S. SMPTE has standardized these formats and given them designations such as D-3, D-5, D-6, D-7, D-9, etc.). The DV-type formats from all manufacturers are variants of the original DV codec, which is standardized for both consumer and professional use. The rest of the formats were developed in isolation, some of them as research projects funded by NHK in Japan. Some machines can play back tapes other than those belonging to their native format, but each format is

**JVC's BR-D860U VTR utilizes the Digital S format, designated D-9 by SMPTE. D-9 is one of the many digital videotape recording and storage formats in use today.**

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unique in some way.

This leads to a major complication for content producers. When a producer chooses a format, he also determines some of the flexibility of the production process. For instance, using the 4:1:1 DV-based formats for acquisition is less desirable for high-quality work due to the chroma subsampling. You can't ignore the resulting limitations on later post-production processes, though upon careful review it is surprising how well 4:1:1 video actually holds up. But, for high-quality graphics and post-production processes, it is certainly better to stick to 4:2:2 recordings. The 4:2:2 recording method was pioneered jointly by the SMPTE and EBU committees, which developed the original D-1 specification in the early 1980s. D-1 remains the highest-quality standard in normal usage today, though the original D-1 recorders have largely disappeared.

The migration from one format to another over time presents major challenges to the producer. Once an economically significant volume of content has been stored on any particular format, the logical question is, "What is the content's shelf life?" Early video recordings lasted perhaps a dozen years before concern over their stability pushed owners to migrate to new recording media. Today, the quality of videotape is better: It is chemically more inert and mechanically more stable. With proper conditions (humidity and temperature, primarily), modern videotape can last decades. But its lifetime is certainly less than that of film which, in some cases, has lasted well over 100 years. No one knows the future, but it seems unlikely that videotape will become an archive format capable of preserving content for hundreds of years.

## Nonlinear media

Manufacturers provide a dizzying array of new recording options every year. But few changes in the market have been as sweeping as the move to hard-disk recording, which is now over a decade old. It is valuable to remember that disk recording is not a new concept. Indeed, John Logie-Baird used "video disks" over 75 years ago. The first nonlinear editing system was invented in the '70s at CMX, and was used commercially by CBS for offline editing in Los Angeles. The

**Most recordings today are committed to videotape, also affectionately known as "rusty mylar."**

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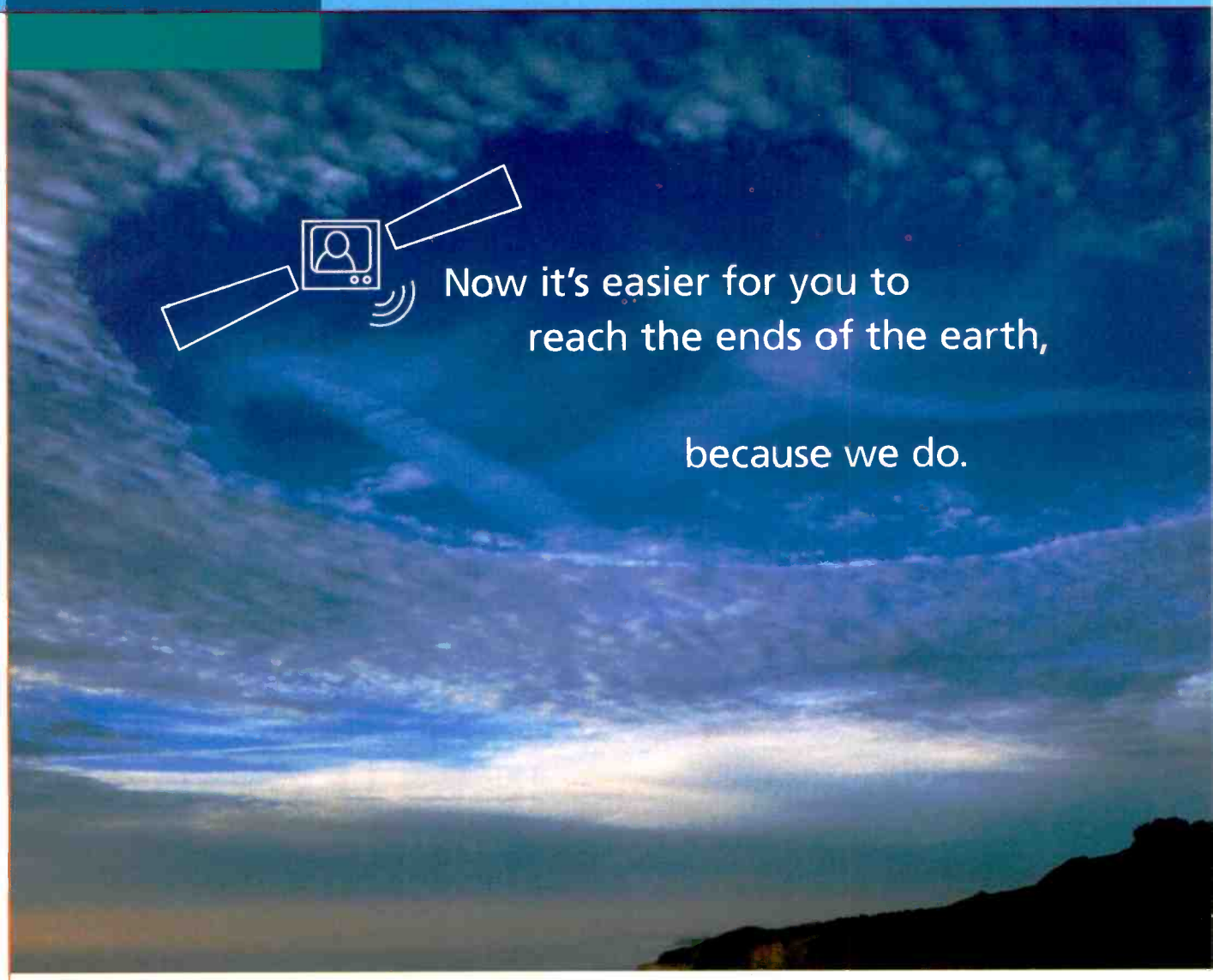


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CMX 600 used computer storage disk drives to record analog monochrome video. But it was a short-lived product. And, though others tried to replicate the concept using other hardware, none were successful for many years.

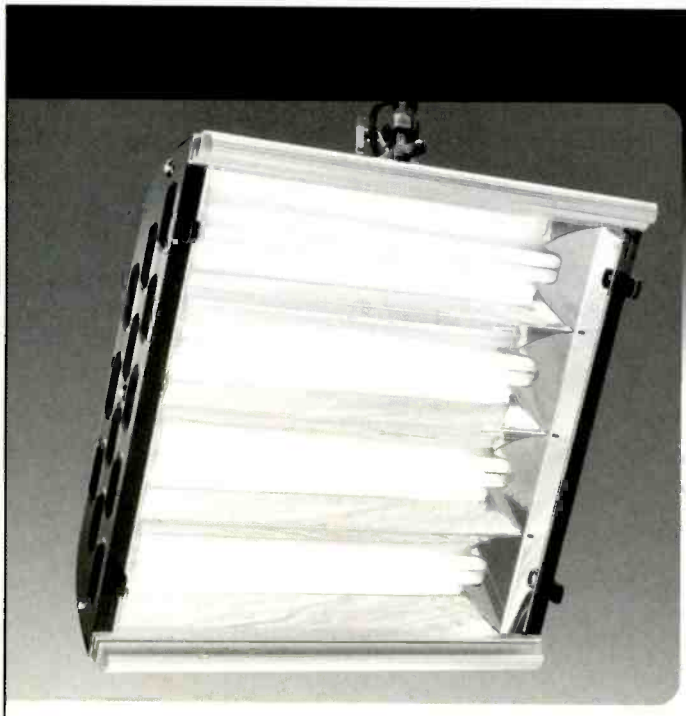
High-quality recording on hard disks began more than 10 years ago. The first commercial units could store only a couple of hours of content due to two interlocking constraints on recording capacity: disk size and compression ratio. Initially, video disk recorders used only JPEG compression, and storage at below 20Mb/s provided marginal results. Drive size now approaches 100 times that of a decade ago, and compression improvements have more than doubled that again. Today, it is not uncommon to buy a video server with over 100 hours of storage in a single chassis. Indeed, consumers now can record acceptable video on hard-disk home recorders that allow over 50 hours of storage, with the promise of hundreds of hours in the next few years.

**Few changes in the market have been as sweeping as the move to hard-disk recording.**

This explosion of capacity, along with effective means of sharing both the storage and control over inexpensive networks, has changed the way programmers, distributors and broadcasters manage content. Videotape recording is far from dead, but the areas of our industry where tape predominates shrink every year. Servers and smaller-scale disk recorders have dropped in price while steadily increasing in capability at a rate somewhat lower than Moore's Law. In part, this is because of the portion of the cost that is attributable to high-quality compression engines and networking hardware and software.

### Compression and interchange

Today, most server products use MPEG-2 or DV compression. A few use proprietary variants, but, for marketing and engineering reasons, most have adopted standard codecs. Compression technology continues to advance, and MPEG-4 AVC (advanced video coding), also known as H.264, stands on the near-term horizon. H.264 promises significant improvement in picture quality at modest bit rates. In the short term, it is expected to yield efficiency gains of 20 percent

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**Volkswagon's Autostdat in Germany uses several synchronized QuBit video servers to store and play video and audio to a theater in the round.**

to 30 percent, with further improvements as engineers gain experience with the new tools H.264 allows.

Key among the desires of all broadcasters and content providers is the ability to interchange files (or streams) among servers made by all manufacturers. Several efforts to allow that interchange are under way, and several methods are in place. The simplest to understand are efforts to codify an interchange standard to which all manufacturers can adhere. The Material eXchange Format (MXF) standard, which is in the final stages of development within SMPTE, holds that promise. MXF not only provides the mechanism for interchange, it also standardizes the interchange of metadata. This will allow distributors to encode time information, version, episode and other important information with the content and deliver it all the way to the server at the station used for playback to air. Traffic and automation can then grab that metadata without rekeying information at every playback site. Information about embedded commercials could be extracted similarly.

The ability to interchange bit streams (with or without metadata) is key to the further growth and simplification of video servers. Either all manufacturers must adopt standardized interchange formats, or stand-alone boxes must be developed to allow that interchange. The Pro-MPEG Forum, AAF, SMPTE and others are hard at work to create those standardized interchange mechanisms. But some in our industry cannot wait for standards to catch up to current market demands. This creates an opening for stand-alone, or embedded, applications and hardware facilitating interchange.

Two such products have had a major impact on current implementations. Telestream's Flip Factory and Pinnacle's Exchange convert streams between different formats. They have developed a concept that allows seamless interchange between proprietary products created by third parties. In a somewhat "disinterested" approach, they leapfrogged standards to achieve interchange in the short term where commercial interests and standards have not moved fast enough for the marketplace. These products are having a major impact on real-world applications today. Streams distributed by networks and service providers for both news and commercials can now be fed directly into servers for air or production use without going back to baseband as an interchange medium. The resultant im-

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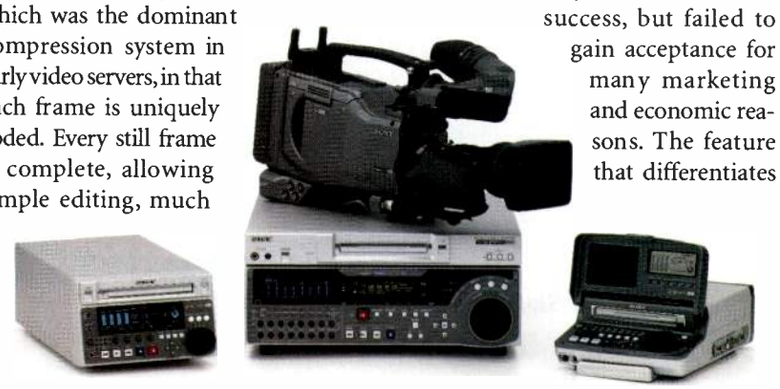
provement in quality and workflow is important and represents the best that technology can apply to real-world problems.

One can envision, however, a general-purpose approach to the same problem. Assume for a moment that a news provider shoots on DV tape and wishes to edit only in an MPEG-2 I-frame environment. Along with that content, he wishes to deliver the thumbnails and other metadata that comes from the field camera. A server system that has an MXF- or AAF-compliant I/O could take the content in, parse the metadata and, using a hardware-embedded approach like FlipFactory, convert the stream to its native format. The user would not care if the next scene came from an MPEG-based camera because the internal system would seamlessly adapt to the content and smoothly deliver the stream to the recording engine in the right format. This may not be very far into the future, and the impact such an approach would have is quite significant.

A mesh of products allowing such free interchange of content might have both native-only and interchange-capable I/O in a homogeneous environment. The resulting improvement in workflow would be significant. Commercials delivered through store-and-forward would appear on air servers almost magically, no matter how they were distributed or what standard the distributor adopted. Metadata could be shared with automation and traffic from a database known to be accurate, improving the on-air look and reducing the work needed to bring distributed content to air.

We tend to focus heavily on MPEG standards today, which is appropriate given the installed base and economics. Other compression standards are moving rapidly along as well, including JPEG 2000, which is based on wavelet compression. It was conceived as a compression system for high-quality stills, in major part due to the explosion of electronic still cameras. Wavelet compression is not new to our industry. At least one commercially successful nonlinear editing system used wavelets. Motion JPEG 2000 is analogous to Motion JPEG, which was the dominant compression system in early video servers, in that each frame is uniquely coded. Every still frame is complete, allowing simple editing, much like I-frame-only MPEG.



**Sony's new optical-storage (DVD) camera and decks represent the first major professional production products to use optical storage.**

When implemented as a moving-image compression system, JPEG 2000 allows lower bit-rate decoding of a main bitstream. This will allow a high-definition stream to be decoded for standard-definition use, or thumbnails to be extracted without creating a proxy stream. This technique might allow a video server to mix uses in a single bitstream, allowing browsing on the desktop, SD broadcasting and cinema release from a single coded bitstream at modest bit rates.

**Ideally, the endgame in your struggle for storage will see minimum cost, maximum capacity and maximum versatility in the total system.**

This month's "Technology in Transition" column (page 179) discusses archive systems. It is important to note here that video storage is not monolithic. The characteristics of storage systems must be matched to the intended application. For instance, Sony has just introduced a new optical-storage (DVD) camera. This represents the first major professional production product to use optical storage. Until now, virtually all storage, except for robotic archives, has used magnetic techniques (disk and tape). Key advantages of this innovative approach are improvements in workflow that an inherently nonlinear (at least read, but not write) medium can provide. Avid and Ikegami attempted this with magnetic hard-disk camcorders. They achieved modest success, but failed to gain acceptance for many marketing and economic reasons. The feature that differentiates Sony's new approach is that, unlike hard disks, DVDs might be considered a consumable, much like videotape, media. Note that, at press time, Sony had not announced a price for the disks. However, the disks are not expected to be as inexpensive as blank consumer DVDs.

Ideally, the endgame in your struggle for storage will see minimum cost, maximum capacity and maximum versatility in the total system. If you choose to use products optimized for the intended workflow, the gains can be significant. But implementing a new video-storage strategy in your organization without first developing a road map and list of requirements can lead to a short-lived solution. There are products in the market today that can facilitate nearly any strategy, from lowest possible cost, low storage density and modest quality, to highly automated workflow and hooks to future migration. The key to understanding the marketplace may be to listen carefully and think openly about your requirements and the options available to you. BE

*John Luff is senior vice president of business development at AZCAR. To reach him, visit www.azcar.com.*

# soundwaves

CALREC

THE CALREC BROADCAST AUDIO NEWS UPDATE

# New Digital Console

## Zeta 100 for Local TV and Radio Production Markets

issue5

# PRODUCT UPDATE

## 100% Calrec - Digital Family Expands with Zeta 100

Calrec Audio Ltd unveil their latest digital console at AES Europe in Amsterdam and NAB 2003 in Las Vegas.

The Zeta 100 is the third digital production console to emerge from Calrec's well-established digital development programme and builds on the Alpha and Sigma system architecture.

The Zeta 100 is a pivotal point in Calrec's digital programme to provide broadcasters with a broad choice of purpose-designed, digital consoles.

Targeted at local TV and network stations, the Zeta 100 addresses the same market sector as the C2 analogue console and is available at a similar price. However, the Zeta 100 has features and functionality that far exceed those of the C2.

"The Zeta 100 further expands our digital family to provide broadcasters with a range of solutions whatever the requirement," says Sales Director John Gluck.

"Live production demands the highest levels of reliability, user-friendly controls and a solid operating platform which the operator can have the ultimate confidence in. The Zeta 100 is designed to meet the needs of broadcasters who do not want to sacrifice these features just because they require a smaller console."

Packed with solid Calrec engineering, broadcast features and bulletproof construction, the Zeta 100 is a groundbreaking console available in three standard frame sizes and a variety of i/o packages.

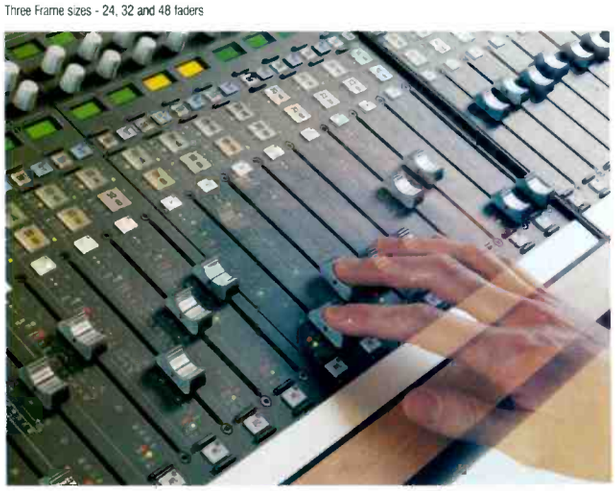
Available in 24, 32 or 48 fader configurations with DSP allocation for up to 56 channels, Zeta 100 is highly resilient. In common with the Alpha and Sigma 100, all cards and panels are hot-pluggable, with automatic redundancy on power supplies, DSP and control processors.

Operation is not dependent on the PC and the console boots from cold in less than 20 seconds. Control surface reset is less than 10 seconds, with no loss of audio.

Compact and powerful, all standard configurations accommodate DSP processing, Digital I/O and Analogue I/O into a single 7U, 19" rack, while the control surface can be stand, table-top or recess mounted.

2 "wild" controls per channel, instinctive routing display

Three Frame sizes - 24, 32 and 48 faders



*"The (Sigma 100) is very reliable with a lot of redundancy - it is very suitable for live broadcast."*

Ka Dayuan,
Deputy Director
of CCTV Audio
Department

Zeta 100

Space-saving control surface

## Calrec Up Front about Front End

The Zeta 100 console runs an entirely new and updated front end. The proprietary software system introduces several new features including the ability to patch and move whole blocks of inputs to channels, and a "Bird Beater" function on all aux outputs.

Using a software sub-set of the Alpha and Sigma consoles with our new control surface, Zeta is a powerful, easy to use console.

"These consoles operate independently of the PC, " says Product Manager, Chris Gaunt. "The new front end uses a more efficient operating platform to facilitate set up and gives us the opportunity to introduce brand new features" ■

Bi-colour configurable LCD display

## Zeta 100 Feature Set

### Ergonomics

- Intuitive control surface
- 24, 32 or 48 faders
- Compact size
  24 faders (784mm w)
  32 faders (1290mm w)
  48 faders (1796mm w)
- Suitable for tabletop mounting
- Standard DSP processing, I/O and analogue inputs fit into one 7U, 19" rack

### Facilities

- DSP allocation for up to 56 channels (32 stereo, 24 mono)
- 16 Multitrack/IFB outputs
- 8 Auxes (pre or post fader)
- Mix-minus/Direct outputs available on every channel
- Transmit/Rehearse modes of operation
- 2 Main outputs (stereo/5.1 Surround) with compressor
- 8 sub-Groups (stereo/mono) with compressor
- 2 "wild" controls per channel
- Unlimited VCA Groups
- Interrogation facility on every buss
- Ganging system allows blocks of inputs or outputs to be patched directly
- Pre EQ, pre fader and post fader feeds to Tracks and Direct Outputs
- 99 Flash ROM memories
- Comprehensive Talkback

### Reliability

- Full intelligent and automatic redundancy on all power supplies, DSP and control processors
- Operation is independent of on-board PC – PC failure has no effect on the audio signal
- Audio and control system boots from cold in les than 20 seconds
- Full control system reset in less than 10 seconds with no loss of audio
- All panels and cards can be inserted and removed under power with no damage ■

*"Sigma fulfilled our requirements. It met our technical needs and Calrec management worked to understand and fulfil our business requirements. We were able to get the technology we demanded at a cost within our budget."*

Jim Starzynski,
NBC Principal
Engineer

CALREC

Zeta 100

## Quality Standard Certification

Calrec Audio Ltd has been issued the ISO9001: 2000 standard by the Governing Board of ISOQAR.

The award, for both UKAS and RAB registration, is the most comprehensive of the ISO9000 international standards.

The certification is granted in recognition of excellence across design, development, manufacture and after-sales support.

ISO9001: 2000 follows a rigorous and thorough review of Calrec's internal and external communication and business procedures.

Calrec Audio's Engineering Director George Waddington spearheaded the campaign: "Calrec have long enjoyed an excellent reputation amongst broadcasters for the design and manufacture of analogue and digital audio mixing consoles," he says.

"The ISO 9001: 2000 certification reinforces that reputation by recognising Calrec's business and administration procedures. We have invested a great deal of time and effort into refining our procedures.

"It is a credit to everyone involved that the ISOQAR assessors were unanimous in their decision." ■

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## Calrec is Good for Your Elf!

This Christmas, Sweetwater Digital Productions in LA, USA, got just what they wanted - a 120 channel Alpha 100 digital console in their brand new, state of the art remote unit. Their Christmas card was a *fairy* pleasant surprise indeed! ■

Happy Xmas from Sweetwater Digital!

## Family Outing

Calrec Audio introduce the brand new Zeta 100 digital console - featured on page 2 - at AES in Amsterdam (booth 2210) and NAB 2003 in Las Vegas (booth 2646).

The third digital production console to emerge from Calrec's live production digital programme, Zeta 100 builds on the Alpha and Sigma 100 system architecture. Both the Alpha and the Sigma 100 are also on show. ■

### Exhibition Diary

| Exhibition | Location | Dates |
|---|---|---|
| AES Europe 2003 | Amsterdam | 22-25 March |
| NAB 2003 2003 | Las Vegas | 7-10 April |
| IBC 2003 | Amsterdam | 12-16 Sept |

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Company News

# NAB PRODUCT HIGHLIGHTS

As a further guide to the new technology being shown at this year's NAB show, the *Broadcast Engineering* staff has assembled a second installment of new products for your enjoyment. NAB is about the technology, plain and simple. If you aren't witnessing it on the show floor, you're learning about it in hundreds of informative sessions held throughout the week.

An advanced look at what is available is a step toward finding the perfect solution for your facility. *Broadcast Engineering* provides you with that advanced look by presenting over 100 new products that will be exhibited on the show floor. Use the following listings to find what you're looking for at the show and to get in touch with manufacturers and company representatives. Issue advertisers are indicated by colored listings.

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# NAB PRODUCT HIGHLIGHTS

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ZOOM LENS

## Thales Angenieux 26X HR series

***973-812-4326; www.angenieux.com***

***Booth: C2425***

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NLE

## Accom AFFINITY

***650-328-3818; www.accom.com***

***Booth: SU7305***

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MULTI SDI MONITOR

## Leader Instruments LV 5700

***714-527-9300; www.LeaderUSA.com***

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Features an XGA TFT color LCD in an adjustable tilt front panel; tests 14 HD-SDI and SD-SDI formats with digital processing compliant to SMPTE 259M, SMPTE 292M and SMPTE 296M; input format, colorimetry, and trilevel or blackburst external reference inputs are automatically detected. ▲

TIME CODE GENERATOR

## HORITA GPS-MTG

***949-489-0240; www.horita.com***

***Booth: C4362***

Uses the accuracy of the atomic clocks in the Global Positioning System (GPS) to generate SMPTE longitudinal time code matched to UTC, offset to local time or time and date, day-after-day, month-after-month, year-after-year, unattended, anywhere in the world; when generated by the GPS-MTG, SMPTE time code becomes an accurate global real-time clock/calendar, allowing video images in different locations across the city, state, continent or globe to be simultaneously recorded with the same time and date stamp. ▲

AUDIO ROUTER

## Quartz Q256-DA/AA

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***Booth: SU6435***

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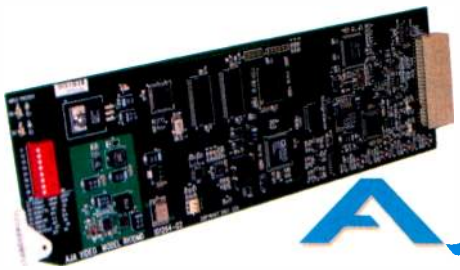
*Configurable for 16:9 or 4:3 monitor

*Crop Mode or Letterbox Mode

*Supports 4 channel embedded audio (passed to SDI output)



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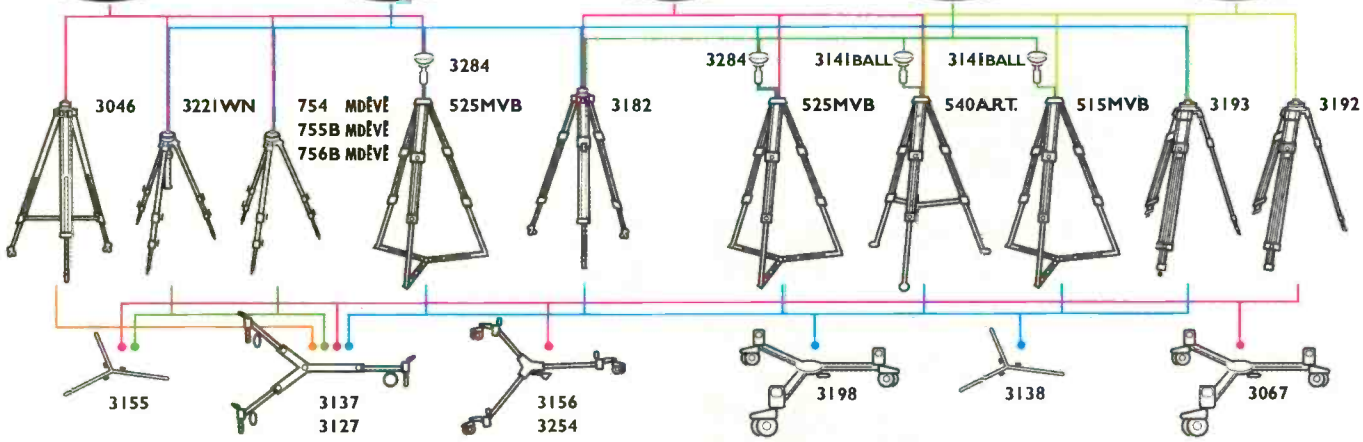


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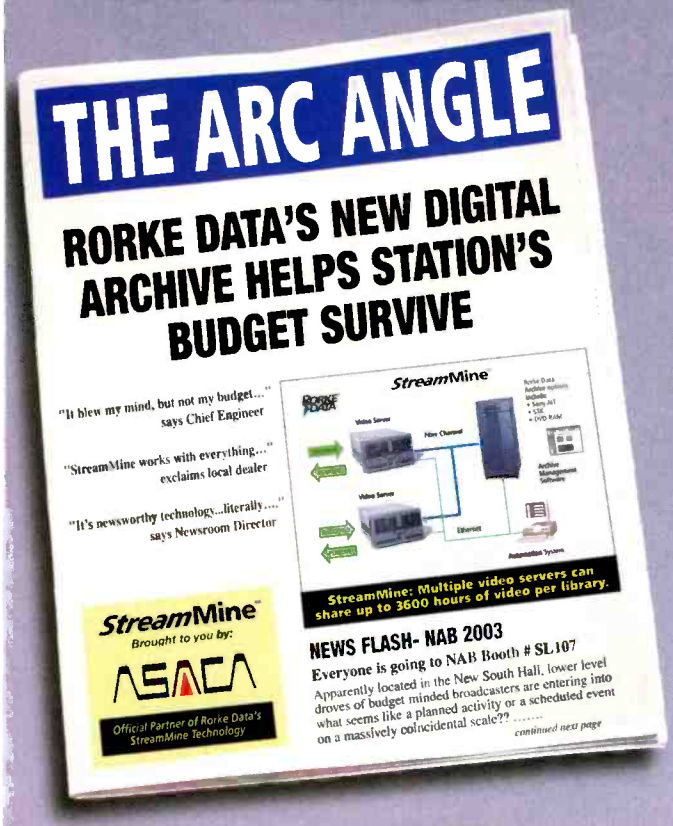


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MULTIPLEXER

## Harmonic MN20

***408-542-2500; www.harmonicinc.com***

***Booth: SU5449***

Takes video input from multiple sources in multiple protocols and formats; can now multiplex MPEG-2 content and data for transport/distribution across an IP network; single-box solution. ▲

LIGHTING SYSTEM

## Kino Flo Flathead 80

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***Booth: C4258***

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## Bogen Manfrotto MDeVe 754

***201-934-8500; www.bogenphoto.com***

***Booths: C2469, C2369***

Two-stage carbon fiber video tripod allows the video camera to be positioned at a height just under five feet; can support up to 13 pounds of equipment; features center column construction and a built-in 50mm leveling ball system locked by a detachable rotating grip at the bottom of the center column; construction eliminates the need to make micro adjustments to each individual leg in leveling the camera and adjusting its height; crown design also allows the center column to be horizontally mounted. ▲

PAN/TILT/ZOOM SYSTEM

## Canon Digi NU-700N

***516-328-5000; www.canonbroadcast.com***

***Booth: C2040***

Combines Canon 3-CCD camera electronics with a Canon 20x lens under a weatherproof housing; controllable via either a Web browser with Canon's camera server software or a remote control panel. ▲

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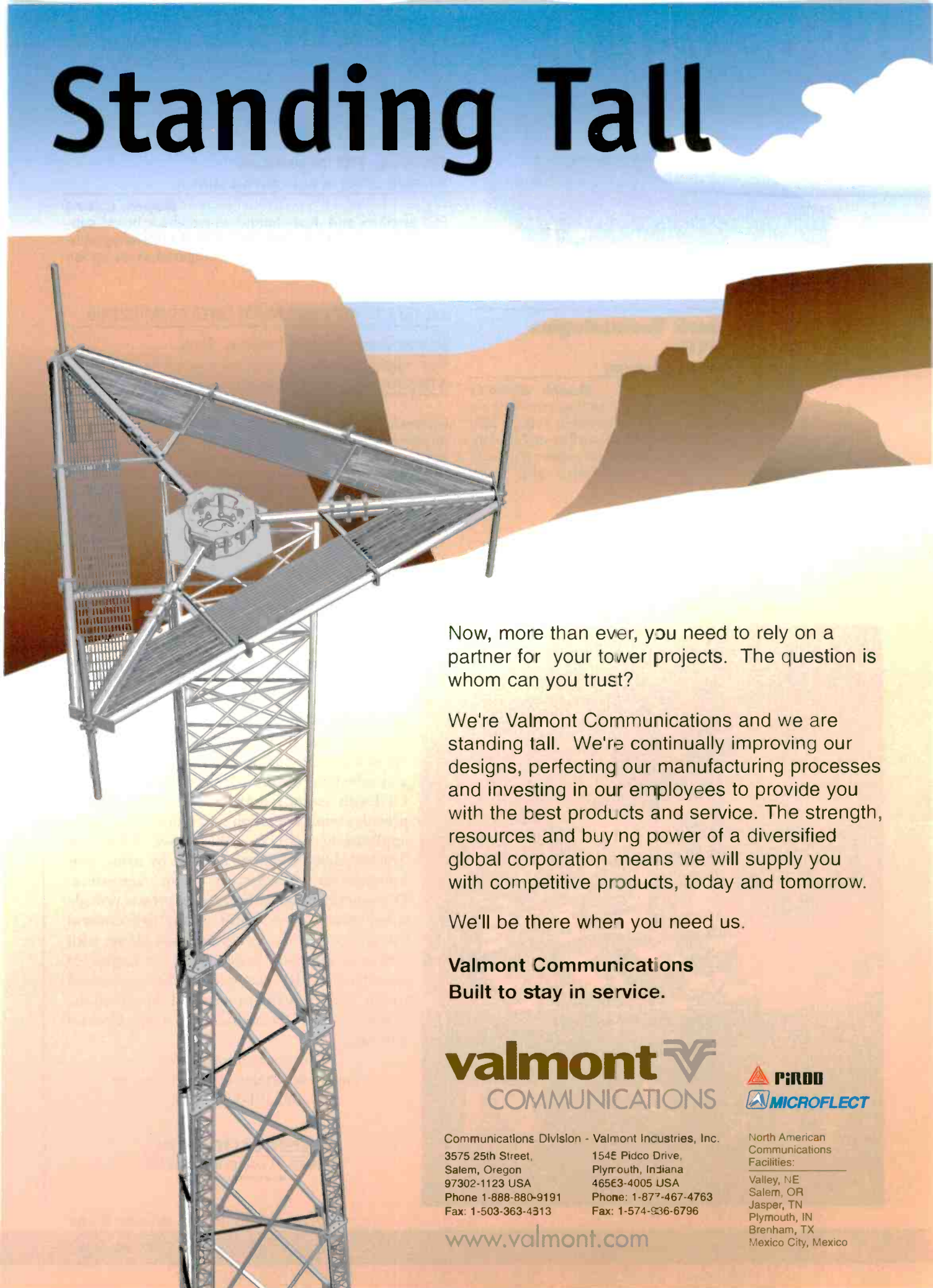

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## Scopus Network Technologies CODICO E-1510

*609-987-8092; www.scopus.net*

**Booth: SU6411**

Professional MPEG-2 DSNG exciter; unique combination of an encoder, modulator and upconverter in a single 2RU enclosure; suits ideally the requests of satellite mobile contribution networks; user-friendly exciter relies on a 4:2:0/4:2:2 encoder, 70/140MHz modulator and a Ku upconverter unit. ▲

SQUEEZEBACK BOARD

## Chyron PC Squeeze

*631-845-2000; www.chyron.com*

**Booth: C2074**

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3-D TEXT, EFFECTS AND MULTI-LAYER COMPOSITING

## Inscriber TitleMotion Pro for dpsVelocity

*519-570-9111; www.inscriber.com*

**Booth: SL1715**

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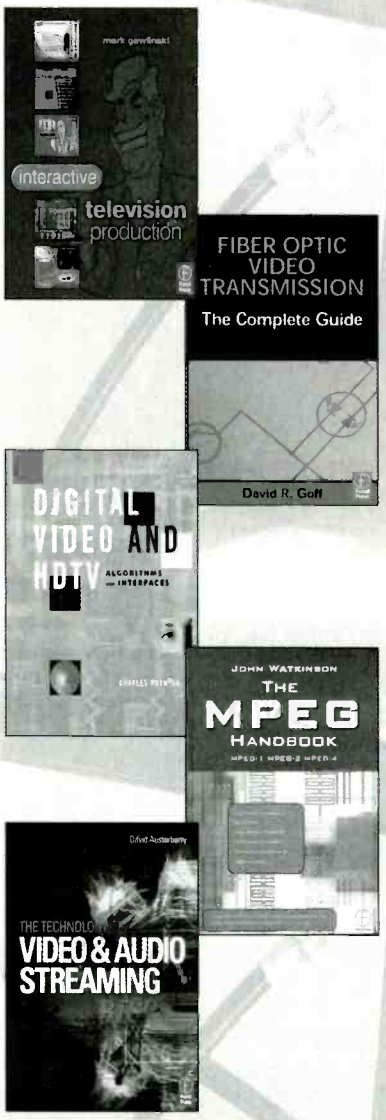


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# NAB PRODUCT HIGHLIGHTS

BATTERY MANAGEMENT SYSTEM

## IDX ENDURA

***310-891-2800; www.idx.tv***

***Booth: C968***

Software provides detailed information on E-80 batteries; will soon provide information on E-50 batteries; each E-80 includes Digital Data Protocol, which stores complete battery information, including charge cycles, operating temperatures and high loads, in nonvolatile form. ▲

EDITING SYSTEM

## Pinnacle Liquid purple v5

***650-526-1600; www.pinnaclesys.com***

***Booth: SU5003***

A complete DV editing and effects solution designed for videographers and broadcasters; delivers real-time 2-D and 3-D effects, time-saving background processing, analog video output, integrated DVD authoring and Palladium networked media support. ▲

ANTENNA TRACKING CONTROLLER

## Andrew ACS 3000

***708-349-3300; www.andrew.com***

***Booth: C2630***

Features storage capacity for up to 1000 satellite positions, built-in NORAD and Intelsat program track algorithms, and built-in Andrew SmarTrack mode; computes satellite long-term orbital model in only six hours; also features patented three-point peak tracking for 25 percent less wear. ▲

TELEPHOTO LENS

## Fujinon HA22x7.8 BERM/BERD

***973-633-5600; www.fujinon.com***

***Booth: SU4710***

Features a 2x extender, maximum relative aperture of F1.8 (from 7.8mm to 122mm) and reduced minimum object distance (0.8m). ▲

TRANSMISSION SOLUTION

## BT Broadcast BT SatNet

***202-721-8880; www.broadcast.bt.com***

***Booth: N1038***

Automated mobile system provides uplink and satellite capacity; features control from a central hub; uplink unit can be fitted to the roofs of most vehicles; incorporates fixed transmit settings and automatic dish deployment and positioning. ▲

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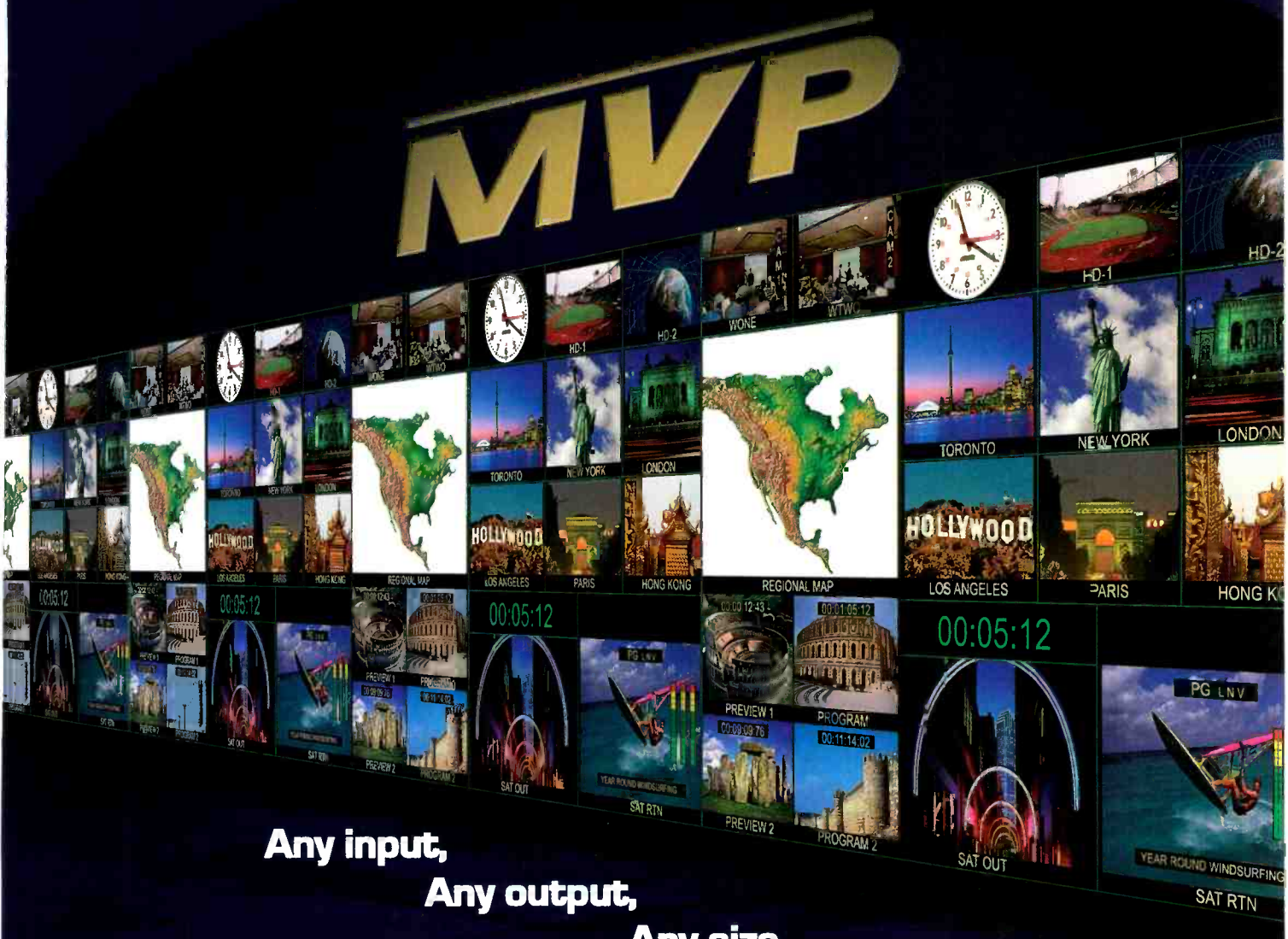


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SUBTITLE DECODER

## Eyeheight SD-2

***+44 1923 256 000; www.eyeheight.com***

***Booth: SU6632***

Decodes teletext subtitles and displays them in video; features eight user memories; PCB that fits into an FB-9 Flexi-Box; controlled using an FP-9 or FP-10 Flexi-Panel; the board can alternatively be housed in an MB-9 Minibox desktop unit with optional control panel. ▲

HD SWITCHER

## Thomson Grass Valley Kalypso HD

***530-478-3000; www.thomsongrassvalley.com***

***Booth: SU7059***

Provides native support for 1080i and 720p production; offers the same user interface, feature set and effects-generation capability as the SD Kalypso system; designed to support seamless native switching between SD and HD formats from the same frame. ▲

DIGITAL ROUTER

## Leitch Integrator Gold

***757-548-2300; www.leitch.com***

***Booth: SU4525***

Comes in standard-definition digital and wideband digital multi-rate formats; will route digital video signals from 30Mb/s to HDTV at 1.485Gb/s, while reclocking most standard data rates; expandable from 8x8 to 128x128 in a single 8RU chassis. ▲

AUDIO ANALYZER

## Modulation Sciences SpiderVision

***732-302-3090; www.modsci.com***

***Booth: C125***

Delivers a picture of the direction and amplitude (vector) of the dominant sound sources; real-time digital analyses alarm a host of conditions that might otherwise corrupt sound quality; visualizes the sound field of stereo and surround signals. ▲

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DIGITAL SOLID-STATE UHF TRANSMITTER

## Larcan Magnum

***905-564-9222; www.larcan.com***

***Booth: C3450***

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PLAYER/RECORDER

## Panasonic AJ-DX225

***800-528-8601; www.panasonic.com/broadcast***

***Booth: C904***

Suited for high-speed IEEE-1394-based computer editing, dubbing and archiving applications; can support 50Mb/s bandwidth IEEE-1394 play and record of DV Proline and DVCPRO format cassettes at two times normal speed with an appropriately equipped IEEE-1394-based personal computer, server or second AJ-DX225 videotape recorder, providing high-speed lossless dubbing. ▲

NTSC DECODER

## Fortel DTV DEC-410

***770-806-0234; www.forteldtv.com***

***Booth: SU6319***

Converts composite analog to component digital; for use in decoder-only applications not requiring the additional cost of synchronization. ▲

NEWS EDITING SYSTEM

## Panasonic AJ-DE10

***800-528-8601; www.panasonic.com/broadcast***

***Booth: C904***

IEEE-1394-equipped system consists of a specifically configured Panasonic TOUGHBOOK laptop computer with news editing software developed from the newsBYTE news NLE system; via its IEEE-1394 interface, 25Mb/s DVCPRO and DV video can be quickly ingested, edited using the intuitive software, and then file-transferred in the field or the studio. ▲

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# NAB PRODUCT HIGHLIGHTS

FIBER-OPTIC CONNECTORS

## Lemo USA fiber optic connectors

***707-578-8811; www.LemoUSA.com***

**Booth: C2433**

Features include security of the push-pull latching system, single-mode and multi-mode fibers, two-parts plug and socket connection system, protection against damage to the fiber end face, wide range of models and hybrid configurations. ▲

HANDHELD HD CAMCORDER

## JVC Professional JY-HD10U

***973-317-5000; www.jvc.com/pro***

**Booth: C2050**

Ideal for those on a limited budget; offers three resolution modes: HD at 720/30p, or SD at 480/60p or 480/60i; the two progressive modes use native 16:9 from the CCD with MPEG-2 compression, and the standard mode is 4:3 with DV compression; can upconvert or downconvert into virtually any format, including 1080i, 720/30p, 480/60p and 480/60i. ▲

ROUTER

## PESA Switching Systems Ocelot

***800-328-1008; www.pesa.com***

**Booth: SU6625**

Small-scale HD router is now capable of multiformat digital (SDI and HD-SDI); the Ocelot OES multi-rate card set handles bit rates from 3Mb/s to 1.5Gb/s, and reclocks at both SMPTE 259M and 292M rates; compact design enables it to be used in mobile trucks, as well as for field or studio applications. ▲

ASSET MANAGEMENT SYSTEM

## Florical Systems MediaMaster

***352-372-8326; www.florical.com***

**Booth: SU5425**

Now controls the contents of most broadcast-quality video servers using LAN-based asset management; increases the number of commands used to control the contents of video servers. ▲

CONSULTING SERVICES

## Dielectric Communications

***207-655-4555; www.dielectric.com***

**Booth: C424**

Designs, engineers and manufactures broadcast antennas for DTV and NTSC, FM antennas, combiners, switches, transmission lines, waveguides and dehydrators; provides custom solutions for its customers' unique requirements. ▲

UPCONVERSION SYSTEM

## Snell & Wilcox UpCaste

***212-481-1830; www.snellwilcox.c***

**B**

One-box HD upconverter for use in trans production; specifically designed to enable U casters to achieve a high-quality DTV picture an economic price point; suited to live productio to its low latency; easily configurable and designed marily for fixed-mode operation; can handle all comm HD formats. ▲

FIELD MIXER

## Azden FMX-2

***516-328-7500; www.azden.com***

**Booth: N2038**

Portable, two-channel field mixer; battery-operated mixer can be attached directly to a camera; features XLR inputs and outputs for larger cameras, in addition to a mini-plug output for miniDV cameras; also features two balanced XLR mic/line switchable outputs. ▲

CABLE

## Belden DataTwist 600e UTP

***800-235-3361; www.Belden.com***

**Booth: C674**

Fully characterized with guaranteed performance to 600MHz; delivers guaranteed 8dB of Power Sum NEXT headroom over proposed Category 6; almost 5dB of guaranteed return loss improvement over proposed Category 6 at 100MHz; attenuation margin over proposed Category 6; positive Power Sum ACR to 460MHz. ▲

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## Clear-Com Intercom Systems AMS-1025

***800-877-1771; www.clearcom.com***

**Booth: C3526**

Self-contained, bi-amplified, monitor speaker that occupies only a single rack space; provides convenient, powerful, high-quality audio monitoring capability in locations where few other monitor speakers can fit; features magnetically shielded speakers; provides very low distortion at high output power. ▲

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## DK Audio PTV PT5202

***800-421-0888; www.dk-audio.com***

**Booth: C766**

Compact VariTime sync generator that includes all the features necessary for professional sync, timing and test signals in one half-sized box; incorporates front panel controls that enable users to operate the sync generator without recourse to software within a PC; its small size is useful for remote vehicles and for studios that require an accurate and cost-effective sync generation tool. ▲

*CONTINUED ON PAGE 141*

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# ABOUT SIGMA

Since its foundation in 1976, Sigma Electronics has been manufacturing high quality, cost effective products for television production and broadcasting. Sigma products have been running continuously for many years in all corners of our industry. In 2002 we committed our time to rebuilding our engineering team and defined a new product roadmap that will allow us to capitalize on our foundations of reliability and cost control while bringing you a range of exciting new products and services.

I am pleased to announce that this year will see the introduction of a variety of new designs aimed at providing unique and affordable solutions to the issues faced when developing digital infrastructures. We will continue to provide the range of analog switching, generation, and distribution products that have become our trademark. At the same time we will continue to look for creative ways to address the signal management needs of your new digital systems.

The digital audio content of DTV adds new challenges to signal management requirements. We have a good understanding of some of these challenges and have identified a number of new product designs, some of which are described in these pages.

As of this spring, we will also add online purchasing to our web site. You will be able to purchase our products quickly and easily. We look forward to demonstrating fast product delivery and excellent customer service – at remarkably affordable prices!

Our website also carries detailed information and specifications of all our products and services. So please visit our site regularly to keep up with our latest news and offers.

Nigel Spratling
President

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# NEW PRODUCTS

## NEW EQUIPMENT FRAME - S5000

FOR DETAILED SPECS, VISIT OUR WEBSITE

Our 2100 series frames provide high module density at very attractive prices. However, our new products would not readily fit the 2100 architecture. We needed a new frame design that could offer emissions compliance at HD bit rates, front-loading modules, high connector density, and the ability to communicate status and control.

Rather than burden the market with another frame design, we assessed available frames to determine if an existing product could accommodate our needs.

As a result - the new S5000 is 100% compatible with the NVISION NV500 frame. This frame meets all of our design goals and has already gained wide industry acceptance. Thank you NVISION, for allowing us to adopt this excellent design.

For more information see page 7.

## OctaStream 8 CHANNEL DIGITAL AUDIO

**OctaStream Mixer & Subframe Router: Adjust gain, mix and shuffle 8 audio channels (4 AES)**
**DA5320 ..... $1,495 ..... Page 11**

**OctaStream Variable Delay Compensator: Up to 10 seconds of delay for 4 Independent AES signals (8 channels)**
**DA5315 ..... $1,495 ..... Page 11**

**OctaStream Sample Rate Converter: Retime 4 AES asynchronous inputs to a local reference and maintain perfect phase**
**DA5325 ..... $1,495 ..... Page 12**

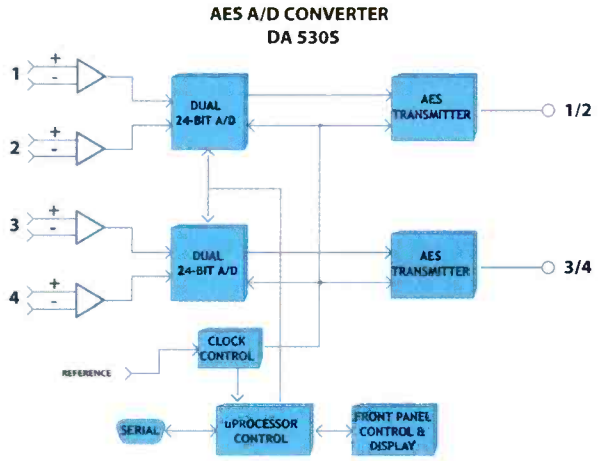
**OctaStream Audio Reference Generator: Generate AES tone/silence with 8 audible channel identifiers**
**SG5605 ..... $1,495 ..... Page 12**

## DIGITAL ROUTING SWITCHERS

**32 x 32 SDI & AES switching now available in the compact MRX series ..... Page 25**

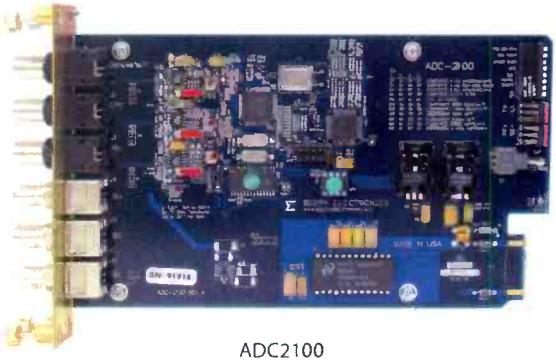
## SIGNAL CONVERSION PRODUCTS

### DIGITAL AUDIO

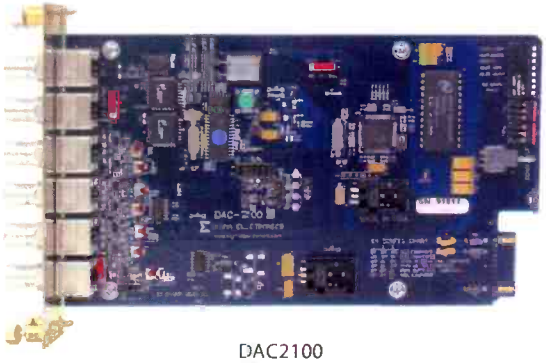


**24bit/ 96 kHz, 4 channel AES A to D converter**
**DA5305 ..... $1,345 ..... Page 15**
**24bit/ 96 kHz, 4 channel AES D to A converter**
**DA5310 ..... $1,095 ..... Page 15**

### DIGITAL VIDEO



ADC2100



DAC2100

**10 bit NTSC/PAL to SMPTE 259M converter**
**ADC2100 ..... $1195 ..... Page 15**
**10 bit SMPTE 259M to NTSC/PAL converter**
**DAC2100 ..... $1195 ..... Page 15**

## SIGNAL GENERATION PRODUCTS

**Digital and Analog Test and Reference generator**

**TSG470D ..... $4,995 ..... Page 17**

BUY NOW FROM OUR WEBSITE!

# NEW PRODUCTS

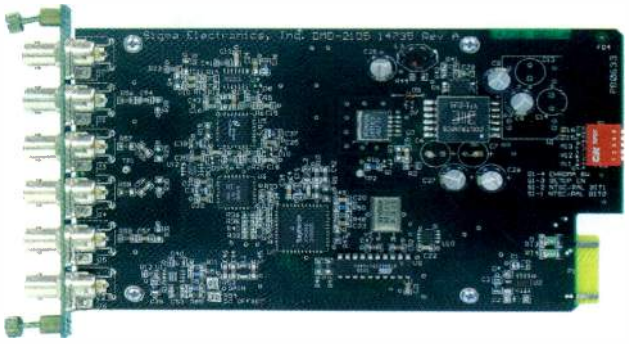
## SIGNAL GENERATION PRODUCTS

**HD Tri-level Sync Generator for all formats**

**SG5610 ..... Available Fall '03 ..... Page 16**

## DISTRIBUTION AMPLIFIERS

**Monitoring SDI DA with EQ & reclocking, NTSC or PAL monitor output**



DMD2105

2100 series: **DMD2105** ..... **$595** ..... **Page 13**
S5000 series: **DV5505** ..... **$595** ..... **Page 13**

**Digital High Definition DA with EQ & reclocking**

**HD5805 ..... Available Fall '03 ..... Page 13**

**Wordclock (SDIF2) DA, 1x6, BNC connectors, 1 slot module**

**2100 series: WC2100 ..... $245 ..... Page 13**

## CONTROL SYSTEM INTERFACES

**Communications Control Module for adding Sigma routing to third party control systems**

**CCM2100 ..... $795 ..... Page 35**

**Control Interface to add third party DNF RS-422 port routers to Sigma MRX/ADX systems**

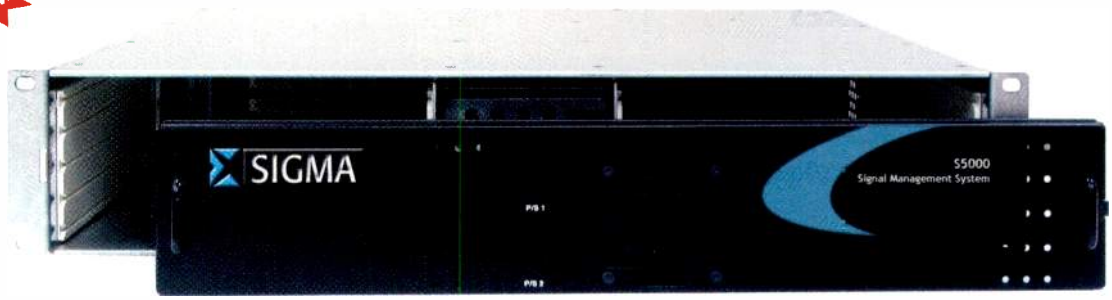
**DNX2144 ..... $395 ..... Page 35**

**Communications Controller for the new S5000 frame**

**CI5705 ..... $395 ..... Pages 7-8**

FOR DETAILED SPECS, VISIT OUR WEBSITE

## NEW S5000 SIGNAL MANAGEMENT SYSTEM




Our new S5000 signal management frame is 100% compatible with the NVISION NV500 enclosure. This new frame allows us to bring you some exciting new modular products that fully utilize the benefits of this outstanding design.

### FRAME FEATURES

- 2RU frame holds 10 modules, each with 10 connectors–ideal for high density applications
- Communications controller for external status and command–allows centralized system management
- Front–to–side airflow allows frames to be stacked without spacing–providing maximum rack utilization
- Quiet running, door mounted cooling fan–excellent cooling, easy replacement
- Module status indicators viewable with door installed–check module health at-a-glance
- All modules and power supplies are hot swappable–no need to power down for service replacement
- Redundant power supply readily fitted–never lose service from power supply failure
- Fully CE and UL compliant–meets international safety and emissions standards
- Door is completely removable–allows full unrestricted access to all modules
- Power supplies positively latch into the frame–ensures resistance to vibration for mobile applications
- Alarm outputs for power supplies–know instantly when a supply fails in redundant operation

### COMMUNICATIONS

By adding the communications interface, modules can report status and be remotely controlled. The interface is connected to a host computer via RS-485, which allows up to 32 S5000 frames to communicate via a single serial port.

Control applications are supplied for individual module control of our new OctaStream products and later this year we will introduce an SNMP agent which will allow module management and status reporting for large systems.

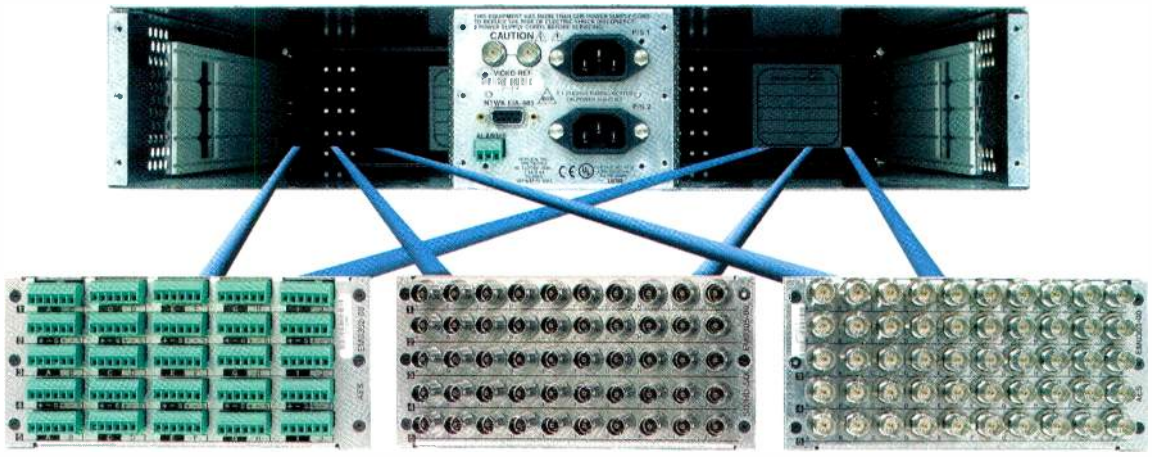
BUY NOW FROM OUR WEBSITE!

## CONFIGURATION

The S5000 is supplied with a choice of three rear connector modules. These modules fit in either side of the frame and allow the frame to contain mixed signal formats.

## REAR CONNECTOR CHOICES

Twisted Pair via plug-in screw-terminal blocks: RP302
BNC for unbalanced AES audio: RP303
BNC panel for HD and SD digital video: RP305



RP302 RP305 RP303

## WHAT YOU GET

The S5000 is supplied complete with a single power supply and comes preconfigured with your choice of any two rear connector panels.

**S5000** ..... **$1,295**

## OPTIONS

Additional power supply for redundant operation

**P5000** ..... **$595**

Communications interface card, allows external communication via RS485

**CI5705** ..... **$395**

For information on compatible modules from NVISION – please visit the NVISION website *www.nvision1.com*

FOR DETAILED SPECS, VISIT OUR WEBSITE

## 2100 ECONOMY SERIES

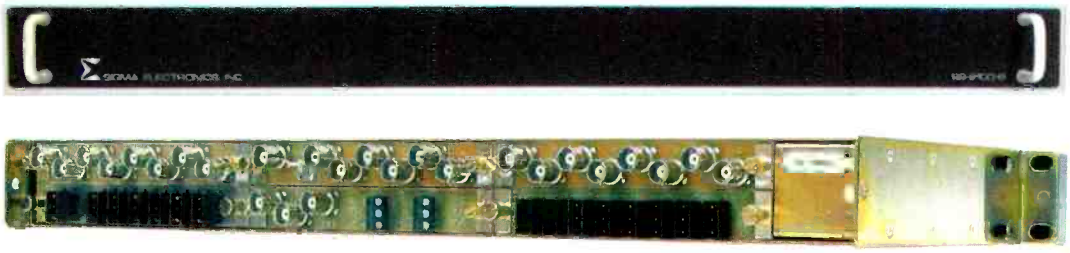
High-density housings for a wide range of modular products. Designed to provide efficient use of space reliably and cost-effectively.

### FRAMES

**A freestanding box with power supply providing two module slots.**

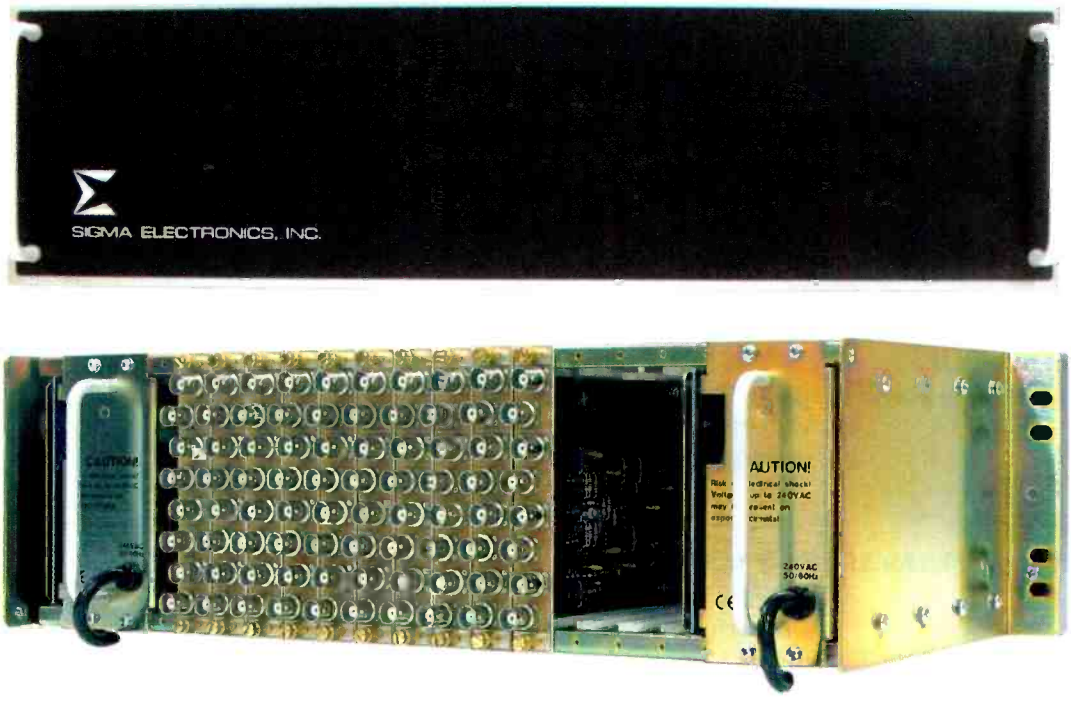
**SS 2100-2** ..... **$275**

**A 1RU enclosure with six module slots, including wall power supply.**



**SS 2100-6** ..... **$450**

**A 3RU enclosure providing 13 module slots and housing redundant power supplies for fail-safe operation. Complete with one supply.**

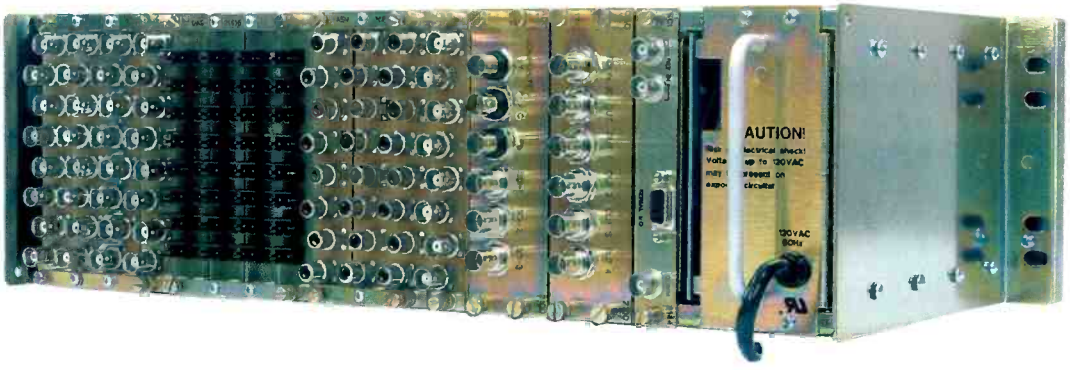



**SS 2100-12 PLUS** ..... **$595**

BUY NOW FROM OUR WEBSITE!

# EQUIPMENT FRAMES
## 2100 SERIES

**A 3RU enclosure providing 17 module slots complete with internal power supply**




**SS 2100-16 PLUS** ..... $595

**A self-powered stand-alone box for a single slot 2100 series module**

**SSB21** ..... $175

### POWER SUPPLIES

**Redundant/Spare power supply for SS 2100-12/16 PLUS**

120 VAC 50/60Hz: **FPS-2100** ..... $275
230 VAC 50/60Hz: **FPS-2101** ..... $275

### ACCESSORIES

**1RU rack-mount kit for SS 2100-2 (holds two)**

**RMT 2100-2A** ..... $70
Blank panel for RMT 2100-2A: **SBP 2102** ..... $16

**1RU rack-mount kit for SSB21 (holds three)**

**RMK26** ..... $50

**Extender card for 2100 series modules**

**IAM 2100** ..... $95

FOR DETAILED SPECS, VISIT OUR WEBSITE

# OCTASTREAM™ 8 CHANNEL DIGITAL AUDIO

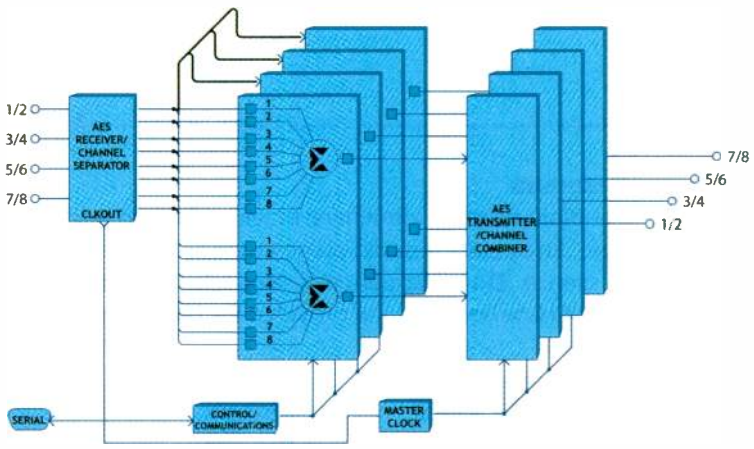
## OCTASTREAM™ 8 CHANNEL DIGITAL AUDIO

The design of video systems for the digital transition is well understood. In most cases a wide range of devices are available for all digital video signal management needs. However, managing digital audio still presents many technical challenges that have few solutions.

**OctaStream™** is a new product range designed specifically to provide quality, cost-effective solutions to assist in the integration of AES and multi-channel digital audio into the DTV system. Our first offerings include unique timing, mixing and synchronizing solutions that are only available from Sigma. For more detailed specifications, additional product announcements or to buy any Sigma product directly, please visit our website. For frame options see pages 7-8.

### OctaStream™ Mixer & Subframe Router

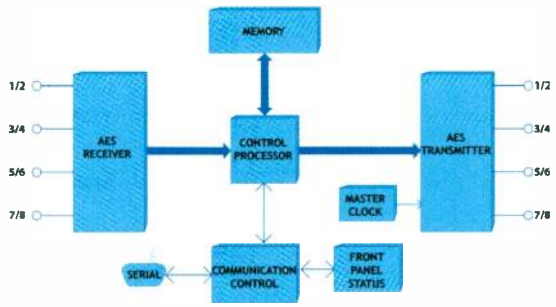
Allows phase & gain adjustments, mixing and subframe routing (channel shuffle) of 8 individual audio channels from 4 AES input streams. Timing reference is derived from AES input 1/2. Simple front panel controls are provided for basic operations. The supplied software GUI* provides full control of all functions.




**DA5320** ..... **$1,495**

### OctaStream™ Variable Delay Compensator

Up to 10 seconds of delay for each of 4 independent AES signals (8 channels). Each AES channel pair can be set for different delay amounts with a maximum delay of 10 seconds. Ideal for compensating video path latency. Delays can be selected in units of seconds or NTSC/PAL frames. Simple front panel controls are provided for basic operations. The supplied software GUI* provides full control of all functions.



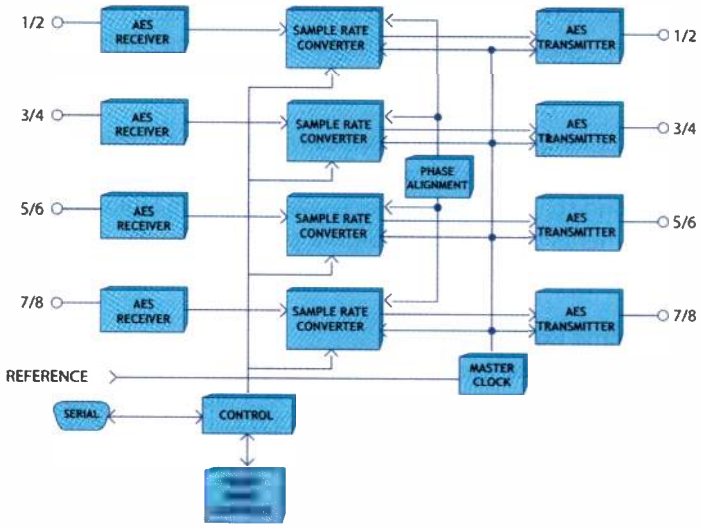

**DA5315** ..... **$1,495**

*(Requires a CI5705 control interface module installed in the S5000 frame).

BUY NOW FROM OUR WEBSITE!

### OctaStream™ Sample Rate Converter

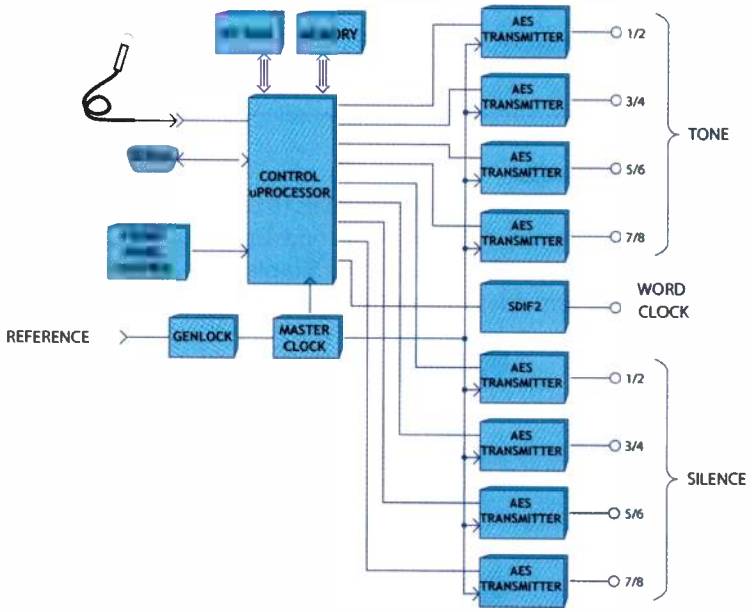
The audio equivalent of a video frame synchronizer – retime 4 asynchronous AES inputs to a local reference and maintain perfect phase. Allows conversion of sample rates from 28-108 kHz to 44.1kHz, 48kHz, 88.2kHz, 96kHz or the output sample rate can be steered by an external reference. Simple front panel controls are provided for basic operations. The supplied software GUI* provides full control of all functions.




**DA5325** ..... **$1,495**

### OctaStream™ Audio Reference Generator

Generate AES tone/silence with 8 audible channel identifiers. Provides built-in audible channel ID's as well as allows for local recording and storage. Can operate in stand-alone mode or be locked to a master video reference. Simultaneous outputs of tone and silence, ID timing period is user selectable and can be turned on/off on a channel-by-channel basis. Simple front panel controls are provided for basic operations. The supplied software GUI* provides full control of all functions.




**SG5605** ..... **$1,495**

*(Requires a CI5705 control interface module installed in the 55000 frame).

FOR DETAILED SPECS, VISIT OUR WEBSITE

## DIGITAL DISTRIBUTION

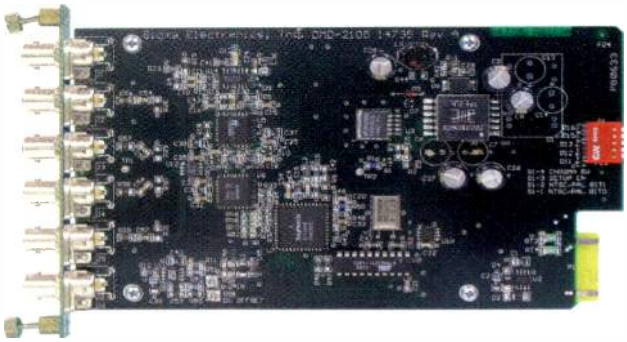
Our digital DA's provide the quality you need for a remarkably small price. Please visit our website for detailed specifications or to order directly.

### VIDEO

NEW **HD DA: 1 x 9 Wideband, SD and HD data rates with equalizing and auto reclocking**
S5000 series module: **HD5805** ..... TBA

**SMPTE 259M DA, 1x8 with equalizing and reclocking**
2 slot 2100 series module: **DVD-2104** ..... $345

NEW **Monitoring DA, SMPTE 259M , 1x4 DA with equalizing and reclocking**
**Plus: Analog composite output NTSC/PAL**

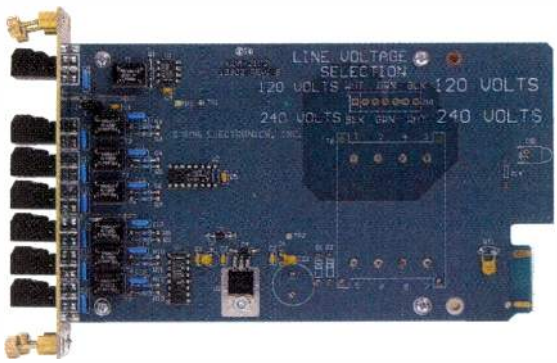


1 slot 2100 series module: **DMD-2105** ..... $695

NEW **Monitoring DA, SMPTE 259M , 1x8 DA with equalizing and reclocking**
**Plus: Analog composite output NTSC/PAL**
S5000 series module: **DV5505** ..... $695

### AUDIO

**AES/EBU, 1x6 fan out DA for 110ohm balanced connections**




1 slot 2100 series module: **UDA-2102** ..... $195

NEW **Wordclock (SDIF2) DA, 1x6, BNC connectors**
1 slot 2100 series module: **WC2100** ..... $245

BUY NOW FROM OUR WEBSITE!

# ANALOG DISTRIBUTION

Sigma distribution amplifiers are available for a wide variety of applications in either modular or stand alone configurations. For frame choices, please refer to pages 9-10

Our analog DA's offer the best choice for signal performance and cost efficeincy.

## VIDEO

**1x6,general purpose, Looping input, 35MHz bandwidth**

modular: **VDA-21** ..... $99.00
stand alone: **VDA-26A** ..... $295.00

**1x6 equalizing up to 1500 ft., AC or clamped**

modular: **VEQ-2105A** ..... $225.00
stand alone: **VEQ-2605A** ..... $375.00

**Dual 1x3, 110MHz Bandwidth, Graphics and high density applications**

modular: **VDA-2102x3** ..... $280.00
stand alone: **VDA-2602x3** ..... $455.00

**1x6 Y/C, with 4 pin "S Video" connectors**

modular: **SDA-2182** ..... $300.00
stand alone: **SDA-2682** ..... $475.00

**1x6, 100 MHz wideband, with Eq for 500ft, for RGB and other high bandwidth signals**

stand alone: **VEQ-2601A** ..... $500.00

## AUDIO

**1x6,high performance, balanced, 150 kHz bandwidth**

modular: **ADA-21** ..... $150.00
stand alone: **ADA-26A** ..... $300.00

**Stereo, dual 1x3, high performance, balanced**

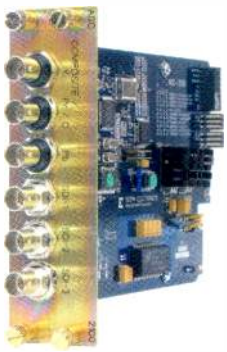
modular: **ADA-21S** ..... $175.00
stand alone: **ADA-26S** ..... $400.00

FOR DETAILED SPECS, VISIT OUR WEBSITE

## CONVERSION

This year we have added several new conversion products, engineered to enable you to manage mixed signal formats as transparently as possible at affordable prices. These products include high end video conversion for critical applications as well as a new range of digital audio products.

### VIDEO



ADC-2100

DAC-2100

NEW **Reference Quality - Analog to Digital video converter, 10 bit, with high resolution PAL/NTSC decoding,**
2 slot 2100 series module: **ADC2100** ..... **$1,195.00**

NEW **Reference Quality - Digital to Analog video converter, 10 bit, with high resolution encoding, SMPTE 259M in, Y,Pr,Pb,RGB,Y/C, PAL/NTSC out**
2 slot 2100 series module: **DAC2100** ..... **$1,195.00**

**Y,Pr,Pb to NTSC & Y/C Transcoder**
2100 series module: **TXC2114** ..... **$575.00**
Stand alone: **TXC2614** ..... **$750.00**

**NTSC or PAL to Y/C : Y/C to NTSC or PAL Transcoder**
2100 series module: **TYC2115** ..... **$260.00**
Stand alone: **TYC26** ..... **$395.00**

**For frame choices, please refer to pages 9-10.**

### AUDIO

NEW **Dual – High quality, 24bit 96kHz A to D converter, 4 analog inputs, 2 AES outputs**
5000 series module: **DA5305** ..... **$1,345.00**

NEW **Dual – High quality, 24bit 96kHz D to A converter, 2 AES inputs, 4 analog outputs**
5000 series module: **DA5310** ..... **$1,095.00**

NEW **OctaStream 8 channel (4 AES) 24bit 96kHz Sample Rate Converter – See page 12**

**For frame choices, please refer to pages 7-8.**

BUY NOW FROM OUR WEBSITE!

# GENERATION

## MODULAR AND STAND-ALONE SIGNAL GENERATORS

High quality, clock stable signal generators for stand-alone and system installations. Naturally offering the same Sigma mix of high performance at reasonable cost.

### MODULAR *(for frame choices see pages 7-10)*

NEW **HD Tri-level Sync Generator for all formats - SG5610 - Available Fall '03...**
A universal video sync generator designed to provide all of the signals necessary for High Definition production, post-production and broadcasting. This new generator locks to standard NTSC/PAL references as well as an atomic clock. It has 8 user selectable outputs that are available in the following Tri-level and Bi-level formats.

1080i/60, 1080i/59.94, 1080i/50, 1080p/30, 1080p/25, 1080p/24, 1080p/24sF, 720p/60, 720p/59.94, 625i/48, 625i/50, 525i/59.94, 6Hz Pulse, 1Hz Pulse

A 5000 series module: **SG5610** ..... **$TBA**

**Black Signal Generator with eight outputs.**
1 slot 2100 series module, NTSC: **BSG21N** ..... **$275.00**
1 slot 2100 series module, PAL: **BSG21P** ..... **$325.00**

**Color Bar, Tone & ID Generator, NTSC only. (ID programmed at Sigma Factory)**
2 slot 2100 series module: **CBG2155A2** ..... **$395.00**

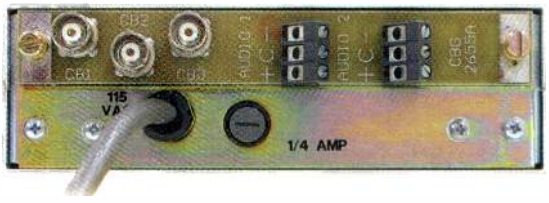
**OctaStream - Audio Reference Generator: SG5605... see page 12**

### STAND-ALONE

**Black Signal Generator with six outputs.**

NTSC: **BSG26N** ..... **$395.00**
PAL: **BSG26P** ..... **$445.00**

**Color Bar, Tone & ID Generator, NTSC only (ID programmed at Sigma Factory)**




**CBG2655A** ..... **$570.00**

**Master RS-170A Sync Generator**
**CSG455** ..... **$1,995.00**

FOR DETAILED SPECS, VISIT OUR WEBSITE

## MASTER SYNC & TEST PATTERN GENERATOR

The **TSG-470** is a master sync generator designed to satisfy requirements of all broadcast serial digital and mixed digital/analog postproduction and operational environments.

All of the timing and test signals needed to satisfy any application in NTSC or PAL are provided by the **TSG470**. It is equally suited to use as either a master or slave when genlocked to an external reference. The built in animated ID's are invaluable for verification of feeds from remotes.

NEW The **TSG470D** is now available, it adds digital video (SMPTE 259M) outputs to this high quality product. All of the standard **TSG470** features are retained.

### FEATURES

- Superior peformance, stability, and reliability
- Comprehensive range of test patterns for all analog and digital applications
- ±2 field genlock timing range with 3 presets
- Multiple color black outputs
- Analog stereo tone output
- User programmable text ID's (3)
- Animated text ID's

TSG-470D FRONT

TSG-470D BACK

**Analog only: TSG-470** ..... **$3,495**
**Analog & Digital: TSG-470D** ..... **$4,995**

### OPTIONS

Dual standard Color Black option, three timeable blacks independently adjustable, ±2 fields NTSC or ± 4 fields PAL (selectable for each output)

**OM-402** ..... **$1250**

BUY NOW FROM OUR WEBSITE!

## SOURCE SELECT

Sigma Source Select Switches are available for a wide variety of applications, from simple non-synchronous 12 x 1's to configurable, multi-level, vertical interval systems. Like all Sigma products these switches are highly reliable and very affordable.

### AVAILABLE MODELS:

**Non-Synchronous, 12x1, analog video/stereo audio - VSS series**
Simple, inexpensive switching for monitoring functions

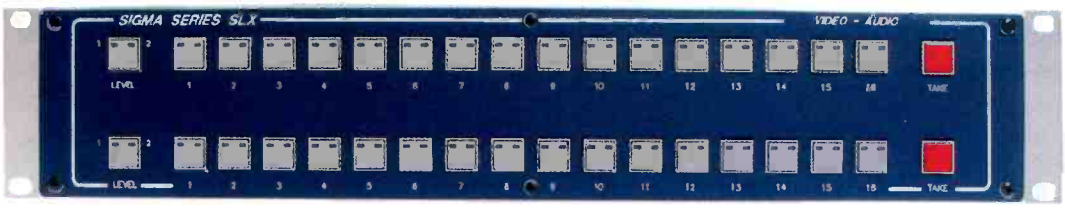
Twisted Pair audio: **VSS 12** ..... **$575**
RCA audio connectors: **VSS 12R** ..... **$575**

**Synchronous Vertical Interval switching, 12x1, analog video/stereo audio, w/ breakaway - 12X SV**
Simple, inexpensive 'glitch free' switching for monitoring, recording & transmission applications

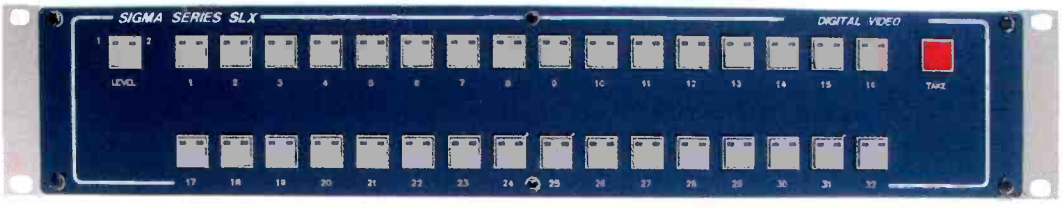
**12X SV** ..... **$995**

**Synchronous Vertical Interval switching, 16 or 32 inputs, 1 or 2 destinations, w/ breakaway – SLX series**
Configurable, inexpensive 'glitch free' switching for monitoring, recording and transmission applications

**SLX 161**




**SLX 162**




**SLX 321**

### SLX ORDERING GUIDES

The charts on the following pages show basic configurations and prices.
To order simply choose the model # and suffix.

### ORDERING EXAMPLE

model #: SLX 161 with suffix: DVA = SLX 161 DVA = 16x1 digital video/analog audio

FOR DETAILED SPECS, VISIT OUR WEBSITE

## ANALOG SYSTEMS

| MATRIX SIZE & MODEL # | | 16x1 SLX-161 | | 16x2 SLX-162 | | 32x1 SLX-321 | | 32x2 SLX-322 | |
|---|---|---|---|---|---|---|---|---|---|
| CONFIGURATION | SUFFIX | PRICE | # RU | PRICE | # RU | PRICE | # RU | PRICE | # RU |
| AUDIO ONLY | AO | $1170 | 1 | $1490 | 1 | $1660 | 2 | $2300 | 2 |
| STEREO ONLY | SO | $1490 | 1 | $2300 | 2 | $2300 | 2 | $4010 | 4 |
| VIDEO ONLY | VO | $1170 | 1 | $1500 | 1 | $1660 | 2 | $2300 | 2 |
| | VO(L) | $1200 | 1 | $1720 | 2 | $1720 | 2 | $2850 | 4 |
| AUDIO/VIDEO | AV | $1490 | 1 | $2300 | 2 | $2300 | 2 | $4010 | 4 |
| | AV(L) | $1600 | 2 | $2730 | 3 | $2730 | 3 | $4670 | 6 |
| STEREO AUDIO/VIDEO | SV | $1800 | 1 | $3300 | 3 | $2930 | 3 | $5730 | 6 |
| | SV(L) | $1920 | 2 | $3440 | 4 | $3450 | 4 | $6280 | 8 |
| 2 CHANNEL VIDEO | 2C | $1490 | 1 | $2300 | 2 | $2300 | 2 | $4010 | 4 |
| | 2C(L) | $1630 | 2 | $2860 | 4 | $2850 | 4 | $5120 | 8 |
| 3 CHANNEL VIDEO | 3C | $1900 | 2 | $3300 | 3 | $3310 | 3 | $5730 | 6 |
| | 3C(L) | $2350 | 3 | $4000 | 6 | $4000 | 6 | $7390 | 12 |

(L) in product suffix indicates looping inputs

## STANDARD DEFINITION DIGITAL/ANALOG SYSTEMS

| MATRIX SIZE & MODEL # | | 16x1 SLX-161 | | 16x2 SLX-162 | | 32x1 SLX-321 | | 32x2 SLX-322 | |
|---|---|---|---|---|---|---|---|---|---|
| CONFIGURATION | SUFFIX | PRICE | # RU | PRICE | # RU | PRICE | # RU | PRICE | # RU |
| DIGITAL AUDIO | DA | $1310 | 1 | $1600 | 2 | $1940 | 2 | $2520 | 3 |
| DIGITAL VIDEO | DV | $1310 | 1 | $1730 | 2 | $1940 | 2 | $3140 | 3 |
| DIGITAL AUDIO/VIDEO | DVDA | $1770 | 1 | $3020 | 3 | $3230 | 3 | $5010 | 5 |
| DIGITAL VIDEO ANALOG AUDIO | DVA | $1630 | 1 | $2910 | 3 | $2950 | 3 | $4790 | 4 |
| DIGITAL VIDEO/ ANLG ST AUDIO | DVS | $1950 | 1 | $3550 | 3 | $3590 | 3 | $6500 | 5 |

Custom configurations and remote control options are available; please contact the factory for more information

BUY NOW FROM OUR WEBSITE!

## SMALL SYSTEMS

### SMALL ROUTING SYSTEMS (4 x 4 to 16 x 16)

For many years Sigma routing modules have provided the basic foundation for a wide variety of systems. Our small router lines included the Micro-Matrix, Sigma-lite and HPX systems. These systems all shared a common platform - the 2100 series frame - and for this year we have consolidated these product lines into a single group, simplifying ordering and widening overall product application.

All of the routing modules in this section are housed in 2100 series frames; for frame information go to pages 9-10.

We have also developed a good selection of control panels and interface options. Control options available are shown on pages 31-32.

The following chart can be used to select the correct modules for your needs by selecting matrix size and signal requirements.

| MATRIX SIZE | ANALOG AUDIO | ANALOG VIDEO | AES-EBU AUDIO | SDI VIDEO | PULSE |
|---|---|---|---|---|---|
| 4x4 | ASM-2144 | VSM-2144A | DAS-2144 | DVS-2144 | HPP-D44 |
| 8x4 | ASM-2184 | VSM-2184A | N/A | DVS-2184 | N/A |
| 8x8 | ASM-88*<br>HPA-88* | VSM-88*<br>HPV-88* | DAS-2188 | N/A<br>N/A | HPP-88 |
| 16x4 | ASM-21164 | VSM-21164A | N/A | DVS-21164 | N/A |
| 16x8 | ASM-168*<br>HPA-168* | VSM-168*<br>HPV-168* | N/A | N/A<br>N/A | HPP-168 |
| 16x16 | ASM-1616*<br>HPA-1616* | VSM-1616*<br>HPV-1616* | DAS-21616 | DVS-1616*<br>DVM-1616 | HPP-1616 |

*Choice of connector

*Choice of bandwidth

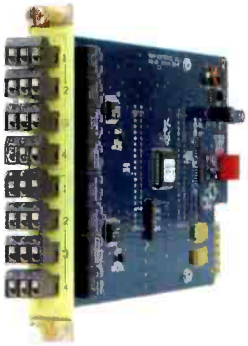
*Stand-alone system

To build and configure your small routing system, simply choose the matrix size and signal type - then add up the slots occupied by each module to determine your frame requirements. Don't forget to add a slot for a System Control Interface (SCI).

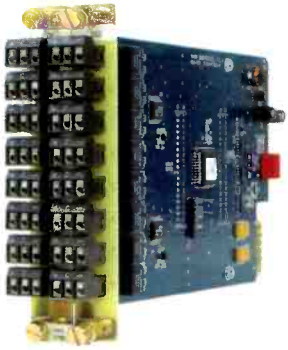
FOR DETAILED SPECS, VISIT OUR WEBSITE

## DIGITAL AUDIO (AES/EBU)

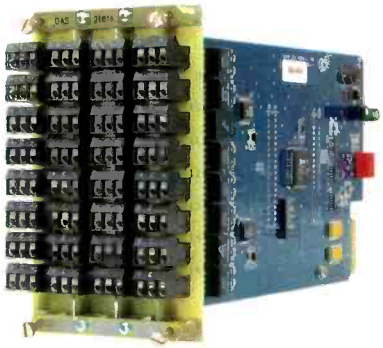
**Plug-in connector blocks**



DAS-2144



DAS-2188



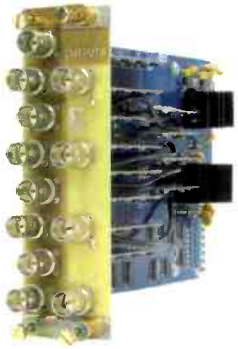
DAS-21616

4-in X 4-out, 1 slot: **DAS-2144** ..... **$375**
8-in X 8-out, 2 slots: **DAS-2188** ..... **$650**
16-in X 16-out, 4 slots: **DAS-21616** ..... **$1300**

## DIGITAL VIDEO (SDI)

**SMPTE 259M video switching**

DVS-2144



DVS-2184

DVS-21164

4-in X 4-out, 1 slot: **DVS-2144** ..... **$525**
8-in X 4-out, 2 slots: **DVS-2184** ..... **$750**
16-in X 4-out, 4 slots: **DVS-21164** ..... **$1050**

**Complete, just add control panel (see page 31)**

16-in X 16-out, 1RU: **DVS-1616** ..... **$2995**

**Add SDI to existing 2100 switching system**

16-in X 16-out, 1RU: **DVM-1616** ..... **$2195**

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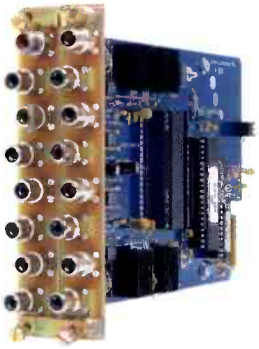
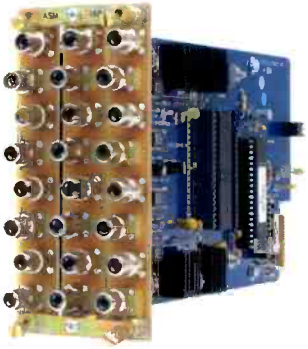
## ANALOG AUDIO

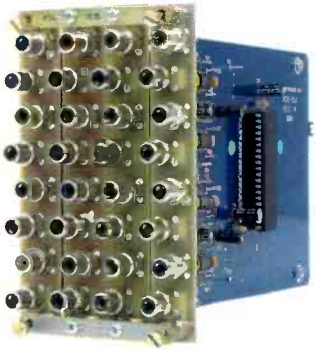
**RCA jacks for unbalanced applications**



ASM-88



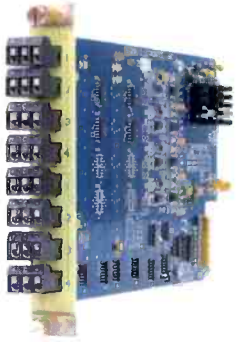
ASM-168



ASM-1616

8-in x 8 out, 2 slots: **ASM-88** ..... **$350**
16-in x 8 out, 3 slots: **ASM-168** ..... **$495**
16-in x 8 out, 4 slots: **ASM-1616** ..... **$695**

**Plug-in, balanced audio connectors**



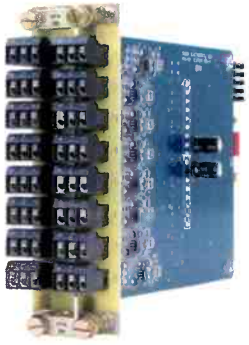
ASM-2144

ASM-2184

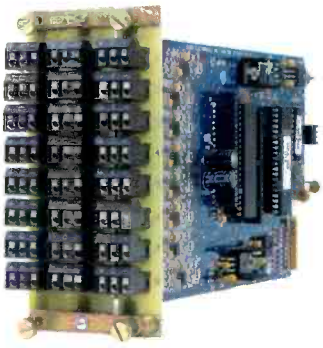
ASM-21164

4-in X 4-out, 1 slot: **ASM-2144** ..... **$275**
8-in X 4-out, 2 slots: **ASM-2184** ..... **$375**
16-in X 4-out, 3 slots: **ASM-21164** ..... **$550**

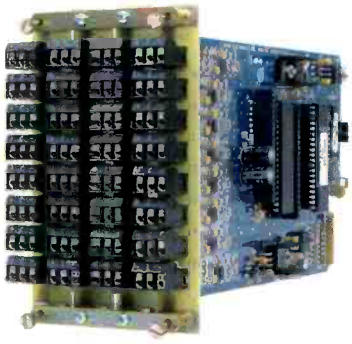
**Plug-in, balanced audio connectors**



HPA-88



HPA-168



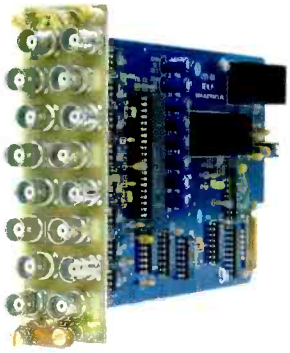
HPA-1616

8-in X 8-out, 2 slots: **HPA-88** ..... **$550**
16-in X 8-out, 3 slots: **HPA-168** ..... **$875**
16-in X 16-out, 4 slots: **HPA-1616** ..... **$1300**

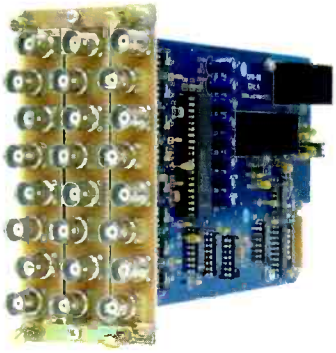
FOR DETAILED SPECS, VISIT OUR WEBSITE

## ANALOG VIDEO

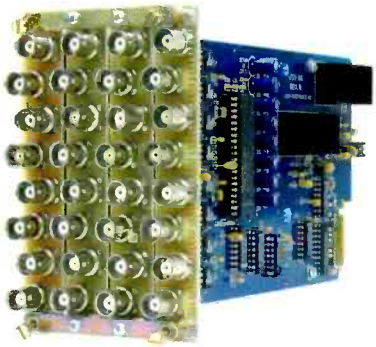
### NTSC/PAL switching



VSM-88



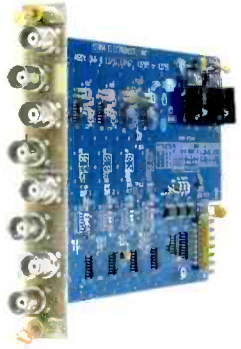
VSM-168



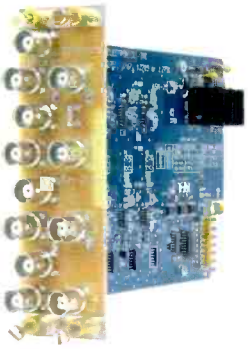
VSM-1616

8-in x 8-out, 2 slots: **VSM-88** ..... **$350**
16-in x 8-out, 3 slots: **VSM-168** ..... **$495**
16-in x 16-out, 4 slots: **VSM-1616** ..... **$695**

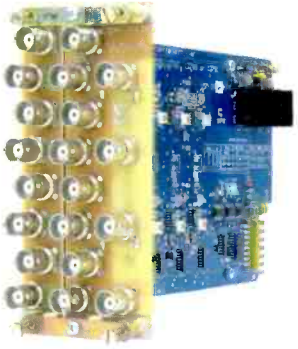
### High bandwidth switching for NTSC/PAL and Component



VSM-2144A

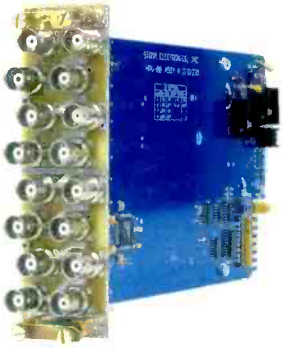


VSM-2184A

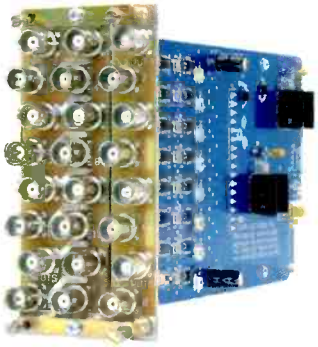


VSM-21164A

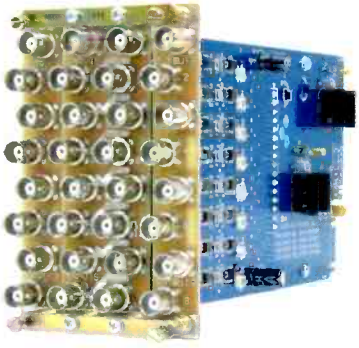
4-in x 4-out, 200 MHz, 1 slot : **VSM-2144A** ..... **$250**
8-in x 4-out, 200 MHz, 2 slots: **VSM-2184A** ..... **$375**
16-in x 4-out, 175 MHz, 3 slots: **VSM-21164A** ..... **$550**



HPV-88



HPV-168



HPV-1616

8-in X 8-out, 160 MHz, 2 slots: **HPV-88** ..... **$375**
16-in X 8-out, 175 MHz, 3 slots: **HPV-168** ..... **$750**
16-in X 16-out, 160 MHz, 4 slots: **HPV-1616** ..... **$1375**

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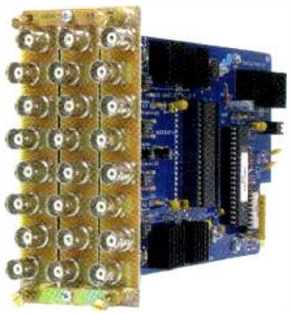
## PULSE

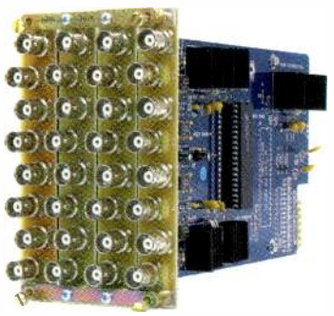
**4V (max) Sync signal switching**

HPP-D44

HPP-88



HPP-168

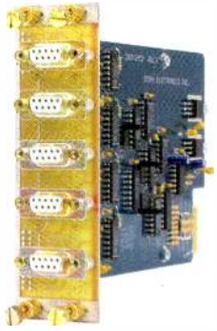


HPP-1616

Dual 4 X 4, 2 slots: **HPP-D44** ..... $425
8 X 8, 2 slots: **HPP-88** ..... $425
16 X 8, 3 slots: **HPP-168** ..... $750
16 X 16, 4 slots: **HPP-1616** ..... $1300

## RS-422 (MACHINE CONTROL)

**Machine Control Switcher, for small editing systems**



4-in to 1-out, 2 slots: **DSM-2422** ..... $350

## CONTROL SYSTEM MODULES

**System Control Interface–Provides control panel interfacing for up to four routing switch modules**

1 slot: **SCI-2144** ..... $375

**Control Data Slave Kit, provides control expansion for additional 2100 series frames**

1 slot: **SLC-2102** ..... $150

**Control Data Slave Kit to interface the DVM 1616 to 2100 series**

1 slot: **SLV-2126** ..... $75

**Control Data Translator, allows 2100 series systems to coexist with MRX/ADX systems**

1 slot: **ADX/MRX-2100** ..... $325
Stand-alone: **ADX/MRX-2600** ..... $500

FOR DETAILED SPECS, VISIT OUR WEBSITE

## MID-SIZED ROUTING SYSTEMS: THE MRX SERIES

Manage digital and analog video/audio signals with the MRX series of compact, full featured & high quality, mid-size routers. MRX is the only system available that provides 32x32 switching in just one rack unit for all standard signal types.

5 levels of 32x32 signal switching occupies just 6 RU – and the MRX is modular, serviceable and reliable. MRX systems can be combined with other Sigma routing families utilizing the same extensive range of control panels and software systems.

MRX can now be added to existing installations operating under other manufacturers control systems – thanks to our new protocol converter module. See page 35.

### SIGNAL FORMATS SUPPORTED

- SMPTE 259M digital video
- AES Unbalanced via BNC's
- AES Balanced via twisted pair connections
- NTSC/PAL Composite
- Balanced Analog Audio

### FEATURES

- Wide range of Sigma and third party control options
- Highest density switching system available
- Lowest cost per crosspoint in its class
- Separate 1RU power frame supplies up to 5 routers
- Redundant power supply option
- Ideal for space limited applications
- Designed to meet the highest reliability standard
- Comprehensive Sigma 5 year warranty

### EMERGENCY ALERT SYSTEM INTERFACE

In conjunction with our SigMatriX software, the MRX can be programmed to initiate a system salvo in the event of EAS activation. The salvo is user-determined and the EAS interface is controlled via contact closure.

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## SYSTEM CONFIGURATION

**Each signal format is managed in its own 1RU frame**

Digital Video, 32x32: **MRXDVF** ..... $9,440
Digital Audio, 32x32, Unbalanced: **MRXCDAF** ..... $6,330
Analog Video, 24x24: **MRX24V** ..... $3,455
Analog Video, 32x32: **MRX32V** ..... $4,365

Digital Audio, 32x32, Balanced: **MRXTDAF** ..... $6,330
Analog Audio, 24x24: **MRX24A** ..... $2,795
Analog Audio, 32x32: **MRX32A** ..... $4,095
(For stereo analog audio, use two frames)

Power and control is provided by a separate 1RU frame

The power supply frame houses a system control interface (SCI) and slots for four power supplies. Normal operation requires 1 supply for 2 digital switch frames and 1 supply for 3 analog switch frames. A 32x32 system consisting of digital video, digital audio, analog video and two analog audio frames requires just 2 supplies. For redundant operation 2 additional supplies may be added.

Power and control frame, including SCI: **MRXPSF** ..... $1,800
Power supplies: **MRXPSU** ..... $695

For control options, see pages 32-35.

FOR DETAILED SPECS, VISIT OUR WEBSITE

## LARGE MATRIX DIGITAL AND ANALOG ROUTING: THE ADX SERIES

Sigma's ADX series provides practical and economic solutions for large routing applications. Engineered for expansion, systems can be configured from 16 x 16 to 128 x 128, for any combination of digital video and audio as well as composite video, sync pulses, Y/C, Y, Pr, Pb or RGB analog signals.

### SIGNAL FORMATS SUPPORTED

- SMPTE 259M digital video
- NTSC/PAL composite
- Y/C component
- Y,Pr,Pb component
- RGB HV component
- Sync Pulse
- AES Balanced
- Analog Audio Balanced

### CONTROL INTERFACES

An ADX system integrates directly with other Sigma routing systems and control options (page 32). Adding a level of ADX routing to your existing system is easily achieved via our new control protocol converter (page 35). Our standard Sigma control interfaces can support up to 8 switching levels.

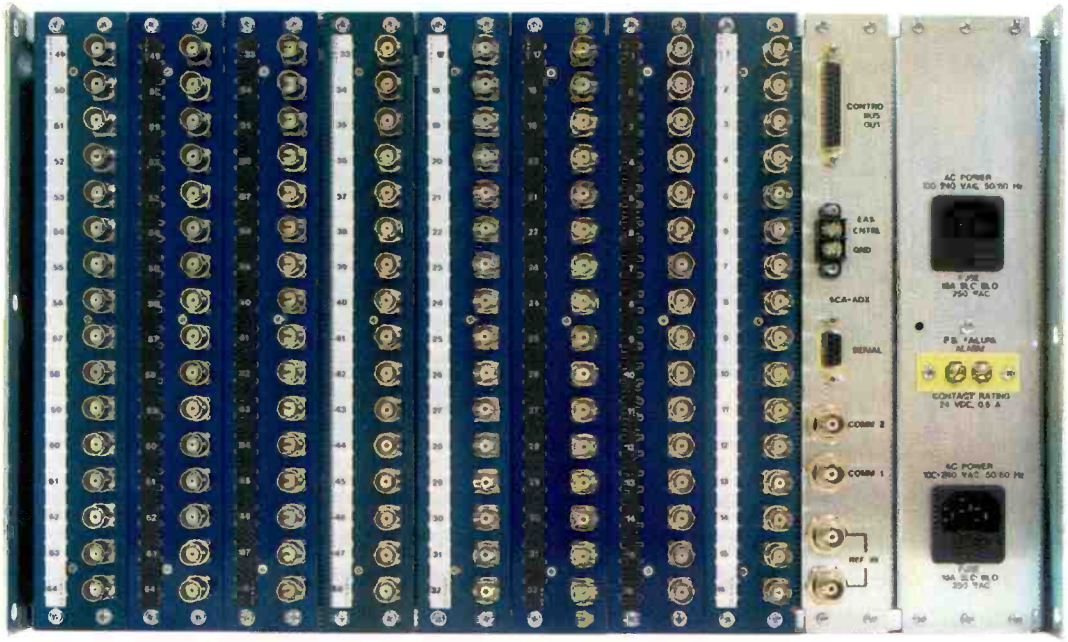
BUY NOW FROM OUR WEBSITE!

### EMERGENCY ALERT SYSTEM INTERFACE

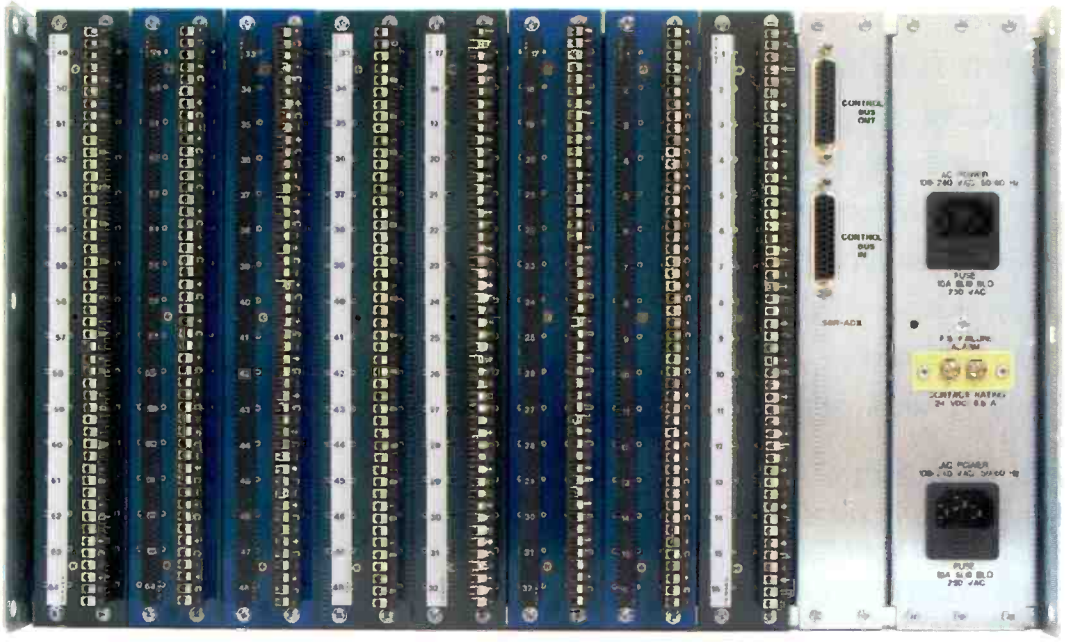
In conjunction with our SigMatriX software, the ADX can be programmed to initiate a system salvo in the event of EAS activation. The salvo is user-determined and the EAS interface is controlled via contact closure.

### SWITCH FRAMES

One 6 RU frame configuration allows for systems of up to 64x64. Two frames provide up to 64x128 or 128x64. Four frames allow up to a 128x128 matrix.



ADX VIDEO



ADX AUDIO

FOR DETAILED SPECS, VISIT OUR WEBSITE

### STANDARD SYSTEM PRICING

The following charts provide pricing information for typical ADX systems.

### ORDERING EXAMPLE

model #: ADX-3232 with suffix: DVS = ADX-3232 DVS = 32x32 digital video

## ANALOG SYSTEMS

| MATRIX SIZE & MODEL # | | 16x16 ADX-1616 | | 32x32 ADX-3232 | | 64x64 ADX-6464 | |
|---|---|---|---|---|---|---|---|
| CONFIGURATION | SUFFIX | PRICE | # RU | PRICE | # RU | PRICE | # RU |
| AUDIO ONLY | AO | $5,628 | [illegible] | $7,678 | 6 | $14,328 | 6 |
| STEREO ONLY | SO | $9,828 | 12 | $13,928 | 12 | $27,228 | 12 |
| VIDEO ONLY | VO | $5,703 | [illegible] | $8,528 | 6 | $18,078 | 6 |
| AUDIO VIDEO | AV | $9,903 | 12 | $14,778 | 12 | $30,978 | 12 |
| STEREO VIDEO/AUDIO | SV | $14,103 | 18 | $21,028 | 13 | $43,878 | 18 |

## STANDARD DEFINITION DIGITAL/ANALOG SYSTEMS

| MATRIX SIZE & MODEL # | | 16x16 ADX-1616 | | 32x32 ADX-3232 | | 64x64 ADX-6464 | |
|---|---|---|---|---|---|---|---|
| CONFIGURATION | SUFFIX | PRICE | # RU | PRICE | # RU | PRICE | # RU |
| DIGITAL AUDIO | DA | $6,778 | 6 | $9,628 | 6 | $16,828 | 6 |
| DIGITAL VIDEO | DV | $8,278 | [illegible] | $14,778 | 6 | $34,978 | 6 |
| DIGITAL VID/AUD | DVDA | $13,628 | [illegible] | $22,978 | 12 | $50,378 | 12 |
| DIGITAL VIDEO/ ANALOG STEREO | DVS | $16,678 | 18 | $27,278 | 18 | $60,778 | 18 |

Digital video systems shown include output reclocking.
For price quotations or other configurations options, please contact our customer service center - 866 569 2681.

BUY NOW FROM OUR WEBSITE!

## SPECIAL APPLICATIONS ADX SYSTEMS

### CABLE SYSTEM/MONITOR SWITCH

Unique to Sigma – a 240 input by 16 output, 75mHz monitor router in our standard 6RU package. This unusual configuration was specifically developed in conjunction with a large cable operator to provide them with a simple method of ensuring delivered signal quality. This switching system allows up to 240 RF-node return feeds to be monitored cyclically or individually.

**Complete 240x16 routing switch**

**ADX24016 VO** ..... **$22,272**

**Special master control panels with scrolling input selection**

**SYX24016** ..... **$728**

### CRITICAL FEED PROTECTION SYSTEM

Again unique – a combination of special input cards and an intelligent controller that allows up to 128 analog video signals to be monitored for presence. The controller features monitored input and backup source selection via preset DIP switches.

**Intelligent Controller**

**SDX** ..... **$2600**

If a monitored input loses presence, the system will automatically switch all of the destinations it has currently assigned to the preset backup source.

The protection system can be configured for partial or complete input monitoring in groups of 16. For pricing and configuration information, please contact our customer service center - 866 569 2681.

FOR DETAILED SPECS, VISIT OUR WEBSITE

## FROM SIMPLE TO SOPHISTICATED – WE CAN PROVIDE YOU WITH CONTROL OPTIONS TO SUIT YOUR NEEDS.

To control your Sigma routing systems, we have developed a comprehensive range of control panels. These panels are divided into two groups for control of our small routing systems of up to 4 levels and mid to large systems of up to 8 levels. If required, the two control panel families can coexist in a single system by utilizing a simple interface module.

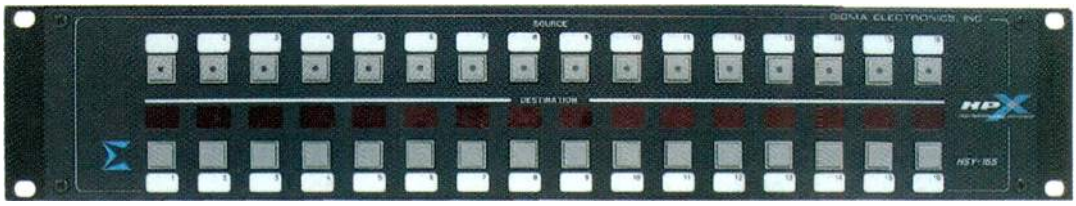
In addition to our panels, a PC-based software control system and a web-based intranet control interface are also available.

### NEW FOR 2003

For customers wishing to add our routing switchers to non-Sigma routing systems, we can now offer third party control interfaces.
Please refer to page 35.

### CONTROL FOR SMALL ROUTERS:

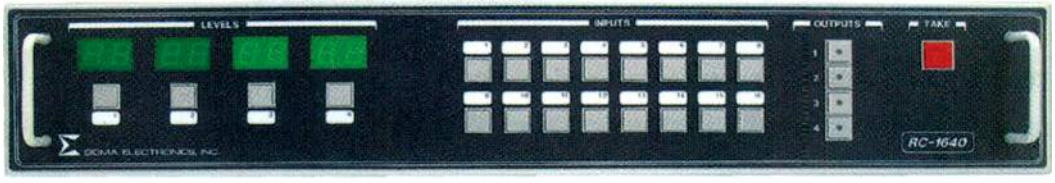
**Master control panel, full status display, 16x16**



**HSY-16S** ..... **$600**

**Master control panels w/ status display, 4 level breakaway, 8x4, 16x4, or 16x16**

**RC-840** ..... **$450**



**RC-1640** ..... **$475**

**HSY-1616** ..... **$600**

BUY NOW FROM OUR WEBSITE!

Master Control Panel, button per source/destination, 8x8

SYC-88 ..... $375

Single Bus Control Panel, 4 control levels, 16x1

HSB-16 ..... $500

Single bus control panel, 16x1

SBC-16 ..... $400

## CONTROL FOR MID TO LARGE ROUTERS:

Alphanumeric XY master control panel, 8 levels, 128x128

ANX ..... $995

XY master control panel, 4 levels, 128x128

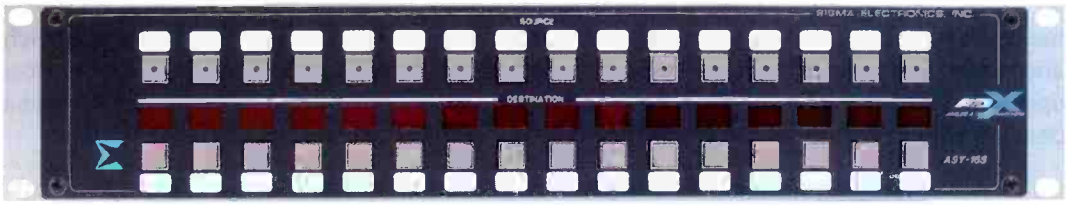
SYX ..... $728

Master control panel, button per source/destination, 32x32

SYX-3232 ..... $1,000

FOR DETAILED SPECS, VISIT OUR WEBSITE

**Master Control Panel, cascade, full status display, 16x16**



**ASY-16S** ..... **$600**

**Single Bus Control Panel, 64x1**

**SBX-64** ..... **$1,000**

**Single Bus Control Panel, 32x1**

**SBX-32** ..... **$700**

**Rapid Take Single Bus Control Panel, 32x1**

**RTX-32** ..... **$600**

## *Unique to Sigma - The SDX Signal Protection System.*

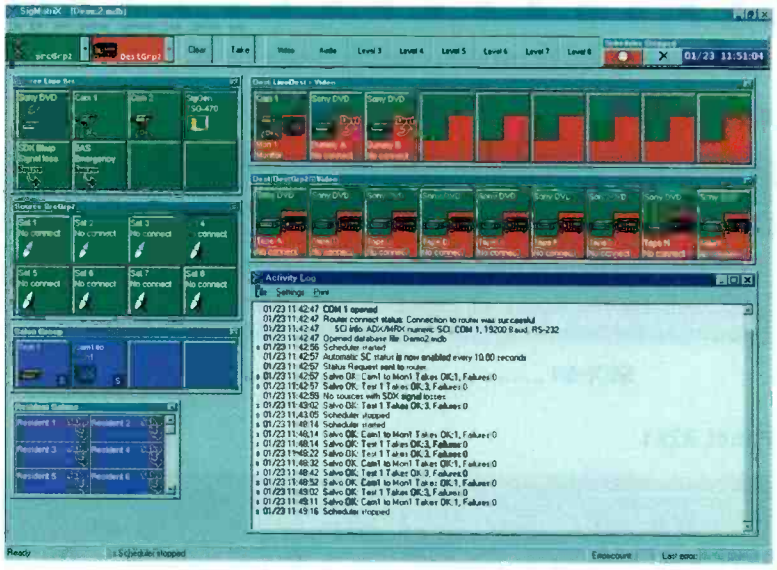
The SDX can be set to monitor up to 128 analog video inputs. If a signal failure should occur, the SDX will initiate a switch to all selected destinations of the failed signal, to a predetermined backup source. Upon signal restoration, all affected destinations are reconnected to the original source. (Requires specially configured input cards (VI-16TSD) in the ADX frame) Includes contact closures for external alarms.

**SDX** ..... **$2600**

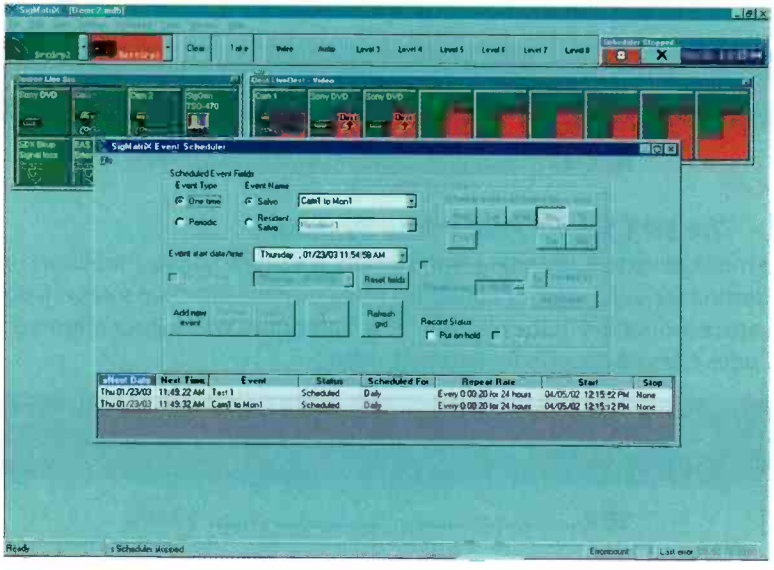
BUY NOW FROM OUR WEBSITE!

## SOFT CONTROL

**SigMatriX** is a Windows-based software control package for all Sigma routing systems. Communication via a PC's serial port allows the operator full control of up to 8 router levels. Remote control of routers via modem is also supported. Functions include real-time source to destination routing, salvo execution, and event scheduling. Source and destination buttons are organized on the **SigMatriX** screen in a customizable way that is convenient for the operator. Each button can be given two lines of text and assigned a graphic. A library of graphic images is provided and additional images can be easily added.



Routing with **SigMatriX** is as simple as clicking on an input button followed by an output button. For more complex routes, individual levels can be selected for breakaway and split mode takes, and an unlimited number of salvos can be created for one-click routing. The built-in scheduler allows **SigMatriX** to perform salvos at a set time in the future, either as one-time events or periodically. An activity log records all system activity with timestamps.



**Control Software, Windows® Interface**

**SigMatriX** ..... **$850**

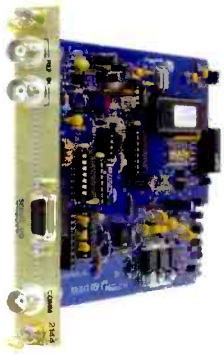
**Remote control modem including SigMatriX Software**

**MCP-SigMatriX** ..... **$1100**

FOR DETAILED SPECS, VISIT OUR WEBSITE

## *THIRD PARTY INTERFACES*

**Control Data Converter for interfacing third party RS-422 port routers from DNF Controls Inc. to MRX/ADX systems. (www.dnfcontrols.com)**



**DNX-2144** ..... **$375**

**Communications Control Module**

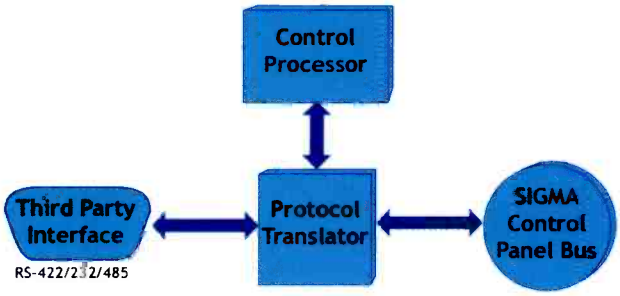
The requirement to add another signal level to an existing system is commonplace; this new module provides protocol translation between third party control systems and Sigma routing matrices.

Add any sigma routing switch to your existing control system.

**Third party control availability:**

**Utah Scientific (Dynatech, Artel)** ..... **Spring 03**
**BTS (Philips, GVG -Thompson)** ..... **Summer 03**
**Probel** ..... **Summer 03**

For other systems, please contact customer support - 1 866 569 2681




**CCM-2100** ..... **$795**

BUY NOW FROM OUR WEBSITE!

**NOTE* - All specifications and pricing are subject to change without notice.**

# SIGMA Electronics Inc.

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rickm@sigmaelectronics.com

CONTINUED FROM PAGE 104

DV DISK-RECORDING MODULE

## JVC Professional DR-DV5000

***973-317-5000; www.jvc.com/pro***

***Booth: C2050***

For use with the GY-DV5000U camcorder; records the DV signal onto a user-removable, 2.5-inch compact hard disk; an 80GB hard drive will deliver more than 6.5 hours of digital recording time. ▲

SERVER MANAGEMENT SYSTEM

## BUF Technology Spot

***858-451-1350; www.buftek.com***

***Booth: SU301***

New data exchange feature stores panel setups on PCs and recalls them on the same or other Spot panels via the facility's in-house LAN; enhanced system allows for playlist entry-range cut and paste; new PBUS option loads clips when a GV switcher memory is recalled, and switcher timeline triggers control playback; TCW option burns information into monitor feeds independently for each server channel; loaded clip name for each channel is displayed on the monitor wall along with time code or remaining play time. ▲

HD WAVEFORM MONITOR

## Astro Systems WM-3001

***818-848-7722; www.astro-systems.com***

***Booth: SU6635***

Supports 17 HD formats; six-inch LCD compact size allows for portability; provides picture, waveform, vector and status display. ▲

NEWSROOM SYSTEM

## Avid iNEWS

***978-640-6789; www.avid.com***

***Booth: RT606, SL300***

Offers advanced machine control, the ability to store CGs with the script, and the synchronicity of words with pictures inside NewsCutter and Media Browse systems; ControlAir system controls up to 32 on-air playback devices. ▲

STORAGE SYSTEM

## Ciprico FibreSTORE 2210

***763-551-4000; www.ciprico.com***

***Las Vegas Hilton, Suite 5112***

Offers a sustained 187MB/s bandwidth for 1920x1080 HD resolution using one array. ▲

ARCHIVE SERVER

## MicroFirst DAS-CE

***201-651-9300; www.microfirst.com***

***Booth: SU5638***

Designed as a companion to the MicroFirst DAS-CE product line, the DAS-CE archive server provides automatic caching and retrieval of program material for the video server; an automated process involving schedule look-ahead controls caching of unneeded program material from the video server in the DAS-CE and transferring needed program material from the archive server to the online video server. ▲

VIRTUAL SET

## Orad Hi-Tec Systems RealSet

***212-931-6723; www.orad.co.il***

***Booth: SL2114***

Combines Orad's on-air graphics and camera tracking technologies to generate real-time graphics so that it stays fixed to its location in the real set regardless of the shooting camera's motion; graphics are seamlessly composed with the live action in real time; does not require chromakeying or special lighting; powered by Orad's DVG graphical computer based on chaining and synchronization of COTS graphical components and uses Orad's CyberGraphics software with its authoring tools, control and automation options, and database of models and animation. ▲

ROUTER CONTROL SYSTEM

## NVISION NV900

***530-265-1000; www.nvision1.com***

***Booth: C2650***

Designed to be economical; control-panel-based, so no server is required; full-featured and configurable using a customer-supplied PC. ▲

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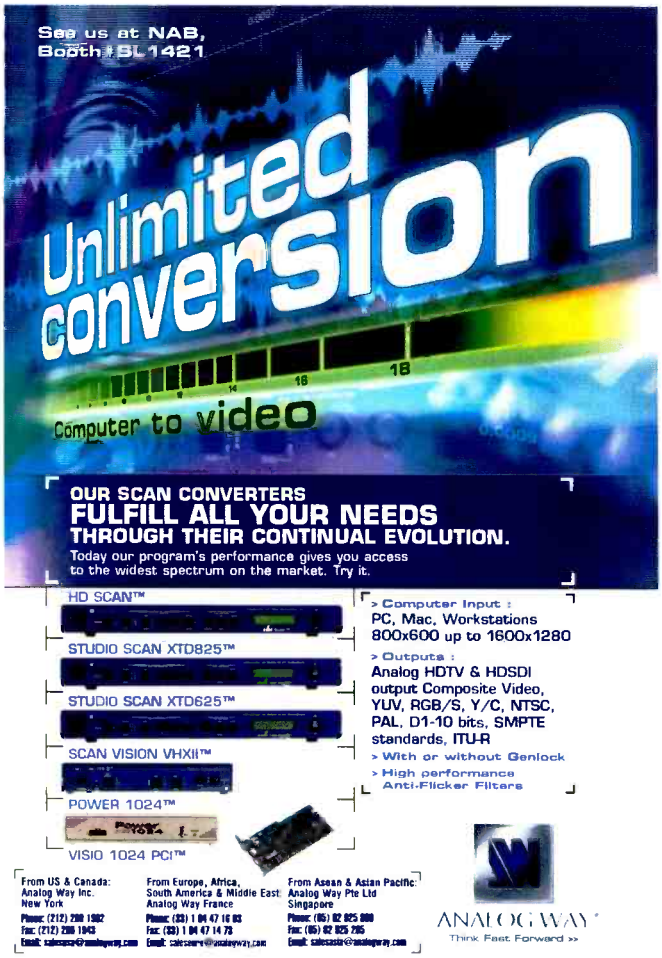


BOOTH # SL1421

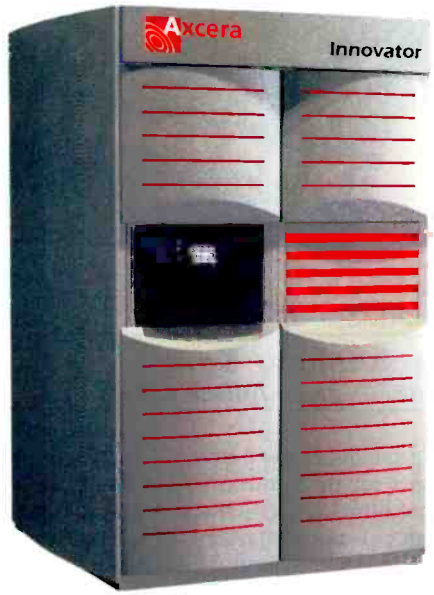
CONSOLE

## Wheatstone D-9TV

***252-638-7000; www.wheatstone.com***

***Booth: N2804***

The modular series is available with four to 52 input faders with sample rate converters on each digital input; D-9TV directs any source to any fader and features integral dynamics/EQ functions and snapshot recall; powerful mix-minus, monitoring and talkback capabilities; 5.1, stereo master, mono and subgroup outputs complete a powerful complement of features along with an operator-oriented control interface. ▲




DIGITAL SOLID-STATE TRANSMITTER

## Axcera Innovator DT

***724-873-8100; www.axcera.com***

***Booth: C367***

Broadband amplifier design covers operating band without turning; modular design allows it to be configured with one to eight amplifier modules per rack for easy upgrade; available in power levels up to 60kW; available for UHF and VHF applications, in either 8-VSB or COFDM configurations. ▲

HARDWARE AND SOFTWARE PLATFORM

## Masstech Group MassExpand

***905-886-1833; www.masstechgroup.com***

***Booth: SU5307***

Platform for expanding disk-to-disk storage of digital content for a variety of nearline devices such as content-delivery systems and video servers; allows third-party SAN or NAS devices to be used with a wide range of industry interface standards for automation and video servers. ▲

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# Cool.
# Studio Cool.

Introducing Arri Studio Cool, the most complete, flexible, and easy to service fluorescent lighting solution ever developed.

The optically superior Arri Studio Cool is available in 2-tube, 4-tube, and 8-tube models. Each lamphead accommodates 55-watt tubes for higher light output. What's more, only Arri offers interchangeable reflectors that allow designers to select either the high output 90 degree reflector or the wide, soft 120 degree beam angle reflector.

Studio Cool's rugged aluminum extrusion and cast housing features a detachable electronics module for total ease of service and maintenance. And when it comes to control, three different choices of Arri Studio Cool provide dimming via DMX control, two-step switching, or phase control dimming. Finally, a complete line of Studio Cool accessories is available to help you create the system solution that's right for you. Accessories include barndoors, intensifiers, egg crates, louvers, and filter frames.

Optically superior, flexible, rugged and reliable, Studio Cool offers everything you've come to expect from Arri. And that's the coolest part of all.

For more information about Arri Studio Cool, please call 845.353.1400 or email us at studio-be@arri.com.

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ARRI

www.arri.com

IOT

## L-3 Communications Electron Devices L-3 IOT 80

*570-326-3561; www.L-3com.com*

**Booth: C344**

Operates in the UHF-TV frequency range of 470MHz to 860MHz; can be used in digital transmitters and analog transmitters requiring combined vision/aural service, vision-only service and aural-only service. ▲

TRANSPORT STREAM MONITOR

## Broadcast Technology DTSM-700

*+44 1264 332633; www.btl.uk.com*

**Booth: C2912**

Designed for DVB-ASI monitoring and compliance of ASI transport streams via copper or fiber; monitor looks for early/late TS packets, overall data rate and additional measurements; can also be used as a 24-hour transmission monitor to record transport stream events. ▲

NETWORK CONTROL PANEL

## Evertz 9000NCP

*905-335-3700; www.evertz.com*

**Booth: C3412**

1RU, rack-mountable unit; features a four-line, 24-alphanumeric-digit VFD display with high brightness and a wide viewing angle, illuminated push buttons and positional rotary switch; a reserved 25th digit is used to display network connection status as well as other small graphics and icons, providing a quick visible status reference. ▲

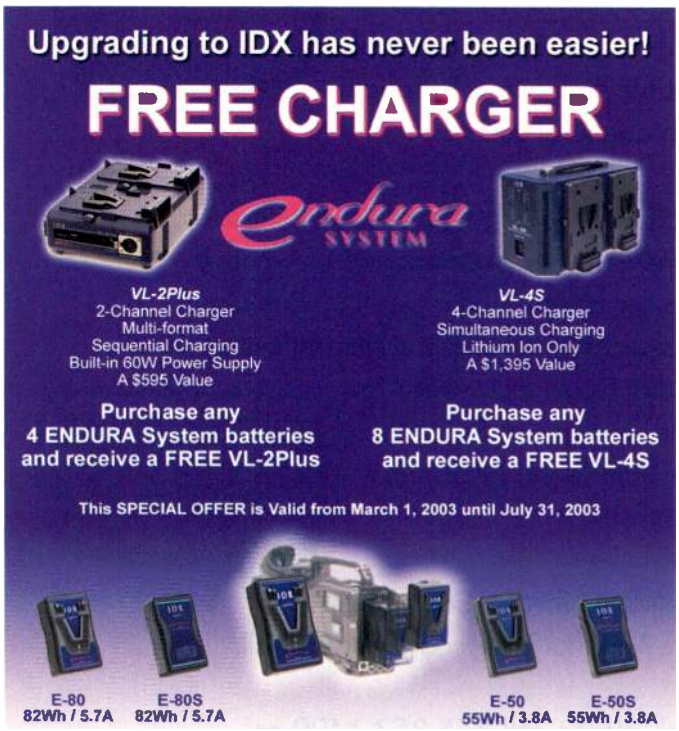
DATA ROUTER

## Quartz Q32-PR

*888-638-8745; www.quartzus.com*

**Booth: SU6435**

Provides port-to-port routing for up to 32 devices; supports both RS-422 and RS-232, or a mixture; the 2U unit provides bi-directional routing without the need for re-cabling; designed to route control data signals between devices such as VTRs, video servers, edit controllers or automation systems; the router switches four wire signals – a transmitter pair and a receiver pair – through the matrix; a route can be established between any two ports, allowing 16 pairs of machines to be connected at one time. ▲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STORAGE CONTROLLER

## DataDirect Networks S2A8000

*818-700-7600; www.datadirectnet.com*

**Booth: SL2933**

Offers eight full duplex FC-2 Fibre-Channel host connections, 20 FC drive loops to storage, built-in hardware RAID, full redundancy, an internal bandwidth of 7.2GB/s, up to 10GB of cache, and storage virtualization and parallel port technology; provides up to 130TB of storage. ▲

SERVER PLUG-IN

## Pinnacle ThunderX

*650-526-1600; www.pinnaclesys.com*

**Booth: SU5003**

New plug-in enables MOS-based newsroom control systems such as ENPS or Avid iNews to communicate directly with the Thunder line of servers; enables journalists to add items from a Thunder database into a story; plug-in also allows producers to dynamically create and modify sequences via the NCS rundown manager. ▲

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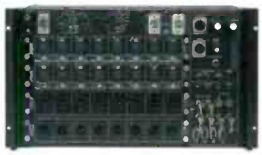


ADDER 162 and 882i

The heart and soul of any live set, the Adder 162 carries 32 mic/line audio, 6 intercom/IFB, and 4 duplex data and closures, all on one fiber conductor. Supports data for stats and scoring, courtesy audio feeds to the booth and commentator feeds to the truck. Further expand your capacity with the Adder 882i, which carries 10 intercom/IFB, 8 data and 4 closure signals in both directions.

SHED and HDX

Run your HD cameras on ordinary single-mode fiber, without the need for heavy, bulky hybrid cables. The SMPTE Hybrid Elimination Device (SHED) simplifies your infrastructure, while the HDX also supplies power to your HD field cameras.

VIPER II

Small throw-down modules are ideal to augment your production. POV links for NTSC and HD point-of-view cameras provide full duplex data for camera and PTZ control, plus genlock/tri-level sync return and power to the camera. Other links support NTSC/audio, SDI and HD distribution to all locations in the venue.

COBRA

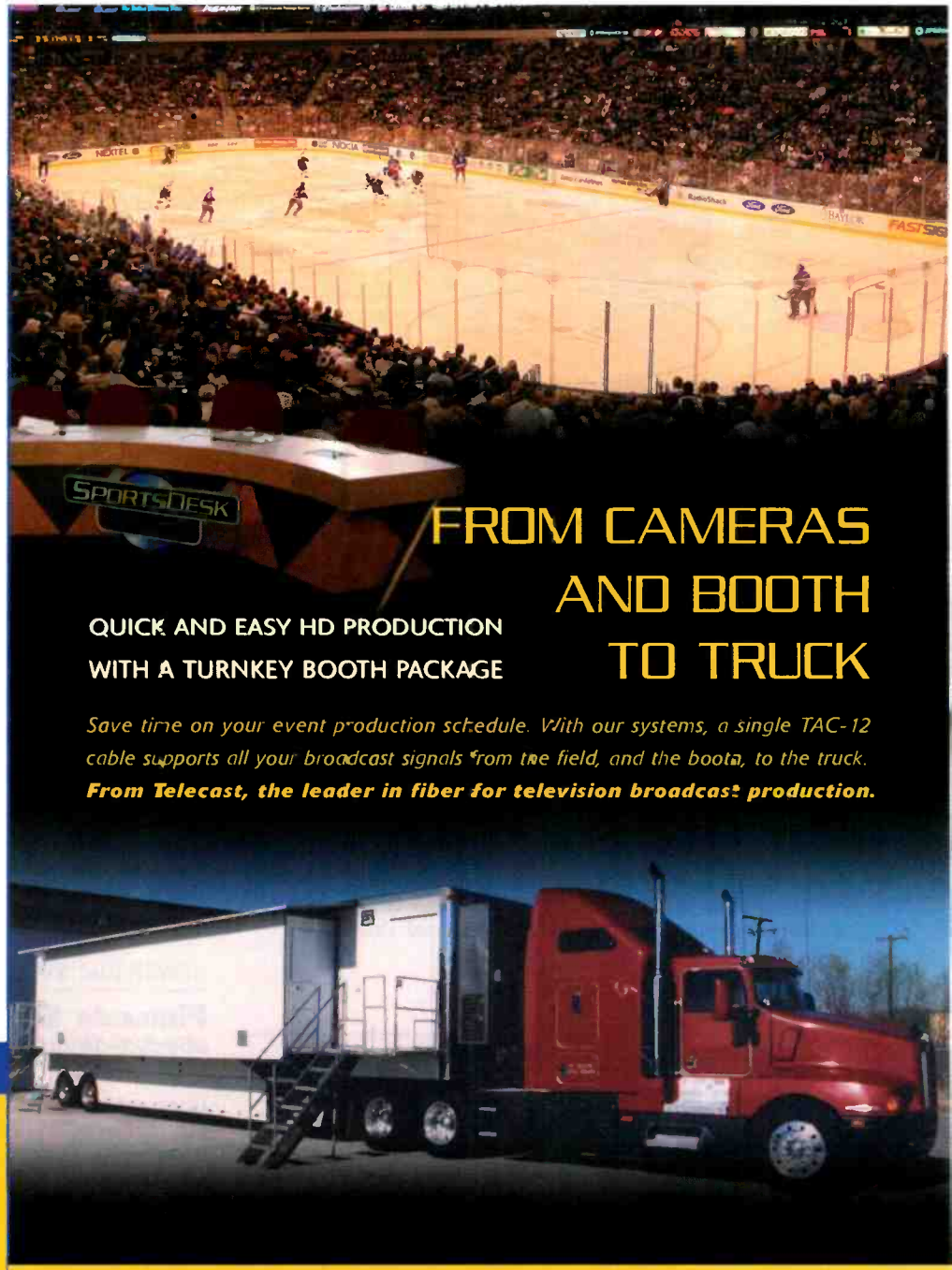
Send your triax camera signals with this patented, field-proven converter. All bidirectional video, audio, intercom and control signals on a single fiber with ten times the distance, one-tenth the weight. Designed for most popular camera families, including slow motion and HD triax.

COPPERHEAD HD/SDI

Replace your triax backs and cumbersome base stations with this camera-mounted fiber transceiver, and turn your ENG camera into a remote production camera. Provides all your bidirectional signals, including HD/SDI/analog video, audio, genlock/tri-level sync, intercom, data control, return video, IFB, tally and PTZ over any distance.

DIAMONDBACK

This video mux is ideal for distributing monitor feeds to a booth, set, monitor wall or to other trucks. Uses only one fiber to transport 8 NTSC signals, with expansion to 64 videos per strand using CWDM. Or swap out any video channel for 16 audio circuits, using an Adder serial coax output.




# FROM CAMERAS AND BOOTH TO TRUCK

## QUICK AND EASY HD PRODUCTION WITH A TURNKEY BOOTH PACKAGE

*Save time on your event production schedule. With our systems, a single TAC-12 cable supports all your broadcast signals from the field, and the booth, to the truck.*

***From Telecast, the leader in fiber for television broadcast production.***

## HD BOOTH PACKAGE

**ADDER 162 + DIAMONDBACK**
**VIPER II 5292 + COPPERHEAD**

- 24 audio to truck
- 8 audio and video to booth
- 3 PL/IFB channels
- 4 duplex data paths
- 1 HD feed to booth
- 1 full HD camera link

**(508) 754-4858**

www.telecast-fiber.com

**Telecast**
*Fiber Systems, Inc.*

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**See us at NAB Booth # 4688**

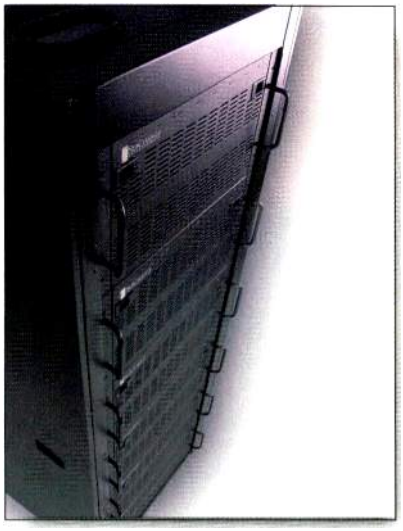
SERVERS

## EVS MPEG-2 server systems

***973-575-7811; www.evs.tv***

***Booth: C736***

Product line is now both ATSC- and DVB-compliant and includes complete DTV business packages for multichannel time-zone delay; multichannel playout is handled by existing automation or with playlist management integrated within the server system; core technology relies on direct ASI inputs and outputs, and integrated multiplexing, maintaining content in the MPEG-compressed domain all the way through. ▲



BROADCAST MEDIALIBRARY

## SeaChange BML 24000

***978-897-0100; www.seachangeinternational.com***

***Booth: SU5459***

Provides compression and file-format independent storage; can house any media type from uncompressed HD to MPEG-1; can scale to terabytes, with more than 16TB of RAID-5 storage per rack using available 144GB disk drives. ▲

STREAM SWITCH

## Logic Innovations Smart Transport Stream Switch (TSS)

***858-455-7200; www.logicinnovations.com***

***SL2522***

Provides MPEG-2 transport stream switching with pre-processing of table information; provides automatic PID detection, PSIP insertion, stream grooming, re-branding of streams, re-mapping of PIDs and blocking of unwanted program elements; designed to interface with popular automation systems for precise control of transport switch timing. ▲

PRODUCTION CONSOLE

## Calrec Zeta 100

***+44 142 284 2159; www.calrec.com***

***Booth: N2646***

New console offers features including dynamics on every channel, eight auxes, 16 multitrack/IFB sends, 99 Flash ROM setup memories, and full 5.1 surround mixing and monitoring; based on the Alpha 100 operating platform; available in three standard frame sizes – 24, 32 and 48 faders; control surface reset is less than 10 seconds, with no loss of audio; other features include two main outputs and eight subgroups. ▲

VIDEO SOLUTIONS SERVICE

## Intelsat Occasional Video Solutions

***202-944-7100; www.intelsat.com***

***Booth: N1546***

Meets broadcasters, rights holders, content providers and service providers occasional end-to-end video requirements; service utilizes Intelsat's global fleet of satellites in combination with terrestrial infrastructure; a dedicated video operations center handles bookings, inquiries, monitoring and other video service requests 24 hours a day. ▲

WIRELESS CAMERA SYSTEM

## Link Research LinkXP2

***+44 0 1923 244 233; www.linkres.co.uk***

***Booth: C390***

Compact design operating at low power; uses MPEG diversity to maintain a robust signal; offers reduced end-to-end signal delay between the camera and the studio to 40 milliseconds. ▲

HD-SDI DOWNCONVERTER AND DA

## AJA RH10MD

***530-274-2048; www.aja.com***

***Booth: SL536***

Features an HD-SDI input, four reclocked HD-SDI outputs, and four 10-bit broadcast-quality downconverted SD outputs; SD outputs can be individually configured as analog or SDI - analog can be component or composite; all HD formats are supported, including 24p/psf with 3:2 pulldown; SD output can be formatted for either 4:3 or 16:9 monitors; RH10MD is dual-rate (HD/SD) and will support SDI inputs. ▲

NEWSROOM SYSTEM

## Pinnacle Systems Vortex

***650-526-1600; www.pinnaclesys.com***

***Booth: SU5003***

Integrates a multi-resolution media server that stores video in MPEG-1 and DV25 simultaneously upon ingest; allows users on the network to browse, make shot selections and edit stories on their desktop computers; users can edit feeds while they are still being recorded onto disc, or edit direct to timeline from a VTR source; MOS protocol and well-established APIs enable seamless interface between Vortex and newsroom computer systems to fully automate capture, playout and archiving. ▲

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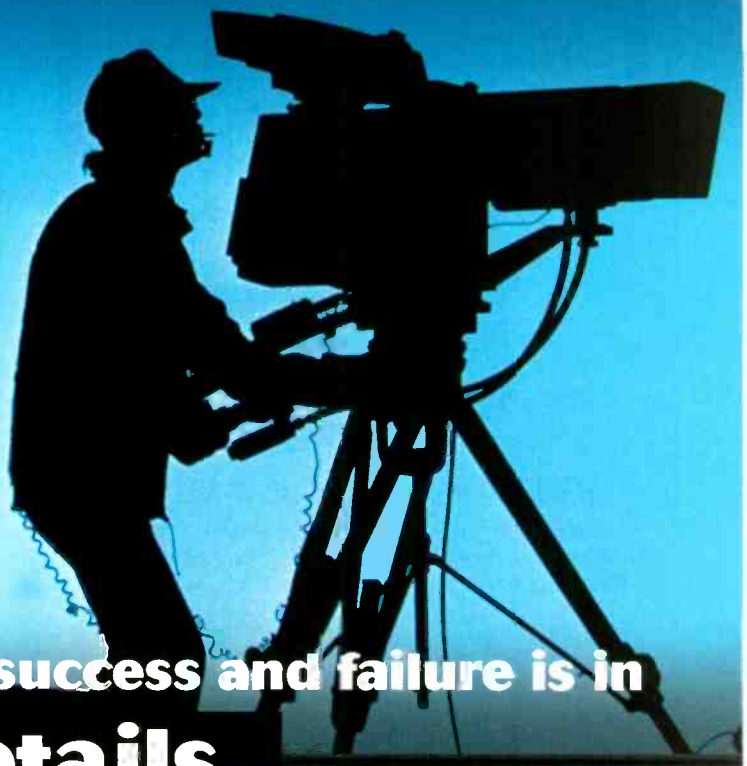

# The difference between success and failure is in the details.

**LEMO® Hybrid Fiber Optic Connectors for HDTV Cameras**

- 2 single mode fibers + 2 power pins + 2 signal pins
- Exceeds ANSI/SMPTE, ARIB and EBU Standards
- Plug/socket designs permits daisy-chaining without adapters
- IP 68 seal rating
- Robust, over 5,000 mating cycles

**LEMO® Triax Connectors**

- Original industry standard in the USA
- Excellent contact resistance

## Expect success. Spec LEMO®.

Because when it comes to details, no one pays more attention than LEMO. We offer connector solutions ideally suited for a broad range of audio video applications. Our products are engineered and tested under demanding conditions. LEMO's A/V connectors are designed with a unique combination of features:

- Coaxial/triaxial versions in 50 and 75 ohms
- Various triax standards in industry worldwide
- Moisture sealed versions, allowing outdoor use
- Excellent repeatable electrical performance
- Patch panels available with all connector types

Sometimes succeeding is as simple as your connection. You want the highest quality connector to get the job done. And the best way to get there is with a connector from LEMO. We're paying attention to the details and it shows.

Want to see just how committed we are to your success? Just call us, or visit our web site. Connections with a focus on details. That's LEMO.

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[ Surround Sound from 4.0 to 7.1 ]

MSD600M Master Stereo Display

• Jelly-Fish™ Surround Sound Indicator • 96 kHz Input • User Configurable up to 32 Input Channels • Signal Generator w/White and Pink Noise • RS232 Comm. Port

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BOOTH# C3846

MINIATURE D/A CONVERTER

## AJA HD10C2

***530-274-2048; www.aja.com***

***Booth: SL536***

Dual-rate HD/SD miniature D/A converter; the RH10MD HD-SDI DA/Downconverter card can directly drive analog high-resolution monitors or projectors; the SVGA mode allows HD monitoring on many SVGA multisync monitors. ▲

MEDIA CONVERTER

## Laird Telemedia LTM-6000

***845-339-9555; www.lairdtelemedia.com***

***Booth: SL113***

Delivers hybrid signal conversion for high-end media production markets; features built-in RS-422 machine control via a nine-pin DSUB connection; other features include dual signal analog outputs in all formats, external genlock, blackburst signal output and a selectable setup (0 IRE or 7.5 IRE). ▲

NEWS AUTOMATION

## Crispin NewsPlayX

***919-845-7744; www.crispincorp.com***

***Booth: SU5651***

Works in conjunction with most news automation systems, including Avid's iNews, AvStar and a MOS interface with AP's ENPS; translates the rundown and executes the playback while controlling video servers, switchers, tape machines and many other devices. ▲

LOCATION SOUND RECORDER

## HHB PORTADRIVE

***805-579-6490; www.hhbusa.com***

***Booth: N2146***

Records uncompressed 24-bit/96kHz digital audio onto eight tracks; provides six high-gain, low-noise XLR mic/line inputs featuring individual phantom powering, gangable limiters, and adjustable delay and phase reverse; audio is recorded onto a removable hard disk in either AES31 or Pro Tools V5 session formats. ▲

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- Electronic Displays
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- Output Systems
- Relay Systems
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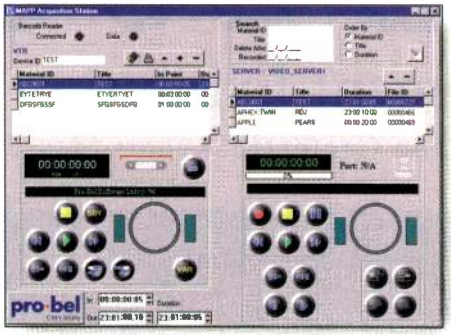
- Lighting Equipment
- Measuring Equipment
- Transmission Cables
- Electric Power Units
- HDTV Systems
- Satellite Broadcasting Systems
- Virtual Systems
- CG Production Systems
- DVD Systems
- Multimedia Systems
- Software
- Multiplex Broadcasting Systems
- Others



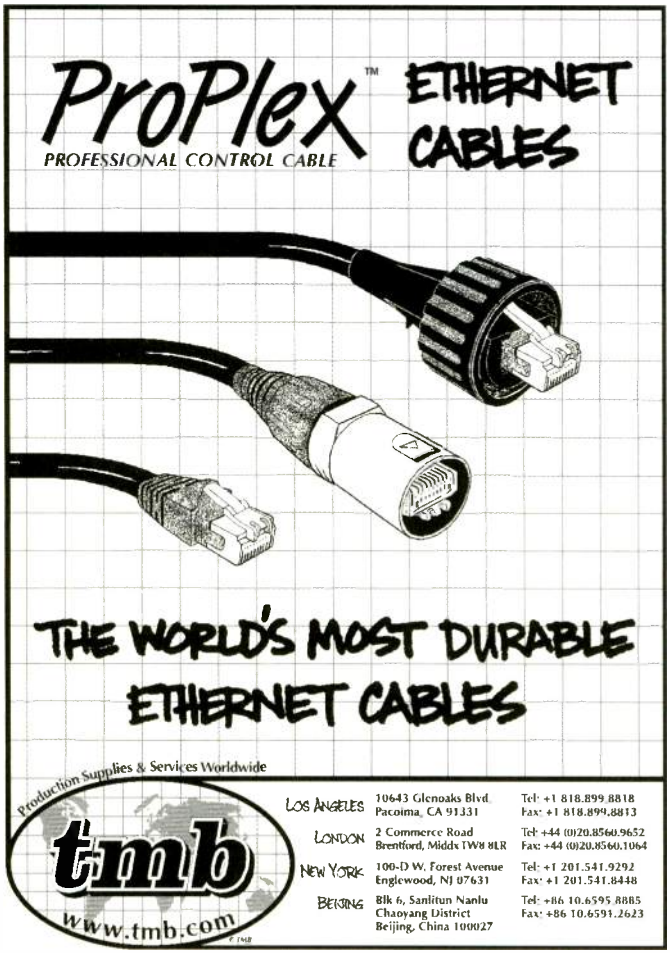
ASSET MANAGEMENT SOFTWARE

## Chyron Pro-Bel MAPP Asset Management

***631-845-2000; www.chyron.com***

***Booth: C2074***

Software suite has been extended to support distributed broadcast models such as centralcasting; media and metadata can be transferred between multiple MAPP systems and third-party management products; system now checks quality of material automatically during acquisition. ▲




INTERCOM SYSTEMS

## Drake networked systems

***44-1727871214; www.drake-uk.com***

***Booth: C386***

Networking matrices allow two or more studios or remote sites to share the same facilities; external four-wires appearing on one system can be transferred over the network to another studio system; trunk lines support point-to-point or group calls, and may be reserved for use by a particular panel; open telecom protocols such as E1/T1, ATM and VoIP provide a solution for wide-area networking, and a link that lets the operator "see" who is calling them; GPIO/tally signals can also be transmitted over the network; up to 15 Drake systems can be networked via Ethernet (audio trunk lines) or over digital networks via the Hi-Que E1 interface or using VeNiX, an ISDN/X.21 networking solution designed specifically for intercom. ▲

HD STUDIO CAMERA

## Sony Electronics HDC-910

***201-930-1000; www.sony.com/professional***

***Booth: SU4015***

Conforms to the multiformat strategy of the HDC-900/950 camera family; uses camera control units that feature optional digital converter boards that can simultaneously deliver the alternative 1280x720@59.94p HDTV output; features a combination of the switchable 50/60 HD camera head and optional downconverter plug-in boards in the camera CCU; can facilitate a cost-effective switchable 525/59.94 and 625/50 SD system; uses a Power HAD image sensor; vertical smear is held to –125dB. ▲

MIXING CONSOLE

## Audioarts R-90

***252-638-7000; www.wheatstone.com***

***Booth: N2804***

Plug-in modular design houses up to 23 input channels with dual-caller support; provides two studios, two headphones, built-in CUE speaker clock and timer, VU meter pairs, two stereo and two mono outputs; hinged meterbridge provides instant DB-25 I/O and programming dipswitch access. ▲

NONLINEAR PRODUCTION SYSTEMS

## AIST Cinegy

***+49 8636 9835 0; www.cinegy.com***

***Booth: SU6569***

System integrates digital archive, media asset management, tape and live ingest, and logging functions; allows for search and browse, editing and playout; integration allows people in different roles to work in parallel on projects; features real-time workgroup collaboration, format-independent editing, multiformat and multi-resolution conform; system can work with multiple proxy resolutions; cluster of PCs perform automatic scene recognition, speech recognition and other optional metadata generation as they encode multiple MPEG-2 and Windows Media streams. ▲

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# What else do You want in a 3U space?

The Marshall Electronics **V-R71PA-SDI** is everything you need for analog & digital audio/video monitoring. High resolution 7" (1440x234 , high brightness (400 nits) LCD panel has Composite Video, S-Video & SDI (601) inputs with active loop through and 16:9 to 4:3 ratio switching. Two stereo pairs of audio may be inputted via 1 SDI embedded, 2 AES/EBU, or 4 balanced analog XLR inputs. Audio monitoring is via a pair of full range stereo speakers. Simultaneous visual monitoring of up to 4 audio channels is provided using a high-resolution LED bar graph with phase metering. Other features include NTSC/PAL auto recognition, built-in color bar generator & high quality 10-bit SDI to Composite Video down converter. All in a package only 2.65", weighting less than 6Lb.

# LCD RACKS

## BIG ON FEATURES, SMALL IN SIZE

**V-R25P**

**Ten hi-res 2.5" LCD monitors with active loop through. Only 3U high, 2.65" deep. Weight 5Lb**

**V-R53P/ V-R53P-SDI**

**Three hi-res 5" panels with CV, S-Video, VGA and SDI (V-R53P-SDI only) inputs per panel. Only 3U high, 2.65" deep. Weight 5Lb**

**V-R44P / V-R44P-SDI**

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**or visit our website: www.LCDRacks.com**

# NAB PRODUCT HIGHLIGHTS

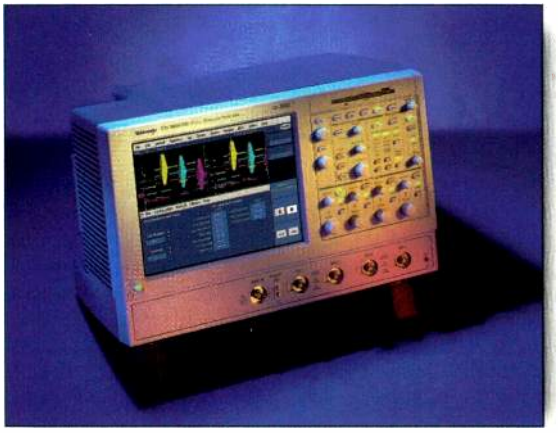
CONTROL SYSTEM

## Network Electronics VikinX.128

***631-928-4422; www.network-electronics.com***

***Booth: SU7045***

Cost-effective range of control panels featuring full TCP/IP connectivity between routers and control panels allowing use of standard Ethernet LAN; existing LANs can be used as hardware platform for routing system; long-distance remote control possible via TCP/IP Internet connections. ▲



SIGNAL ANALYZER

## Tektronix VM5000HD

***503-627-7111; www.tektronix.com***

***Booth: C2450***

Automated component analog video signal analyzer measures high-definition, progressive scan and PC format signals; works with 1080i, 720p, 480p and SXGA formats; analyzer can make 100 different parametric measurements in eight test categories within 10 seconds; features a high-definition matrix signal set for the creation of standardized test signals, including color bars, multiburst and sweeps. ▲

DIGITAL ASSET MANAGEMENT SYSTEM

## Artesia Technologies TEAMS 5.0

***301-548-4000; www.artesia.com***

***Booth: SL2439***

Features streamlined user interface, and incorporates new metadata management capabilities; offers the option of providing those accessing the database with a personalized interface that walks them through importing content, entering metadata and categorizing an asset; new export wizard enables users to create image cut-downs or transcode assets from their browsers. ▲

REMOTE MONITORING SYSTEM

## PatchAmp PA-RMS

***201-457-1504; www.patchamp.com***

***Booth: C2684***

Can monitor frozen video, loss of video, black, snow, max and minimum video levels, frame fan speeds, and power supply voltage; can alarm and notify a technician via on-screen pop-up display with audible alert, send e-mails and/or trigger paging and phone dialing with WAV file playback. ▲

MEDIA PLATFORM

## Quantel iQ

***203-972-3199; www.quantel.com***

***Booth: C2612***

Capable of real-time 2K performance; delivers open-standard platform and performance of dedicated hardware; allows iQ systems to share and integrate workflow with other systems; allows future hardware development without rewriting existing applications. ▲

DIGITAL VIDEO SYSTEM

## Opticomm DVX-104

***858-450-0143; www.opticomm.com***

***Booth: SU6349***

Uncompressed 1-bit serial digital video system at 270Mb/s data rate is free of adjustment over a wide dynamic range; 24 bits per channel at 18.432Mb/s digital; four audio AES/EBU; all signals are multiplexed into one SDI stream transmission. ▲

MONITORING SYSTEM

## Rohde & Schwarz EFA-NET

***410-910-7800; www.rohde-schwarz.com***

***Booth: C335***

Introduces the real-time and historical graphical/analytical reporting of transmitters and transmission systems; provides remote access via private LAN/WAN or by Internet; can access key transmitter site parameters including real-time full-power VSWR monitoring through use of the ECHO display; SNMP-based. ▲

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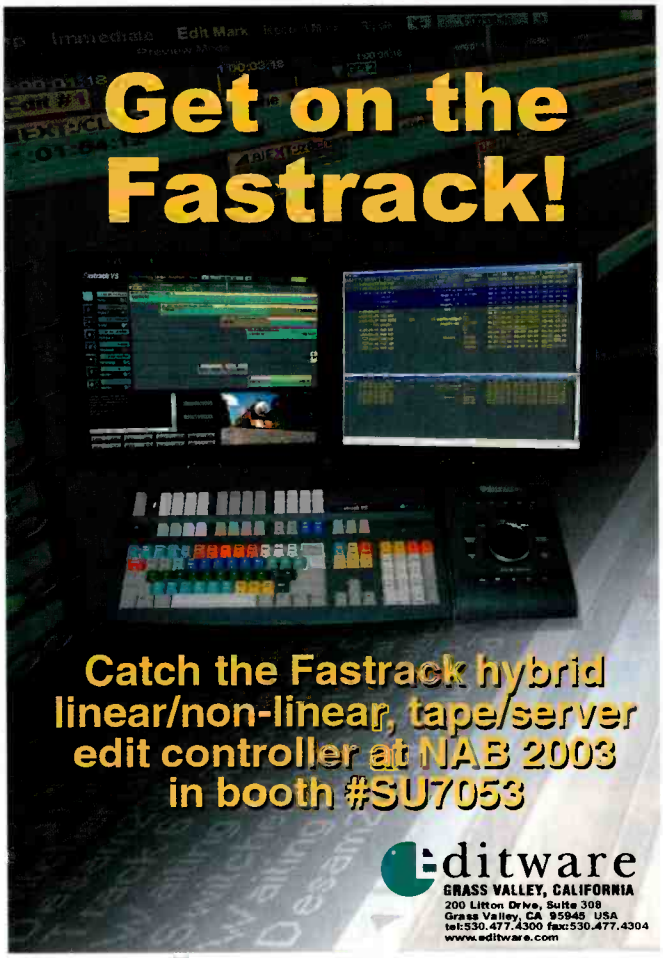

MPEG-2 VIDEO TRANSMISSION SYSTEMS

**Axon Digital *M*Stream**
***+31 13 511 6666; www.axon.tv***

***Booth: SU7303***

Designed for carrying live video and audio as video over Ethernet or or T1/E1 links; video and audio options include analog and digital (SDI) ports as well as 4:2:0 and 4:2:2 MPEG coding formats up to 50Mb/s; a new feature is MPEG store and playout capability, which combines real-time transmission and MPEG archiving. ▲

ENG ANTENNA SYSTEM

**Nucomm Sky Master II**
***908-852-3700; www.nucomm.com***

***Booth: C104***

A 2GHz band, all-solid state, airborne antenna for digital and analog video downlink applications; electronically steerable pod antenna system with an integral GPS receiver that provides fully automated steering in airborne applications including broadcast ENG, law enforcement and military applications; electronic steering feature eliminates moving parts, which can be a source of failure, and replaces them with time-tested electronic steering technology, similar to that used in today's radar antennas. ▲

CAMERA CRANE

**Sachtler CamCrane EFP**
***516-867-4900; www.sachtler.com***

***Booth: C2660***

For cameras up to 39.7 pounds; four towers and four outriggers stabilize the CamCrane EFP; tower and outrigger cables can be adjusted; the main pipe is telescopic; can be set up at a variety of lengths; users can optimallly balance the required force aspects of the horizontal and vertical movements with each other; scaling on the spindle enables the cameras to be moved or repositioned at the same angle. ▲

MICROPHONE

**Sennheiser MKE Platinum**
***860-434-9190; www.sennheiserusa.com***

***Booth: N2103***

Reduced-size subminiature condenser lavalier has an ultra thin cable, with only 1mm thickness and low capacitance; manufactured with Kevlar wrapped copper core; optimized high-end response provides more headroom at the bodypack; has improved rejection of handling noise and an embossed "umbrella" diaphragm that protects the microphone against moisture and sweat. ▲

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# NAB PRODUCT HIGHLIGHTS

## AES DIGITAL AUDIO SIGNAL MANAGEMENT SYSTEM

### Sigma Electronics OctaStream family

***801-575-8801; www.sigmaelectronics.com***

***Booth: SU4664***

Consists of the DA5320 mixer and subframe router, the DA5315 vraible delay compensator, the DA5325 sample rate converter and the SG5605 audio reference generator; the series is designed for the S5000 signal management frame which allows unrestricted access to all modules and is capable of hot-swapping all modules and power supplies. ▲

## DIGITAL BROADCAST CONSOLE

### Solid State Logic C100

***212-315-1111; www.solid-state-logic.com***

***Booth: N2512***

Features Centuri processing technology which includes fault tolerance, self-healing DSP and hot-swappable components; through the master control channel users have access to all channel controls; control linking enables a range of configuration functions to be linked to a specific input or output. ▲

## OPTICAL DISC RECORDING SYSTEM

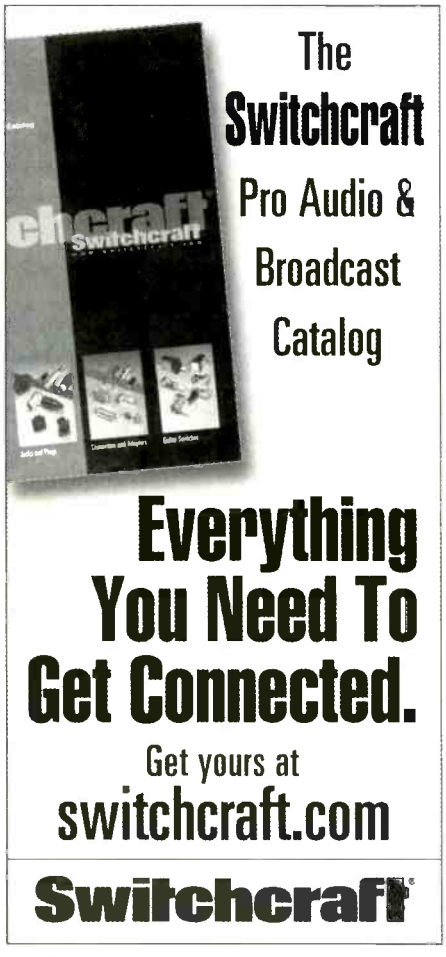
### Sony Electronics Optical family

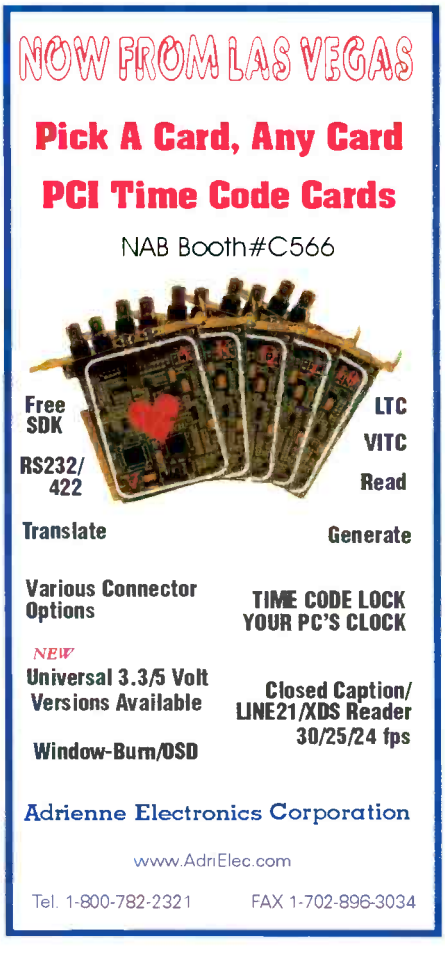
***201-930-1000; www.sony.com/professional***

***Booth: SU4015***

Consists of two camcorders and three decks; from the camcorder, newsgathering teams will be able to transfer the proxy information to laptop editors or back to the studio at up to 30 times faster than real time; field engineers will be able to transfer the high-resolution footage either as video or as a data file over IP networks; in the case of compact decks or studio decks, this proxy material will transfer at up to 50 times faster than real time; offers the choice of recording video with the DVCAM codec at 25Mb/s or the MPEG IMX codec at 30Mb/s, 40Mb/s or 50Mb/s. ▲

*CONTINUED ON PAGE 157*



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STUDIO EDITING VTR

## Sony Electronics SRW-5000

***201-930-1000; www.sony.com/professional***

***Booth: SU4015***

Can record and play back the 1920x1080 HD format at 23.98p, 24p, 25p, 30p, 50i or 59.94i; can also record and play back the 1280x720@59.94p HD format; can play back all existing HDCAM tapes; captures all of these formats at 10-bit depth; records 12 channels of 24-bit audio; features dynamic tracking playback, pre-read, and edit confidence and record monitoring. ▲

WIRELESS INTERCOM

## Systems Wireless HME PRO850

***800-542-3332; www.swl.com***

***Booth: C2535***

Features two-channel wireless intercom operation between 470MHz and 740MHz; automatically selects frequencies or can be programmed by a front panel LCD on the base station or an attached PC; remotes support independent communications for two channels with individual listen adjusts; supports simultaneous 2-wire and 4-wire interfacing. ▲

MONITORING SYSTEM

## Tektronix WVR600 series rasterizer

***503-627-7111; www.tektronix.com***

***Booth: C2450***

Offers high-resolution output to external displays; monitors both analog and digital video signals in an advanced all-digital architecture; includes two standard-definition SDI inputs and two composite inputs for analog audio, digital AES/EBU audio or both. ▲

ADAPTER

## Telecast Fiber Systems SMPTE Hybrid Elimination Device

***508-754-4858; www.telecast-fiber.com***

***Booth: SU4688***

Supports all bi-directional camera signals on standard single-mode fiber cables; cameras can communicate over common single mode fiber; consists of two adapters, which convert from hybrid wire/fiber connectors to standard all-fiber connectors. ▲

MSDC IOT TRANSMITTER

## Thales Broadcast & Multimedia DCX Paragon

***413-998-1100; www.thales-bm.com***

***Booth: C2000***

Uses multi-stage depressed collector (MSDC) IOT technology; for better transmission efficiency, it offers up to 2X conventional IOT and 4X that of a solid-state transmitter; has a low distortion. ▲

EVENT CONTROLLER

## LEIGHTRONIX NET-164

***800-243-5589; www.leightronix.com***

***Booth: C3081***

Replaces the PRO-16 for use in medium-sized systems; building upon the MINI-T-NET features, the NET-164's expanded capabilities include a larger 16x4 routing switcher with stereo audio, as well as PRO-BUS control capacity of 16 sources; loss-of-video detection is standard on all four switcher outputs with automatic e-mail notification. ▲

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# NAB PRODUCT HIGHLIGHTS

## JACK ADAPTERS

### Trompeter UBJ224-RIA
**800-982-2629; www.trompeter.com**

**Booth: SU5401**

Recessed insulated adaptor prevents the jack port from creating a protrusion capable of causing injury to users or the jack; recess socket housing is black plastic, which provides full electrical isolation from the panel. ▲

## DIGITAL ROUTING SWITCHER

### Utah Scientific 400/64
**801-575-8801; www.utahscientific.com**

**Booth: C2317**

Uses a three-board architecture consisting of an input board, a crosspoint board and an output board; contains 36 I/O slots; features signal presence detection, low-power consumption, redundant power supplies and control cards, and an internal monitor matrix. ▲

## CONTROL PANEL SYSTEM UPGRADE

### Videoframe VTECS Control Panel System with PROXY VNODES
**530-477-2000; www.videoframesystems.com**

**Booth: SU6008**

PROXY VNODES are control interfaces used to control modular equipment from companies such as Thomson, Grass Valley and Leitch; configurable; allows for multiple vendor control; has a universal operator interface, full router integration and a channel-based operation. ▲

## MULTIFORMAT AUDIO MONITOR

### Videotek ASM-100
**800-800-5719; www.videotek.com**

**Booth: C974**

Monitors many audio formats in one unit; is a 1RU instrument; displays up to eight channels of analog or AES/EBU audio; for video, options enable de-embedding the SD and HD-SDI inputs, and full Dolby Digital and Dolby E decoding. ▲

## DEMODULATORS/DECODERS

### Videotek DDM-520 and DDM-540
**800-800-5719; www.videotek.com**

**Booth: C974**

Have a variety of I/O capabilities; can display signals at 1080i, 720p, 480p and 480i; decodes and displays EIA 608 and 708 closed captions on-screen; supports three MPEG-2 streamed formats. ▲

## CAMERA STABILIZING SYSTEMS

### Sachtler Artemis family
**516-867-4900; www.sachtler.com**

**Booth: C2660**

New additions to the product line include EFP Pro and EFP versions to complement existing Cine and Cine HD systems; the EFP Pro features a 1.5GHz video line for live coverage using SDI-HD cameras; the EFP model features the Touch & Go system to facilitate camera changeover between the stabilizing system and tripod, even while shooting. ▲

## RF MATRIX ROUTING SYSTEMS

### Quintech's MRF series
**724-349-1412; www.qecinc.com**

**Booth: N1411**

Programmable, non-blocking, full fan-out RF matrix routing systems; configured to route any of two, four, eight or 12 inputs carrying RF signals to two or four outputs; multi-octave systems utilize patented stack-and-tier technology offering high-performance realizations of RF switching technology cost-effectively; systems are DC-blocking. ▲

## SAN FILE MANAGEMENT APPLICATION

### Rorke Data ImageSAN OSX
**952-829-0300; www.rorke.com**

**Booth: SL107**

File management application is specifically designed for Apple Computer's OS X operating system; used with ATTO's Fibre Channel connectivity hardware, the system provides a complete SAN solution, designed for high-bandwidth applications like nonlinear editing and effects creation. ▲

## ROUTING SWITCHER

### SAV Systemes Audiofrequence Videonique GCD 4X1
**+33 1 53 38 22 00; www.sav-broadcast.com**

**Booth: C3920**

Switcher accepts all digital formats, with automatic format switching and has cable equalization on each input; features vertical internal switching and accepts 4:3 and 6:9 formats as well as embedded audio signals; can be remote-controlled; provides four digital inputs from 143Mb/s to 360Mbs/s and two digital outputs; 75Ω with reclocking. ▲

## TOWER SERVICES

### Spectrasite Community Broadcast Facility
**972-550-9500; www.spectrasite.com**

**Booth: C304**

Alternative to the traditional single-station approach to tower planning; allows multiple broadcasters to utilize a common transmission site; promotes community relations, shortens project timelines and preserves capital; services provided include obtaining the site, taking care of zoning and approvals, completing construction and managing the facility. ▲

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PATCHBAY

## Switchcraft EZ Norm

***773-792-2700; www.switchcraft.com***

***Booth: C750***

Allows users to change the normalling configuration from the front of the patchbay with a regular screwdriver; plastic, dual jack with nickel-plated, brass inserts/sleeves; construction increases product life; between the top and bottom jacks is a cam that can be rotated by the screwdriver, and opens and/or closes circuits within the jack housing to change the normals; normalling options include full, half or no normals at all. ▲

VIDEO DISPLAY PROCESSOR

## Zandar Technologies FusionPro

***+35 31 280 8945; www.zandar.com***

***Booth: C3846***

Combines input formats in one system; cards can be used in 3RU or 1RU frames; supports up to 13 dual-channel input cards; 3RU chassis has a dual redundant power supply; 1RU unit has accessible front-loading processing cards and support for local and remote control. ▲

VIDEO SERVER

## 360 Systems ImageServer 7000

***818-991-0360; www.360systems.com***

***Booth: C2024***

MPEG-2 video server provides up to six video channels, 24 audio channels, and up to 330 hours of storage; file transfer uses the MXF file format over dual Gigabit Ethernet ports; system encodes to 15Mb/s in main profile, and to 50Mb/s in 4:2:2 profile; standard features include dual composite and SDI video ports on each channel. ▲

THREE-CCD COLOR CAMERA

## Hitachi HV-D17

***650-589-8300; www.hitachi.com***

***Booth:C2850A***

Works with light levels ranging from 0.0003 to 100,000 lux; utilizes a combination of integration mode with field memory, electronic and digital gain, pixel binning, auto iris, and auto electronic shutter; three 410,000-pixel CCDs achieve a resolution of 850 TV lines, and a signal-to-noise ratio of 65dB with digital noise reduction. ▲

VIDEOCASSETTES

## Maxell Professional DV (DV-PRO)

***800-533-2836; www.maxell.com***

***Booth: C3163***

Developed for use in Mini DV and DV systems within the professional video and broadcast markets; integrates Maxell's Multipuretron vapor-deposited film; DV-PRO enhances picture quality and durability in demanding ENG/EFP applications – including high-speed playback, editing and rewinding – while providing almost seven times the recording density of VHS tape. ▲

VIDEO PORT

## Miranda Technologies DVI-Ramp

***518-371-1660; www.miranda.com***

***Booth: C2826***

DVI-to-HDTV/SDTV video port; enables workstation operators to output computer graphics directly as HD or SD video for post-production, editing and compositing applications, or for live playout to air of 3D and weather graphics; the output of the workstation graphics card is routed to the DVI-Ramp via a single or dual DVI connection; uses pixel-to-pixel mapping. ▲

SERVER SYSTEM PRODUCT

## Omneon Program DelayTool

***866-861-5690; www.omneon.com***

***Booth: SU5437***

Adds real-time program delay capability to the Omneon Media Server System; for each program input, up to six simultaneous delayed outputs can be provided; if multiple instances of DelayTool are run, additional programs can be delayed; offers an easy-to-use graphical user interface and runs on a standard Windows 2000 platform. ▲

FILM RESTORATION TOOL

## Teranex ScratchOut

***407-858-6000; www.teranex.com***

***Booth: C462***

Application designed to enhance Teranex's StarFilm restoration product by adding real-time scratch detection and removal for film-originated SD and HD material; based on Teranex's DCR algorithm technology; automatically detects, classifies and replaces over 80% of the scratches in film in real time, radically reducing the time traditionally required for repairing scratches. ▲

REAL-TIME AUTO SCAN CONVERTER

## YEM CVS-2000

***+81 46 228 8883; www.yem.com***

***Booth: SU6323***

Converts analog RGB signals from computers of horizontal frequency; has an automatic output of serial digital; analog composite signal and digital key signal as an option; includes a built-in superimpose function; allows adjustment of output images; user preset schedule. ▲

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# NAB PRODUCT HIGHLIGHTS

TRANSMISSION SOLUTION

## TANDBERG Television DSNG

***407-380-7055; www.tandbergtv.com***

***Booth: C3711***

Digital satellite newsgathering (DSNG) technology that is a fully integrated 2U digital flyaway, capable of bi-directional transmission of audio, video and data feed from a remote transmission site; provides two-way phone, data and IP communications between the satellite downlink and remote transmit site; set-up is quick and simple, permitting broadcasters to get on-air faster. ▲

ENCODER

## Doremi Labs ORCA

***818-562-1101; www.doremilabs.com***

***Booth: C879***

Real-time MPEG-2 encoder for HD and SD video; provides high bit-rate video compression, HD video support and extensive encoding controls; the ORCA PCI card was designed to meet demanding video encoding needs with its real-time MPEG-2 encoding of HD video; provides users with a choice of encoding parameters such as GOP structure, 4:2:0 and 4:2:2 encoding profiles and compression bit rate. ▲

AUDIO SWITCHERS

## Extron MediaLink switchers

***800-633-9876; www.extron.com***

***Booth: Venetian Ballroom G***

MLS 506 offers pre-amp volume control, as well as bass and treble control; features six inputs and one output; multiformat capability; MLS 506MA builds on the MLS 506 by adding a 30W mono amplifier to drive either a 4Ω or 8Ω load or directly drive a 70V distributed audio system. ▲

MASTER CONTROL SWITCHER

## Evertz PKGHD9625SW

***905-335-3700; www.evertz.com***

***Booth: C3412***

Allows the user to control up to 12 input video signals and up to 48 AES audio inputs; voice-overs, wipes, fades, fade to black and several other features can be performed, all from the single remote control panel. ▲

B1VX PATCH CORD

## ADC Telecommunications

***800-366-3891; www.adc.com***

***Booth: C4026***

VX series, standard/standard, blue, one-foot Pro Patch video patch cord; VX standard and midsize video patch cords feature an all-new plug design that optimizes impedance performance during the patched state; for use in all analog and digital video formats up to 360Mbps; features common plug components. ▲

LAPTOP EDITOR

## Editware Fastrack

***530-477-4300; www.editware.com***

***Booth: SU7053***

Graphic user interface and control allows nonlinear editing with as few as one server channel and up to 80 channels from multiple servers and VTRs; includes applications for sports highlighting, simultaneous acquisition, playout for news and sports, creation of sub-clips and sequences for automation systems, multi-screen multimedia presentations, and reformatting of syndicated shows. ▲

SWITCHER/MIXER

## Analog Way Smart Fade

***212-269-1902; www.analogway.com***

***Booth: SL1421***

Seamless switcher/mixer with improved titling and fading effects; dedicated to high-resolution A/V presentations; combines five video and two computer inputs seamless mixer/switcher, with built-in scaler; enhanced scaler/line multiplier; audio stereo line for each of the seven inputs. ▲

BATTERY

## Anton/Bauer Dionic

***203-929-1100; www.antonbauer.com***

***Booth: C3650***

Delivers more power for its weight and size than any other Anton/Bauer battery thus far; first battery to feature RealTime, an exclusive advancement of the Anton/Bauer InterActive Digital battery system; will run a typical camcorder for over three hours and can be mixed and matched to charge with any Anton/Bauer batteries on InterActive 2000 PowerChargers or the TITAN series of power products. ▲

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CONSOLE

## AMS Neve Logic MMC

***212-965-1400; www.ams-neve.com***

***Booth: N3038***

Offers the same 24-bit, 96kHz operation, XSP DSP and MIOS96 I/O as the DFC console, in a smaller footprint; Logic 1, Logic 2, Logic 3 automation import; features Encore automation; integrated multi-machine control system allows for multi-machine synchronization; console provides a full surround option. ▲

ROUTER

## Chyron Pro-Bel HALO

***631-845-2000; www.chyron.com***

***Booth: C2074***

Router handles HD or SD; comes in 16x16 or 32x32 configurations; compatible with the Pro-Bel router range. ▲

AUDIO MONITOR

## Wohler Technologies AMP1A-106

***650-589-5676; www.wohler.com***

***Booth: C2543***

Provides self-powered, full-fidelity stereo audio monitoring of two analog channels in 1U; features 106-segment ultra-high resolution LED level meters showing simultaneous VU and PPM for level-metering. ▲

LIGHT

## ARRI Sky Panel

***845-353-1400; www.arri.com***

***Booth: C3862***

Light source is based on OSRAM's flat Planon source; optimized to match true daylight on film without using mercury; no color correction is required; modules are approximately 17 inches by 14 inches — but only two inches deep; intelligent docking system allows quick setup in multiple configurations. ▲

DVE SYSTEM

## Accom Dveous/MX

***650-328-3818; www.accom.com***

***Booth: SU7305***

Provides SD and HD capability in one box; features at least one channel of HD and is upgradeable; can be set to work as a dual-twin system in SD (525 or 625) or in HD at 720, 1035 or 1080 at all known frame rates. ▲

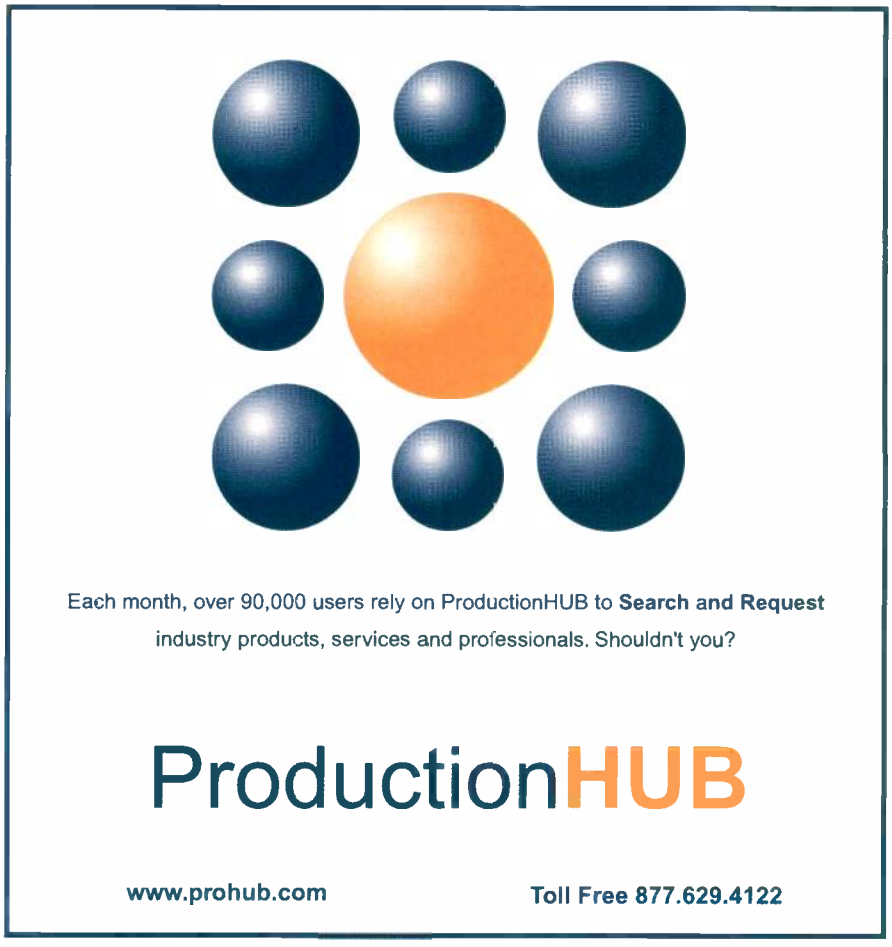
NEWSROOM CONTROL SYSTEM PLUG-IN

## Pinnacle Systems ThunderX

***650-526-1600; www.pinnaclesys.com***

***Booth: SU5003***

Stand-alone ActiveX plug-in provides easy Thunder integration into an automated newsroom control system, without requiring the use of Thunder Browse for MOS integration; offers added security by allowing users read-only access to Thunder systems running in a MOS newsroom control system such as ENPS or iNEWS; other features include saved database settings for multiple Thunders, user-configurable MOS ID, searching, jumping to a clip and showing a clip from a story. ▲

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# Changing channels:
## Audio for DTV

BY NIGEL SPRATLING

Designers are hard at work creating new digital television systems that will fundamentally change each segment of the broadcast industry. During this period of transition, most professionals have focused most of their attention on managing video signals of various formats and data rates. What's often overlooked are the challenges associated with implementing digital audio.

Interestingly, designing digital video signal layers is not very different from designing analog video signal layers. Timing considerations and constraints are similar and, in some instances, less strict. Of course, there are new technologies to implement that utilize servers and compression, but basic signal management schemes remain the same.

However, managing digital audio is far less understood. Digital audio, like video, is just data; data that needs to contain timing information in order for it to be understood and decoded.

The ATSC standards for digital television include the use of Dolby Digital compression to allow the delivery of audio as mono, stereo, Pro-Logic or full 5.1 channel surround sound. But how will the program originator manage the six or eight channels of audio needed for this? How will the networks deliver it to the local broadcaster? In turn, how will the local stations manage these signals before finally encoding them as Dolby Digital for delivery?

These questions have given rise to Sigma's OctaStream family of AES digital audio signal management products. The four initial products that make up OctaStream can all work independently, but collectively they comprise a solution designed to cost-effectively address the integration of AES and multichannel digital audio into the DTV environment.

The family includes the DA5320 mixer and subframe router, the DA5315 variable delay compensator, the DA5325 sample rate converter, and the SG5605 audio reference generator. These eight-channel units are designed to work together in a modular fashion so that stations can buy one, all or any combination and implement them as their needs dictate.

**Digital audio, like video, is just data; data that needs to contain timing information in order for it to be understood and decoded.**

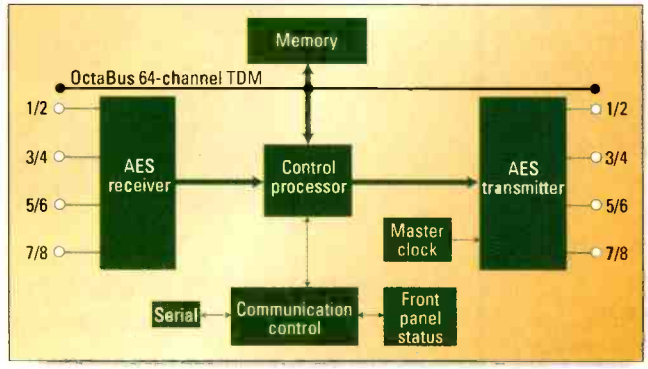


**Figure 1. Using OctaBus interface technology with the OctaStream system allows modules to share input signals and lends flexibility to audio management.**

Each of these "modules" can also be used for independent AES inputs or phased multichannel streams. They are designed for the new S5000 signal management frame, which allows unrestricted access to all modules, provides several choices for external control and is capable of hot-swapping all modules and power supplies. The modules are also fully compatible with NVision's NV500 enclosures, allowing them to be installed into existing NV500 frames.

Broadcasters don't have to have eight channels of audio, but using the modules gives them the option of having eight channels. Also, at some point in the chain there will be eight channels of audio: six channels (or 5.1 surround sound mix) and support for legacy transmissions. In addition, these products are equipped to handle any function connected with ATSC signal management and transmission.

The reference generator allows them to slave to their house reference and OctaStream provides an eight-channel signal reference with IDs incorporated. Then, they'll need to time what comes in, using the eight-channel sample rate converter. The incoming audio could be eight channels of a complete eight-channel set, independent stereo pairs, or it could be from non-video devices.

The variable delay compensator provides the ability to match the latency between video and audio. The most

likely delay path is through the video chain, which offers another eight-channel device that's programmable. Users can either slave all eight channels so they delay to compensate for the video delay or they can independently change the delay of the AES channel pairs.

There's also an eight-channel mixer and channel swapper, which allows users to easily and inexpensively move signals around. The modules also provide the capability to adjust gains of eight independent channels in order to swap channels around in a process called channel shuffling. For example, this process would allow you to swap channels one and three and break them out of their original AES pairs.

All of the modules provide constant AES outputs, regardless of input presence, as well as automatically performing a fade to silence at the loss of an input and a fade to normal once an input recovers. This ensures that critical paths are not interrupted, and that upstream asynchronous switching errors are concealed.

OctaStream also incorporates OctaBus, a proprietary TDM communications technology that allows eight modules to share their input signals via a single connection, providing each module with access to a total of 64 audio channels. (See Figure 1.) Interconnecting modules using this technology adds flexibility to audio management. Via this interface, 64 channels can be mixed, routed or retimed cost-effectively.

As the industry continues to move forward, maintaining phase coherence across audio channels and managing audio/video latency grows ever more essential. Thus, solutions like OctaStream with OctaBus are not only cost-effective, but scalable, and provide the level of flexibility that effective digital television systems require. BE

*Nigel Spratling is the president of Sigma Electronics.*

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# Tektronix
## WVR600 series rasterizer

BY ERIC HODGES AND SPYROS LAZARIS

As the transition to digital continues, increasing pressure on capital and operations budgets has led operators to seek digital equipment that maximizes their capital investment. Maximum return on investment (ROI) isn't measured by the lowest price as much as it is by gains in efficiency and flexibility.

Monitoring instruments have long been employed in applications ranging from color correction and editing to broadcast monitoring in master control rooms and contribution validation.

The Tektronix WVR600 series rasterizer provides an all-digital architecture designed to support both standard-definition digital and composite analog monitoring. The 1RU system also offers optional audio monitoring – analog, digital or both – and features remote control via Ethernet, specialized displays for verifying gamut compliance and signal timing, alarms and event logging, and a flexible display mode.

As an artistic and confidence monitor, the rasterizer performs all of the normally expected functions – waveform, vector, etc. – via fully digital processing for increased stability and accuracy in monitoring applications. Composite analog inputs, video or audio, are immediately demodulated using a high-speed, field-programmable gate array (FPGA), doing away with the need for multiple discrete analog components. This digital architecture provides a more stable monitoring tool over time, with minimal need for calibration and thus decreased downtime. It also means increased resolution of the signal being monitored, up to and including magnified or high gain views, and provides better information to operators as to the health of their signal.

Considering the vast inventory of analog equipment and content that exists in the industry, hybrid facilities are a natural offshoot of the digital transition. The rasterizer supports both analog and digital video, and analog and AES/EBU audio to provide flexibility. The instrument's design also includes loop-through inputs to allow for easier integration into a facility and to minimize disruption of the signal path.

**Hybrid facilities are a natural offshoot of the digital transition.**

The rasterizer also offers efficiency in a variety of ways. Several specialized displays are provided for verifying gamut compliance. (See Figure 1.) To easily check gamut compliance in the RGB domain, two displays – the Diamond and Split Diamond displays – are provided. These displays enable easy isolation of any components at fault. Since most content is created or edited in the component color space, but transmitted in composite, the Arrowhead display delivers enhanced efficiency by allowing composite gamut checking while still in the component domain. This saves time and removes the need for a composite encoder.

For additional operational efficiency, session screens provide a detailed summary of the quality of monitored video and audio content over time, reducing the time an individual must spend monitoring content visually for quality. Alarms and a comprehensive event log capable of referencing events to time-of-day, VITC or LTC provide additional operational efficiency. The event log can be checked for error conditions, and only the content with errors can be checked by referencing the log's time codes.

An additional innovation is FlexVu display capability, which gives operators the ability to independently configure four windows providing four concurrent views of a monitored signal. For example, in verifying gamut compliance, an operator could display Split Diamond and Arrowhead displays in two of the windows to simultaneously check for both component and composite gamut errors, while monitoring the actual picture and video session information in the last two windows. BE

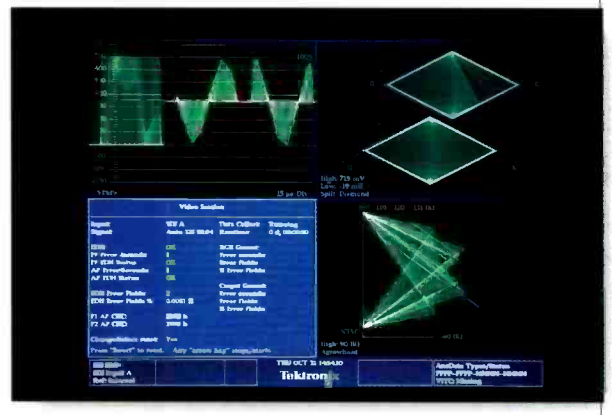

**Figure 1. The WVR600 series rasterizer provides several specialized displays for verification of gamut compliance and easy isolation of faults.**

*Eric Hodges is the worldwide marketing manager, and Spyros Lazaris is a product marketing manager, in the video product line at Tektronix.*

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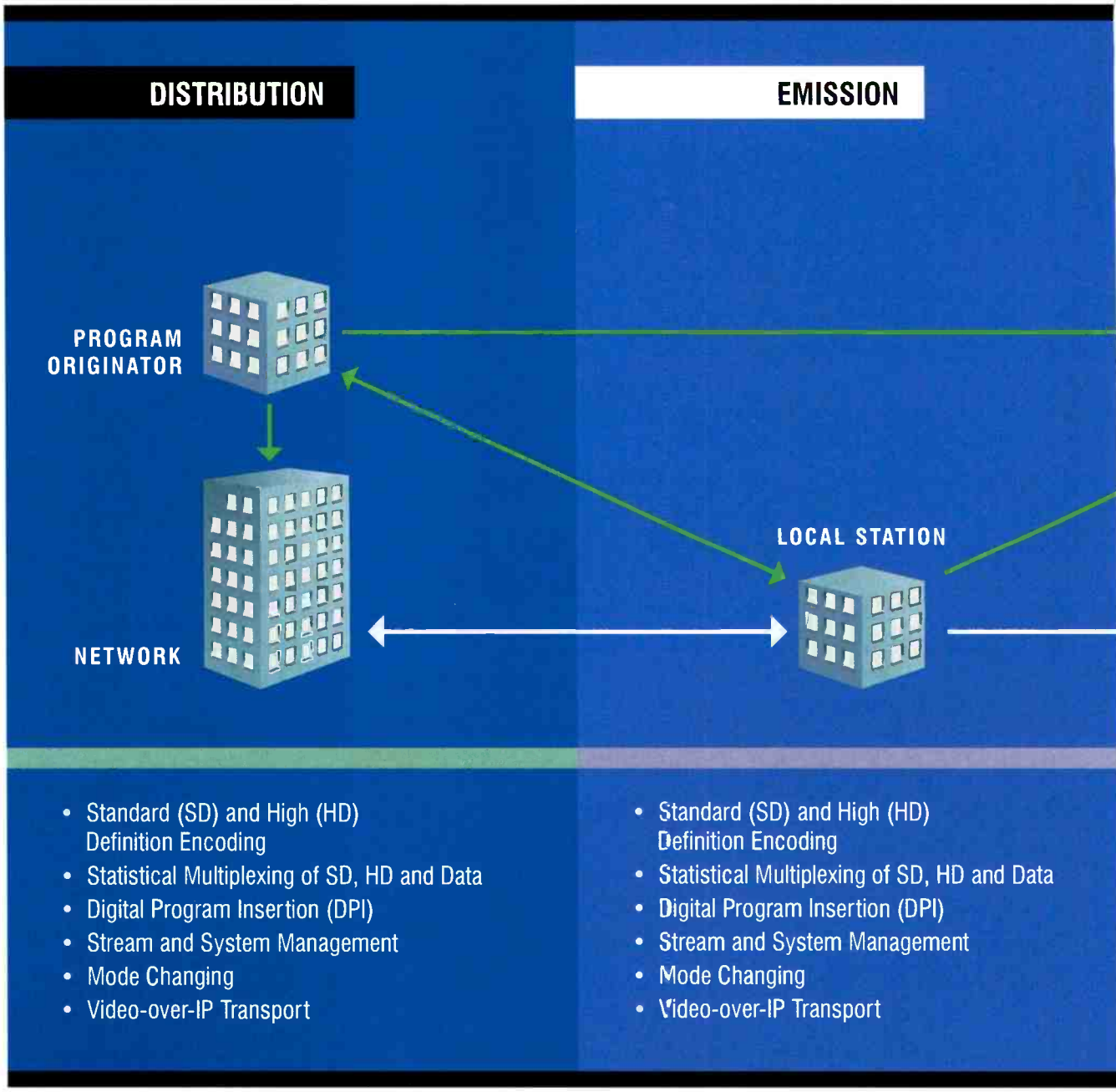


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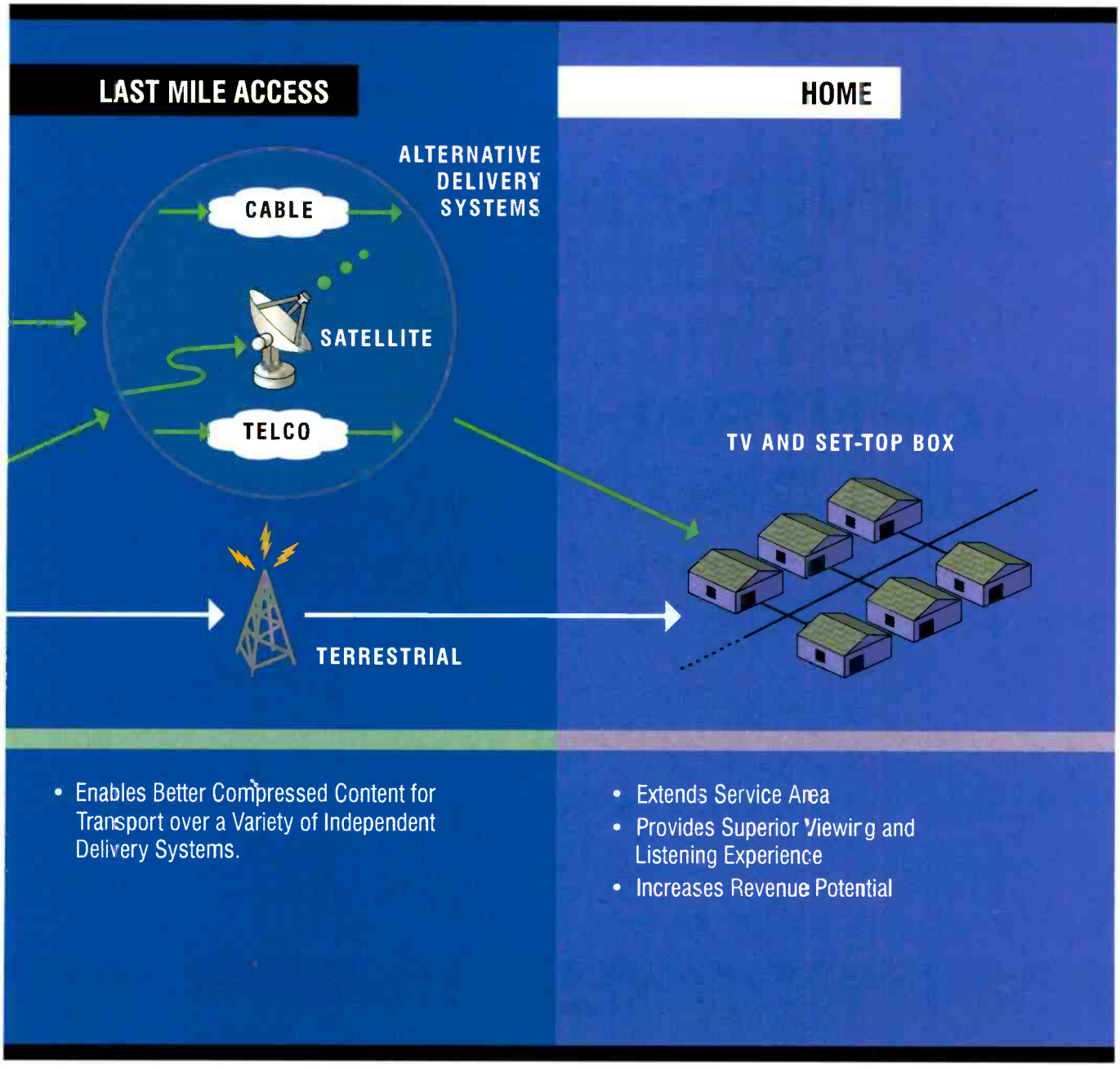


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# A new twist
## on the broadcast paint box

BY D.R. WORTHINGTON

Reports of the death of the broadcast paint box have been greatly exaggerated. For a while, however, it seemed the disappearance of these types of graphics systems from the market appeared imminent. In recent years, many professionals have turned their attention to non-industry-specific graphics packages such as Photoshop, which are low-cost and provide access to hundreds of cool third-party plug-ins.

However, while these applications can serve as excellent general-purpose graphics tools, they often fall far short of integrating into the production scheme of a typical broadcast graphics environment. One solution is to employ a host of other applications, but this requires users to spend large amounts of time importing and exporting files. Then there are also aspect ratio issues to address. The demands on today's television graphics departments are extreme, and the method that calls for the least amount of button pressing paves the road to increased productivity.

VDS' next-generation broadcast paint product, Twister Paint Station, offers another solution. The complete, Windows-compatible graphics application is designed specifically for broadcasters.

The key goals in its design were ensuring a user interface that was clean, intuitive and fast, while offering features like R/W Photoshop layers, direct connection to and file support for most industry-standard devices. The application also supports 3-D paste image and mask layers, Photoshop plug-ins, video grab to canvas, and real-time paint show to video. Chyron's Lyric text plug-in is used for text generation, allowing the operator to create Lyric-compatible layer files.

The software is resolution-independent, and the operator can easily switch from analog to digital, NTSC to PAL, or SD to HD. The resolution settings are user-configurable for custom resolutions and the aspect correction is automatic, eliminating the need to "create" in one resolution and "save as" in another.

**The method [in graphics] that calls for the least amount of button pressing paves the road to increased productivity.**

The application delivers the paint features found in most paint applications and adds many vital broadcast production features. (See Figure 1.) The operator can route broadcast-quality SDI video into the Twister PS I/O by way of the Chyron Digital pcCODI board and have the video appear directly on the graphics system's canvas. From there, the artist can then grab an image, treat it using the image tools library or any of the hundreds of available Photoshop plug-ins, add graphics and layers, add text or shadows, and then output the composited image back through the digital pcCODI card's SDI I/O with key.

Images can also be saved over a network to a still store, character generator, NLE or video server as a native file, all while working in proper video aspect with built-in safe title/action generator and illegal color suppression options. The application can even update the applicable database information.

The application is available in plug-in form for products like Chyron Lyric, offering sophisticated paint and graphics creation tools to Windows-based applications. VDS is also planning to release a 64-bit version later in 2003, complete with rotoscoping features for comprehensive film effects work using the Cineon file format. BE

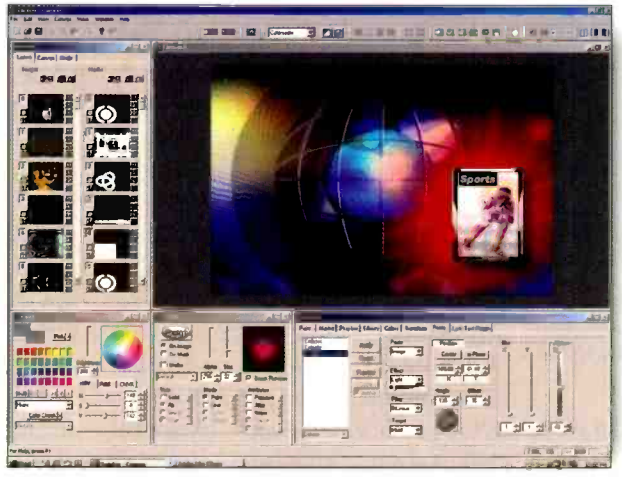

**Figure 1. VDS' Twister Paint Station integrates into broadcast production environments by offering a variety of broadcast-specific features in addition to functions found in other paint applications.**

*D.R. Worthington is director of marketing and product development for Video Design Software.*

# Monitoring incidental phase modulation (ICPM)

BY CHUCK BARROWS

In the late 1970s, television demodulators became available with synchronous detectors, providing a method of monitoring the in-phase and quadrature signal components of television transmitters. Standards for ICPM were developed that helped improve audio quality and reduce video nonlinear distortion. While there has recently been an emphasis on digital television transmissions, there remains a need to maintain the quality of broadcast analog signals in the interim. This article discusses the effects of ICPM and methods of monitoring it with the new generation of equipment currently available.

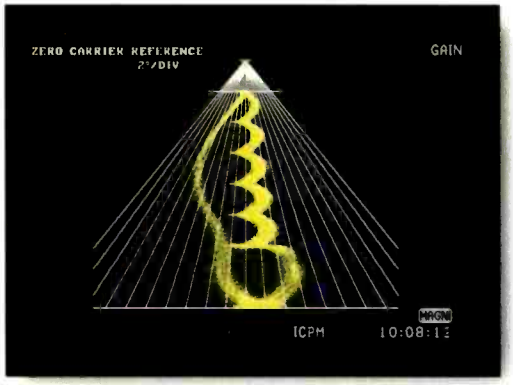


**Figure 1. Pictured is a full-field stair-step test signal with an ICPM display resolution of 2° per division. The frequency response of this particular demodulator is limited to 800kHz in the I and Q channels.**

In television broadcasting, the picture is carried by amplitude modulation (AM) of an RF wave while the audio is carried by frequency modulation (FM). Theoretically, in AM the signal varies the amplitude of a carrier wave, generating sidebands, but does not affect the carrier frequency. In practice, anomalies in the modulation process can cause the carrier frequency to vary slightly with the video signal level. The resulting time-varying frequency, and thus varying phase of the vision carrier, is known as incidental phase modulation, ICPM.

There are two basic types of circuits for demodulating amplitude-modulated signals: envelope and synchronous detectors. Envelope detectors are not sensitive to ICPM, but synchronous detectors are. Synchronous detectors provide better high-frequency response and thus display resolution, while envelope detectors lose resolution due to vestigial sidebands because of an effect known as quadrature distortion. The net effect of all of this can most easily be seen in differential phase measurements. ICPM can translate almost directly to differential phase errors when measured through a synchronous detector, while an envelope detector will respond primarily to the actual differential phase. Originally, television receivers used envelope detectors because of the simplicity of the circuitry required compared to synchronous detectors, so ICPM-induced differential phase was not a major issue. Large-scale integrated circuits have allowed manufacturers to employ synchronous and quasi-synchronous detectors that translate ICPM into differential phase distortion, thus degrading the color fidelity of the picture in some conditions.

In television broadcasting, audio is carried by frequency modulation (FM) on a carrier offset in frequency from the AM picture carrier. Television receivers typically combine the picture carrier and the audio FM signal to create an intermediate frequency signal for audio detection. Combining the two signals causes any time-varying phase in the picture carrier, or ICPM, to generate picture-related noise in the output of the audio detector. Thus, ICPM can cause video-related sound buzz and poor stereo separation.

While there has recently been an emphasis on digital television transmissions, there remains a need to maintain the quality of broadcast analog signals in the interim.

## ICPM monitoring

A television demodulator with two synchronous detector outputs, one in phase (I) and the other detector (Q), operating in quadrature to the picture, RF carrier and a display device, are required for ICPM measurements. The I channel is essentially the normal video signal; the Q channel output is proportional to the ICPM error. (See Figure 1.) Typically, ICPM is displayed in a polar graph expanded around quadrants three and four.

Mathematically, ICPM is equal to the arctangent of the quadrature component divided by the in-phase component of an AM signal: ICPM = ARCTAN (Q/I). In practice typical ICPM values range from less than one degree to ±45°. While the FCC does not have a specified limit for ICPM, there is a recommendation that it be limited to ±3°. ICPM in tens of degrees normally would be unacceptable,

but can be encountered during initial setup.

Early waveform monitors, which had auxiliary horizontal inputs, were used with external graticules for ICPM measurements. Specialized waveform monitors followed with features such as internal ICPM graticules. These units have been largely phased out since then by manufacturers.

Normally, a five-step staircase signal is used for ICPM testing. This provides discrete RF carrier levels, from sync tip to white, for ICPM measurements. Using a full-field

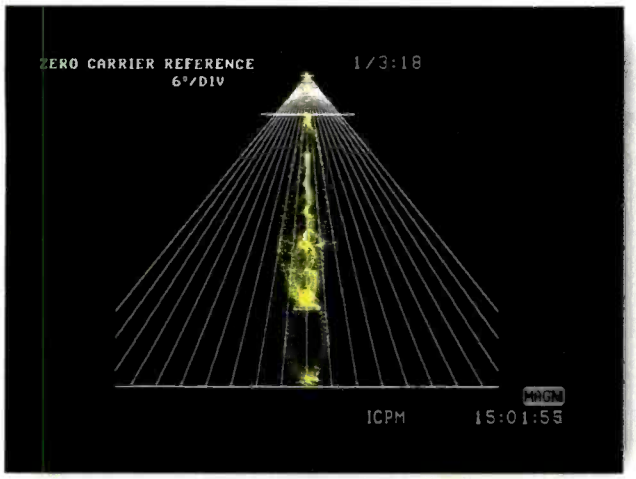


**Figure 2. The ICPM display for an off-air NTC7 VIT signal is shown. The variable persistence of the rasterizer allows ICPM to be observed in relatively high noise levels during normal programming.**

unmodulated staircase signal provides the highest resolution measurements. An NTC7 VIT, or FCC Composite VIT signal, can be used, but the resolution will be reduced by effects of the subcarrier modulation and the low duty cycle. (See Figure 2.)

The need to monitor and maintain high-quality analog broadcasts today is no less than in the past, but now it can be met cost-effectively with the right solutions. One need only look to products that are based on proprietary 10-bit rasterizing technology. Such solutions are capable of delivering sharp, analog CRT-like displays in conjunction with microprocessor processing that provides on-screen waveforms, adaptive graticules and numerical read-outs of important parameters.

A television demodulator, such as the Tektronix 1450, Rhode & Schwarz EFA.93 or Modulation Sciences 320, is required to demodulate the RF signal to baseband video, and to provide the in-phase and quadrature signal. The I and Q signal, and the baseband signal are then connected to the input of systems such as the Magni AVM-510A-T automated video monitor, which has specialized transmitter-testing capability, and provides an on-screen display that can be viewed on a color picture monitor. BE

*Chuck Barrows is vice president of sales and marketing for Magni Systems.*

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# Ciprico stars in HBO's "Movies on Demand" project

BY ELMER MUSSER

HBO's "Movies on Demand" program allows viewers to watch their favorite shows when and where they want, as well as enabling them to pause, rewind and fast-forward their digital movies at will. For viewers to use this service, HBO's broadcast engineering department ingests video content from videotape, encodes it into an MPEG format, and puts it on the network storage. The video data is then reviewed for quality and content and assigned to servers that are located in cable facilities around the world. The distribution server pulls the content from HBO's networked storage and sends it over satellite through IP. Multiple cable systems receive the video content on their local storage and mount it on their local "on demand" server to be viewed by their customers.

With its deadline fast approaching, the department relied on its strong relationship with Ciprico to help it meet its goal. The department staff didn't have time to evaluate products for this project – they wanted to go with the tried and true. The company that was identified to distribute the final content required that the department have network-attached storage (NAS). The company recommended a solution, but the department staff had never used that product. In the past, they had worked with Ciprico. They knew the company was working on a new NAS product and felt that the company would work closely with them to supply exactly what was needed, when it was needed. After reviewing the product specifications and seeing that it met their criteria, the staff decided to use the Ciprico DiMeda 2400 digital media appliance, even though it was a new product and had not been tested in the field. Ciprico gave the staff its word that the product would meet its specifications, and a handshake sealed the deal.

The system is the first in a new family of digital media appliances introduced to address the need for shared storage. Capable of handling large media files at fast speeds, it allows a number of clients to ingest and play back the files in real time without dropping frames. The product combines the best of both storage area networking (SAN) and network-attached storage (NAS) at a reasonable price – a perfect fit for content creation and distribution applications requiring shared storage.

Using a product that had not yet been proven might make some nervous, but the staff was confident that Ciprico would deliver on its promise. The staff took the product right from the drawing board to the department's application. It purchased 3TB of storage for its production environment and an extra 3TB of storage for redundancy. Ever since Sept. 11, the department also has had to provide an emergency recovery system offsite. The department chose to use the same storage solution for this purpose as well. This put all of HBO's storage eggs in one basket, but the staff wasn't nervous because of the close relationship they shared with Ciprico.

**With its deadline fast approaching, the department relied on its strong relationship with Ciprico to help it meet its goal.**

**The Ciprico DiMeda allows a number of clients to ingest and play back files in real time without dropping frames.**

The system was brought into the facility, everything was connected and turned on, and then it was time to watch and wait. Usually, when the department rolls something out for production, it spends an extensive amount of time just running the entire application, so that if anything bad is going to happen, it doesn't happen in a full production environment. So the department ran the "Movies on Demand" system for about three months before HBO went live. In that time, DiMeda worked as expected – it was plug and play, which was exactly what the department needed. BE

*Elmer Musser is vice president of broadcast engineering for HBO.*

Special NAB '03 Edition

BROADCAST | PRO AUDIO | LIVE PERFORMANCE

# DALE e-news

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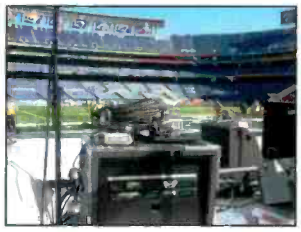
Spring 2003
Issue #3

## Products at Dale PG.2

TELEX/EV



Sound Devices 302 Compact Production Mixer

Genelec 1029.LSE Power Pak

# Dale Equips NMT'S HD4: Newest Member of HD Fleet

*New Truck Is Key Element of Multi-Year Agreement Between NMT and ABC Sports, Covering the Network's Entire Schedule of Remote Productions*

On April 1, National Mobile Television (NMT) rolled out its newly built HD4 mobile production truck, featuring a full complement of gear purchased through New York-based Dale Pro Audio. The new truck, which is NMT's 4th high-definition unit and their first true multi-format HD facility, has already been booked as part of a multi-year contract extension between NMT and ABC Sports.

Under the terms of the agreement, HD4 will be used on "Monday Night Football". The agreement also provides NMT with exclusive facility responsibilities for all ABC Sports remote productions, including college football, PGA Tour events and ABC's scheduled telecast of Super Bowl XXXX in January 2006.

"We chose Dale Electronics for HD4 because they offered an excellent combination of competitive pricing and fast delivery," says Jerry Gepner of NMT. "The team at Dale worked closely with us throughout the entire project, and they were able to adapt very quickly to our needs as they evolved."

"These sales to NMT further substantiate Dale's knowledge of the digital broadcast marketplace," said Michael Descoteau, Dale Pro Audio director of broadcast sales. "Dale's knowledge base in broadcast is wide and the team here is able to provide some of the best consultation for broadcasters making the transition to digital and high definition."

*NMT President Jerry Gepner*

All the equipment in HD4 is state-of-the-art and designed to provide a "plug and play" environment at most any venue across the country. Equipment from Dale included two Genelec 1029LSE Power Pac systems for 5.1 audio, an RTS two-wire intercom, three Focusrite ISA430 Mic PRE Comp/Lim for announcer feeds, four Zaxcom digital wireless systems and over 26 pieces of equipment from Wohler, including six of the brand new AMP2-S8DA Rack Mount audio monitors.

"HD4 is designed and equipped to operate as a true multi-format HD truck, able to meet the technical requirements of any HD broadcaster," said Gepner. "The days of a single format facility for high definition production are rapidly drawing to a close."

## Walk the Perimeter at NAB 2003

As the annual rite of spring, the NAB show, approaches, many of us in the industry view its arrival with mixed emotions, from "Oh, not that again" to "Hey, let's party." Most of us though, look at the show as an opportunity to get out of the office, studio, or mobile truck and visit with colleagues, network with peers, but most of all, get the best opportunity to see, touch and educate ourselves about the latest technology.

The problem is many of us get caught up in a syndrome of only checking out the "big guys." You know what I mean. Fast forward to 11 a.m. on Wednesday. There you are. You saw everything Sony, Panasonic, and SSL has to offer, but not really having the opportunity to find those four or five things that make your life easier...RF mics, small rackmount digital mixers, throw down telephone interfaces.

The approach I developed years ago was what I call the "10x10 perimeter little guy tour." In other words, take one or two hours, and break away from the monolithic booths that dominate the show, and cruise the perimeter of the show halls. Take a look at the 10x10 booths that ring the NAB. They hold potentially great start-up companies. Many of today's better known vendors started on the perimeter. That's how Dale Pro Audio found them! Along with finalizing a big deal, having a great evening with old friends, there's a good feeling of accomplishment finding that special, problem solving audio item you never knew existed.

## Plus In Every Issue

### THE DALE THINK TANK

*Expert Analysis, News & Opinion*

# Surround is Here

THINK TANK

Michael Bogen

mikeb@daleproaudio.com

I know you've heard this before; "Surround is the new, big thing." "Surround is coming." Well, I've got news for you. Surround is here now! If it's not in *your* living room, your neighbor has it. During the last holiday season the fastest selling category in home electronics was the DVD player. Once consumers buy into the concept of surround they want it for movies and then concert videos and soon they want it for everything.

The prices for HD TVs and HD-ready TVs have dropped by thousands of dollars. Cable and satellite companies have joined over-the-air broadcasters in transmitting DTV and HDTV.

If you're a broadcaster, post house, truck, or audio recording studio, the time is now to prepare. Existing rooms will need to be retrofitted for surround monitoring. Powered monitors will need AC power as well as audio signal. Seating spaces for clients may have to be adjusted. If you're adding a new room or starting from scratch, it would be wise to plan the space accordingly.

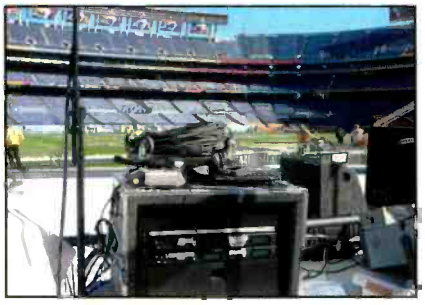
Only the newest consoles provide surround monitoring capabilities in the board. Fortunately, several companies produce external surround controllers with bass management. If you cut CDs or do post work on sports, it's also time to think about 6 channel compression and reverb. Whether you record your audio on tape or in a computer, you'll also have to determine how you're going to store your multi-channel stems. You'll may also want to invest in both an encoder and a decoder.

It doesn't really matter whether the material your facility produces is a hip-hop hit or arena football. The viewer and listener are primed for a total immersion experience and that's what surround provides. The tools have been available for a while. Now the consumer has caught up with the technology.

# Industry Leading Products

## TELEX/EV Products Score at Super Bowl

When the Oakland Raiders and the Tampa Bay Buccaneers squared off in Super Bowl XXXVII this year in San Diego, the action on the field was broadcast to a worldwide audience. The logistical efforts required to pull off the broadcast production for the big event were equally far-reaching, and centered on the use of a number of Telex and Electro-Voice wireless microphone products. The equipment used, including two Electro-Voice CDR-1000 Dual RE-1 Receivers, four 100mW WT-1000REF Bodypacks, four RSB-2 Referee Mute Switch, four ELM-33 Unidirectional Lapel Microphones, and two ALP-450 Passive Log Periodic Antennas are all available through Dale Pro Audio.



Call Dale today to find out how to make these super products work for you.

## Genelec PowerPak Play

The Genelec 1029AP bi-amplified active monitor was introduced in 1996, designed and built on the premise that size shouldn't matter, but rather quality and reliability. "By all measures of success the 1029AP is an amazing product," said Mike Bogen of Dale. "Its acoustic representation of the audio signal always surprises listeners, especially when combined with either the 1091A or in the new TriplePlay system, available through Dale Pro Audio, which utilizes the new 7050A stereo subwoofer."

The larger 7060A Multichannel Subwoofer serves as the cornerstone to the 1029.LSE PowerPak, also available through Dale Pro Audio, which is comprised of five pre-packaged 1029A active monitors and one 7060A. The system is designed for small room surround applications where room volume is less than 2800 cubic feet. Its tightly integrated, feature laden 6.1 bass manager serves to reproduce the low frequencies (29Hz to 85Hz) for all the main channels as well as the reproduction of the LFE (29Hz to 120Hz) channel. In near-field mixing environments (< 8 feet) peak SPL's of 110dB are certainly achievable.

However, the system is surprisingly small (each 1029AP occupies only a 6" x 8" footprint). But don't let its size confuse you. This system will rock the house...or truck (*see NMT story, pg 1*).

Available at
DALE pro audio
Call 800-345-DALE
or visit www.DaleProAudio.com

## Setting New Standards with 302 Field Mixer

Wisconsin-based Sound Devices will introduce the 302 Compact Production Mixer at NAB.

Designed to set new standards for portable audio performance and developed specifically for field production audio applications, the 302 mixer is a great tool for production companies and camera operators wanting to take control of their audio. The 302 is among the most compact and cost-effective battery-powered professional audio mixer in its class.

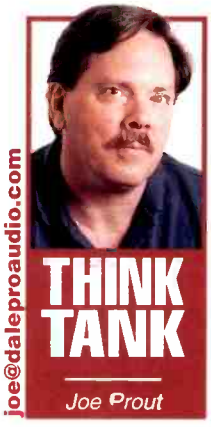
"This is the type of product ENG professionals seek out at NAB," said Michael Descoteau, Director of Broadcast Sales at Dale Pro Audio. "Post show, come to Dale to check out this product, hands-on."

"Today's field production crews need their equipment to be highly portable," said Jon Tatooles, Managing Director of Sound Devices. "Video cameras are getting smaller and lighter while their picture quality continues to improve. Similarly, the 302 provides the features and performance of larger ENG audio mixers in a far smaller size. The 302 brings the most important functions — level control, metering, and monitoring — up front and accessible. While it is a very feature-rich product, we have been able to keep it accessible to all classes of users."

# Wireless Mic Options - Part II

Continuing with the theme of inexpensive, yet full-featured UHF wireless mics from my previous article in the premiere issue of Dale-E News in October 2002, I'd like to review a couple of other brands that fit this description.

Sony's synthesized UHF wireless mics were among the first to be used in the production community almost ten years ago, and Sony has continued to expand and offer many different options within their UHF wireless mic lineup. Their latest offering is their UWP series which allows you the ability to use up to sixteen channels of wireless simultaneously, and gives you 188 usable frequencies to select from. The body-pack and hand-held transmitters in this series both have 5mW/30mW adjustable RF power outputs, giving you the option of longer battery life if you don't need the extra transmission range, and the receivers give you state-of-the-art features such as battery status from the transmitters and headphone monitoring of the audio signal. They also make a modular receiver element which you can install up to six channels of in their existing MB-806A tuner base unit, and up to two tuner modules can be used in one of Sony's integrated mixer/amplifiers, the SRP-X700P or the SRP-X351P. For corporate A/V people, this set up could be highly economical and efficient, and for videographers that do professional events and parties, the UWP series offers a very attractive combination of features at an extremely affordable price point.




Telex and Electro-Voice, working together since Telex's acquisition of Electro-Voice approximately four years ago, have come up with one of the most exciting developments in RF technology. This feature, called Advanced ClearScan, selects both the clearest preset group of up to sixteen compatible channels, and the clearest channels within the clearest group. Advanced ClearScan is available both in the Electro-Voice RE-1 wireless system and the Telex FMR-1000 system.

EVI's RE-1 system offers transmitters that have a 5mW/50mW adjustable RF power output, a "smart" battery circuit so you can't put the battery in the wrong way (How many of you audio professionals/RF techs/rental techs out there have had your clients or talent come up to and say "My wireless mic is not working!", just to find that the batteries were installed the wrong way?), and the ability to have the On/Off switch act as a "mute" button or be disabled entirely so as to prevent accidental turn-offs during use. The receivers are available in single or dual configurations, with 950 possible channels programmable in 25 KHz steps across 24 MHz operating bandwidth. The backlit LCD display offers a plethora of information - the group in use, the channel within that group, transmitter battery status, diversity operation, RF and Audio level meters, and even space to type in a custom name for a particular job or show's setup on that receiver.

The Telex FMR-1000 system shares these innovative features with the E/V RE-1, but has one unique feature of its own - a parametric equalizer that allows for Level, "Q", and frequency control. For those corporate/industrial wireless setups where you sometimes don't have the luxury of a mixer, and you're forced to send the audio output right to an amplifier/P.A., this is a welcome addition. Both the Telex and E/V systems are priced so that even the person on the tightest production budget can afford to step into systems with these types of features that were never previously available even in the highest-priced wireless products on the market.

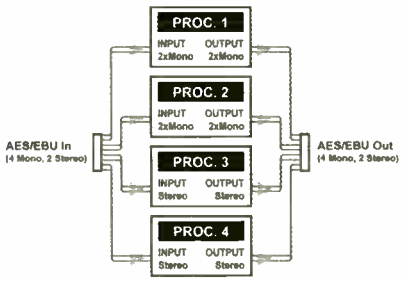
In short, if you have a chance to use wireless these days, you'll be very pleasantly surprised at the myriad of options you have at economical price levels. GO WIRELESS!

# Turner Entertainment Networks Installs TC Audio Processors

America's top rated cable networks have installed The DB-8 TV Transmission Processor - a multi-channel processing platform tailor-made for the broadcast industry and developed to comply with the specific demands of Digital TV. Processing includes real-time Loudness Control, Multi-band (5-band) processing, EQ, delay and Limiting.

Turner Entertainment Networks recently celebrated the December 9th, 2002 move of TNT from pre-existing facilities to their new Network Operations Center in Atlanta. TNT was the 1st of 19 networks to make this transition. Other networks will begin to come online in rapid succession, Turner South in February, WTBS and TBS Superstation in March. Then after a short break, Cartoon Network, TCM and Boomerang will launch sometime in May. The balance will be switched over by October 2003.

All 19 network feeds use TC Electronic's DB-8 Digital Television Audio Processor. The DB-8 met Turner's requirement for independent channel processing and 75Ω AES3 BNC termination with total bypass at power down. The DB-8's ability to process 8 channels of AES digital audio in any combination of mono, stereo or 5.1 were the deciding factors that won the job.




*TYPICAL EXAMPLE OF DB-8 ROUTING FOR TWO STEREO AND 4 MONO SIGNAL PATHS IN A SINGLE FRAME*

On a number of these feeds, multiple languages are present (English on channels1 & 2, Spanish on channel 3, Portuguese on channel 4, Descriptive Video Services for the Visually Impaired on channel 5 and French on channel 6.) Each of these feeds has two identical chains, called A and B, so the "backup" is indistinguishable from the "primary" channel. That's hundreds of audio channels that require processing. That task would have been quite difficult using conventional "stand alone" processors with faceplate controls with the usual small LCD screen. As an alternative, the DB-8 audio mainframe communicates via Ethernet with a graphical PC interface that gives a detailed overview of one, two, or all eight channels found in each 2U frame.

Each DB-8 channel offers true loudness and multi-band processing, AGC, inter-sample accurate peak limiting and delay capabilities. Once the settings are decided upon they are stored to the internal memory of the DB-8 and the PC may be disconnected. The DB-8 will then retain those settings, even after a power down cycle. Unique to the DB-8 is a user assignable routing that permits the system programmer to route internal signals through the 4 DSP "engines" in a flexible method that allows for the various processes to occur in mono, stereo and in 5.1.

*THE SOUTH CONTROL ROOM - ONE OF NINETEEN FEEDS AT THE NEW NETWORK OPERATIONS CENTER*

Format control permits the conversion of stereo to 5.1 using a proprietary algorithm that generates a credible surround field. The standard Matrix programs also permit a 5.1 mix to be summed down to LCRS, Stereo or Mono. The DB-8 also implements a new technology called Inter-Sample Peak Limiting. Not many digital limiters have been able to emulate the very best analog limiters. ISP limiting employs a digital up-sampling technology that results in a more transparent and artifact-free signal, even when in extreme limiting. On February 3, 2003 TC released version 1.20 software for the DB-8. This version offers, improved real-time Loudness Control where new adaptive detection and leveling functions have been added, along with 28 new presets for Analog and Digital TV.

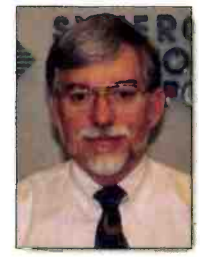
# From Tascam A Digital Controller for All Applications

"The Tascam DS-M7.1 is a great solution for surround monitoring control in applications including television broadcast, post-production for film and video, surround music production , audio for multimedia games and theatrical production," according to Mike Bogen of Dale Pro Audio.

Designed for surround production suites equipped with a digital console, the TASCAM DS-M7.1 Professional Digital Surround Monitor Controller is a surround sound monitor control device that adds multi-speaker monitoring control to digital consoles that only have eight output buses. The DS-M7.1 duplicates the output buses of digital consoles, then routes the signal to both a stem recorder and multiple amplifier/speaker combinations. The DS-M7.1 supports surround formats from LCRS up to 7.1, including 5.1 and 6.1, with the ability to downmix to LR from any surround format.

# Archival storage systems

BY JOHN LUFF



The classic definition of archiving has several connotations that have meaning in the context of media systems. One connotation is to place in a secure place for preservation. Another is to remove from common use and conserve for future use. Both are particularly appropriate for our industry.

Before the advent of digital video storage, archiving had a more classical meaning. Analog recordings, on film and video, were placed in a library in much the same way as books are placed on shelves with a card catalog identifying the contents of the stacks. When a library got too full, some material was removed and stored off-site in what might be properly viewed as an archive.

These analog, physical archives had limited shelf life, defined by the medium on which the content was stored. Old nitrate-based film archives, like the Fox/Movietone news library, eventually had to be transferred to other media to make continued conservation of the content physically viable. Such "archives" held enormously valuable content – preserving defining events in history as well as the artistic output of film and video professionals from the early days of the media industry. Fortunately, much of broadcast and film history has been protected, though some important content has been lost along the way due to neglect and a lack of emphasis on proper conservation and archiving.

The more modern context for archiving revolves around the digital equivalent of that quite physical process. It is about preserving the "representation" of the content as, in reality, the content itself has been turned into a sequence of bits that only replicate the original experience when reassembled in a display process. This might make modern conservation easier in some ways, but it means archiving is much more ethereal and the risk of loss of content is higher.

**The key is to know what you need before you need it.**

For instance, it is difficult to envision the archivist in 3003 retrieving the contents of a digital videotape library, considering the dizzying array of digital video recorders, computer disk readers and other highly mechanical devices required to create and maintain such a library.

SMPTE and other organizations have long tried to define archival storage in the digital age. I once worked on a proposal for converting a major still image library to digital form for the purpose of preserving the content in a form that could be electronically migrated to new media in successive generations of digital archival storage. The concept is easy: Make bits now and you can forever migrate those bits to new media before the old media either physically deteriorates, or the hardware needed to play it back disappears. Any claim that digital content is inherently stable is specious. The goal has to be to move the content before the machines and operating systems are no longer available.

Great standards work has been done by the EBU, SMPTE, ITU and others on file formats that hold the promise of making the future interpretation of the content a much less painful process. Today, we must look at storage as inherently hierarchical, with faster-access media held close to the use or display point, and media with less time sensitivity and higher storage volume stored at any appropriate distance. (See Figure 1.)

As the need to access media quickly increases, it is naturally moved closer to facilitate random access at the speed required. As the need becomes less immediate it can be moved further away and the access time can be much longer. It may even be far slower than real time, since the local storage can buffer the need and make it look transparent. The key is to know what you need before you need it, which is the job of software akin to a digital librarian. Such software understands what is stored, where it is

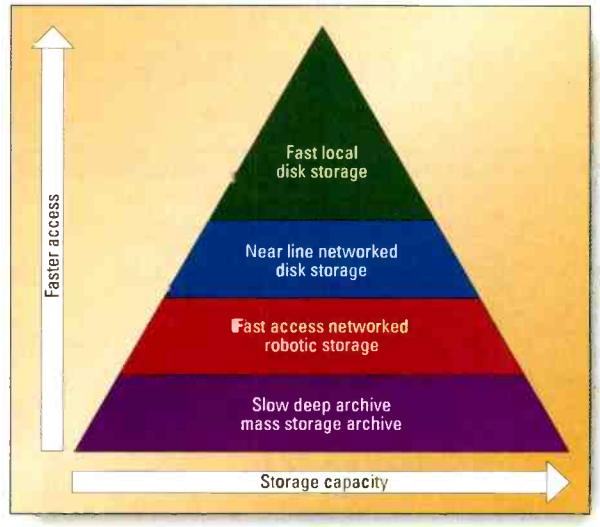



**Figure 1. Storage systems usually take a hierarchical form, with media that needs to be accessed quickly held close to the point of use.**

stored, and how to get it in the most efficient way.

Systems that provide these archival storage functions can vary quite a bit in type and scale. The most obvious class is robotic librarians holding digital data tapes, DVD ROMs or other digital media. Each has its strengths. In general, DVDs are slower and hold less, but are less expensive, perhaps more appropriate for smaller-scale needs at low cost. With blue laser disks coming soon, DVDs will become more effective in medium-size installations. DVD archives may, for instance, be more appropriate for a news archive or deep archive for spots during a station installation.

Tape archives can vary from desktop- to room-sized, with large installations encompassing multiple cabinets, each with multiple drives. Having multiple drives allows simultaneous read and write functions (not always needed if traffic is low), as well as the ability to "clone" content when the physical media begins to show increasing error rates. With high-bandwidth needs – that is to say, many read or write operations potentially needed at the same time – multiple drives may be inescapable. A deep archive of critical content may contain more than one instance of each item if the content is particularly valuable. Having more than one copy of each item would also prove useful if multiple items are stored on each tape, and you might need to access two items on the same media at the same time.

In the last couple of years an intermediate class of storage systems has become important. One might think of them as near-line storage. If the disks attached to your video server network are viewed as local storage, then this additional storage would be slower access, use less expensive disks (JBOD perhaps), have the ability to transfer at lower bandwidth only, but provide cheap mass storage that can buffer deep archive effectively, providing a cost-effective way to put many terabytes online.

**You don't care where the actual bits are drawn from, only that your request is fulfilled.**

This strategy aligns well with the general IT industry, and is particularly suitable in our industry where media has high value and everyone wants to be able to access the maximum amount of content in the minimum time. John Watkinson once spoke at a SMPTE meeting about the perception of storage in our industry. To paraphrase his comments, it does not matter that you can put your hands on the media. What matters is that you ask for media to play back and it does. You don't care where the actual bits are drawn from, only that your request is fulfilled. Unless you must carry the media somewhere by Nike Net to be played back it doesn't even matter if the first 10 percent plays back from RAM, 70 percent plays from fast local disk, 10 percent from the near-line disk archive, and the last 10 percent from a robot 200 miles away. If the bits all arrive at the decoder in time to make a seamless presentation, then all is right with the universe, and the archive has done its job. This article was written in a fragmented file system accessed in a nonlinear manner. What mattered is that my e-mail to the publisher contained all of the content in the right order.

Though not the subject of this article, a word must be said about the "digital librarian," or archive manager. This is a layer of middleware that sits between the physical drives (robots generally), and the "decision layer," which might be an automation system, media asset manager (MAM), integrated newsroom software or other product. The archive manager keeps the card index and moves the content to and from the shelves. It serves many purposes, and without it the archive process could become a largely manual process. Indeed, many systems cannot work without this important piece of the puzzle. BE

*John Luff is senior vice president of business development for AZCAR. To reach him, visit www.azcar.com.*

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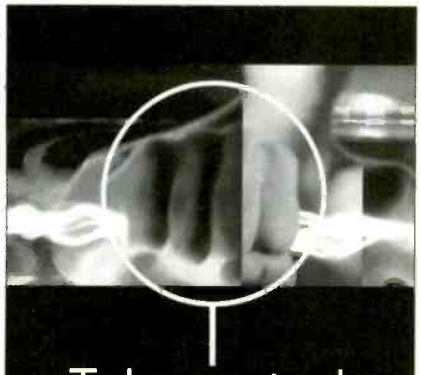

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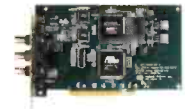

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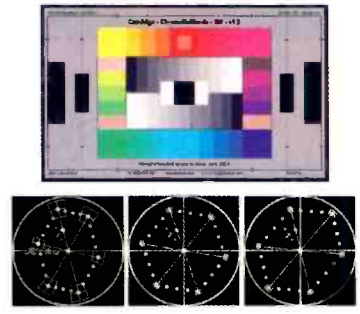

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# Technology abused

BY PAUL MCGOLDRICK

My eight-year-old daughter is a living example of how technology is absorbed by humans; she will deftly select audio sources in the home entertainment system and switch between component, S-video and composite modes without thinking about it. She can also – without being taught – file documents she has created in Word, and open a browser on the home PC and surf. It reminds me of the staggering growth that has occurred since we first had to find the backstroke key in the early 1980s.

Because technology has provided tools for everybody, we have had a generation believe that, with no creative skills, everyone can become a desktop publisher; then we slipped into the time period when everyone could make a video; and, of course, we now have the millions who can compile their own CDs to show what brilliant recording producers they would have made.

But the easily acquired technology that really raises my angst is PowerPoint. I normally have to endure at least one presentation a week in telephone briefings, and that can easily increase to five a day when I am traveling. Everyone can make a PowerPoint presentation – we all know it, and they are almost universally bad.

In a meeting a couple of months ago, with someone I knew very well (and no PR flacks around), I felt able to just lean over and turn off the projector and ask, "Without the slides, tell me what's next?" There was quiet terror in his eyes. Then he caught up with himself and started to explain the product with real enthusiasm and passion. He knew his subject and it showed. After answering my questions he asked why I had done that to him, and I explained the difference between the potted slides with mechanical reading of his lines and the real sales mode he got into without them. I doubt he will waste time on PowerPoint in the future.

Everyone thinks they can be a broadcaster too. Fortunately (unlike the Sony Umatics that took over the airwaves in Italy two decades ago, and ultimately spawned a transmitter industry), the pirates out there are still mostly confined to radio – but they are a royal pain. I have one who has parked himself one FM channel away from one of my translators, but his output power is so variable and on-air times so inconsistent that I haven't found him yet – hopefully he's not mobile!

**Because technology has provided tools for everybody, we have had a generation believe that, with no creative skills, everyone can become a desktop publisher.**

Hollywood seems to take misuse of technology for granted from all of its customers, and all the people it thinks should have been customers. But the half-baked attempts of both the movie and sound recording industries to protect themselves from technology, by using technology, are absolutely doomed. They need to become part of the solution, not the problem. The latest attempts to force future generations of PCs into being controlled by the industry, rather than the user, should be laughable, but unfortunately they're instead scary. Termed "trusted computing," the industry group of 170 companies intends to put security into the silicon of the PC, making it impossible to copy a CD or DVD. Intel calls the silicon part "LaGrande" and Microsoft calls the software side "Palladium." In this way, Hollywood hopes to be able to offer movies and music as paid downloads that go to one place only – and stay there.

Another misuse of technology is billed to be on display here at NAB 2003. The system being offered to carry multiple T-1 rates uses the unlicensed 5GHz ISM band: a low-cost solution for quality, over reasonable distances. But unlicensed also means unprotected, and any system using an ISM band, including 900MHz and 2.4GHz, must be prepared to accept any and all interference by any other user. Why would you set yourself up for interference of your commercial traffic by anybody, without any kind of recourse whatsoever, even if it is done absolutely deliberately? There are a lot of misusers of the lower bands already – even corporate networks – and they will migrate to the higher band as equipment becomes more readily available.

One of the presents my daughter got for Christmas was a small video production system with a $10 color camera, microphone and amplifier, and some movie sets. It was a short-term wonder, and it strikes me that she probably won't become a misuser of technology. At least she doesn't know how to set the clock on the VCR. Or I don't think she does. BE

*Paul McGoldrick is an industry consultant based on the West Coast.*

SEND Send questions and comments to: paul_mcgoldrick@primediabusiness.com

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