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Broadcast ENGINEERING®

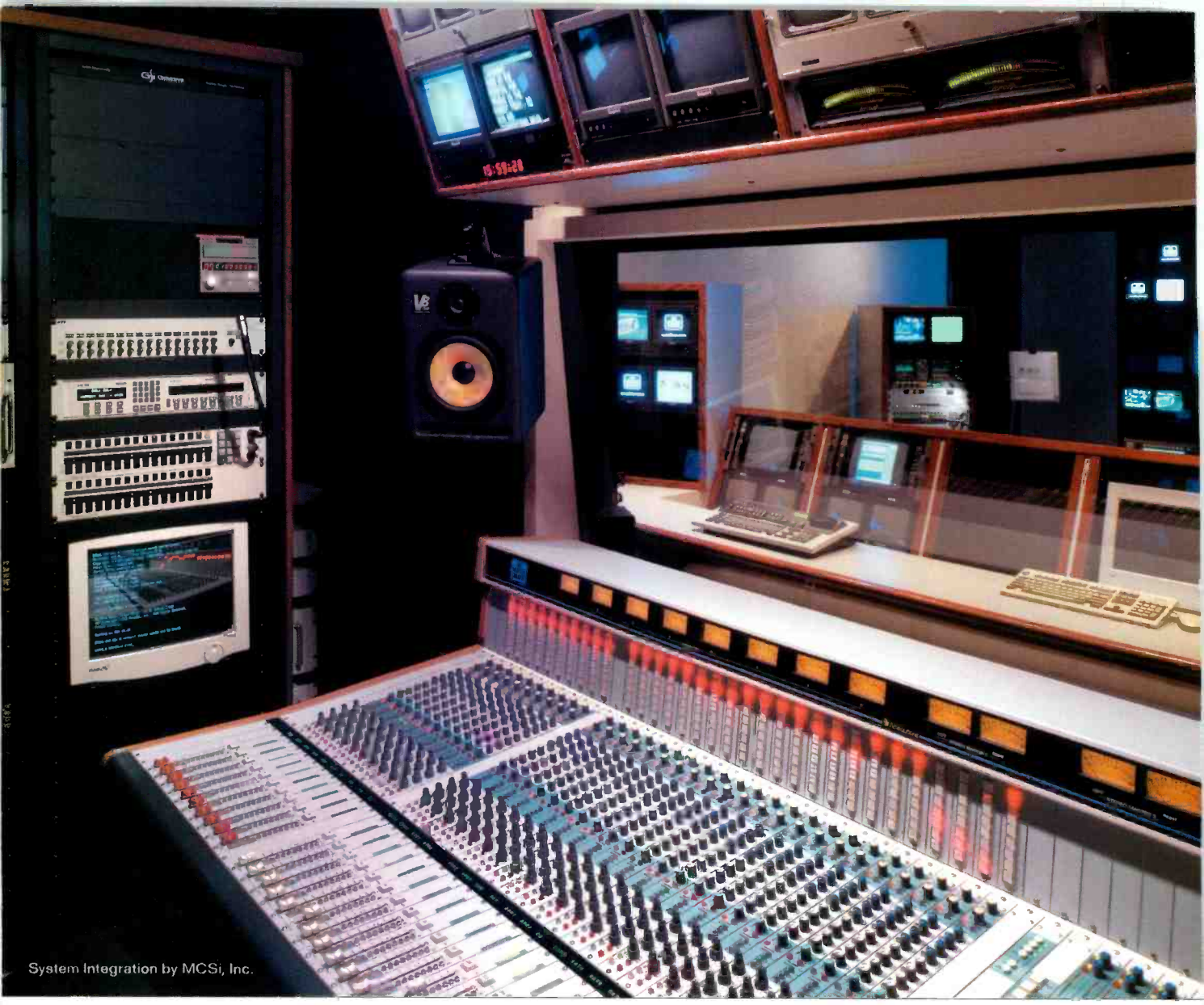
THE JOURNAL OF DIGITAL TELEVISION®

Attendees look for answers

- Latest new products
- 2001 Pick Hit awards

NAB 2001 RePLAY

PSIP: What you need to know



The Weather Channel's TV-80 Console

"ONE OF OUR KEY REQUIREMENTS was the ability to support many more microphones, mix-minuses for IFBs, and satellite sources without routing and patching sources and inputs. WHEATSTONE's TV-80 audio console was the logical fit for our needs. It featured eight internal mix-minuses and was 'tried and true' technology. Its preselects with Event Computer give us the expansion and flexibility needed to satisfy a diverse range of needs, from live production out of multiple sets and studios to pre-production for specially produced programming.

THE WHEATSTONE FACTORY commissioning and training worked out very well. It was well coordinated and the operators (both old and new hands) seemed to understand the console, the layout, and the functionality. There have not been any major operational 'bugs' using the audio console live on-air and user satisfaction with the console has been very good. Setup time and ease of operation have improved significantly. To date we have not had any service needs."

— John Orr, Mgr., Broadcast Engineering Projects

"YOU JUST CAN'T GO WRONG with WHEATSTONE. Their boards are intuitive and clean sounding, and you can track signal flow at a glance. In my eyes the greatest feature of the TV-80 is their mix-minus bus system. *Anyone out there who's 'faking' mix-minus by using submasters or an external box will wonder how they did without it.* The TV-80 is a definite time saver, both in installation and operation. It makes audio operators more confident and reduces show prep time—we're now able to do more and better pre-production. Definitely WORTH EVERY PENNY!"

— Craig Reeves, Audio Engineer

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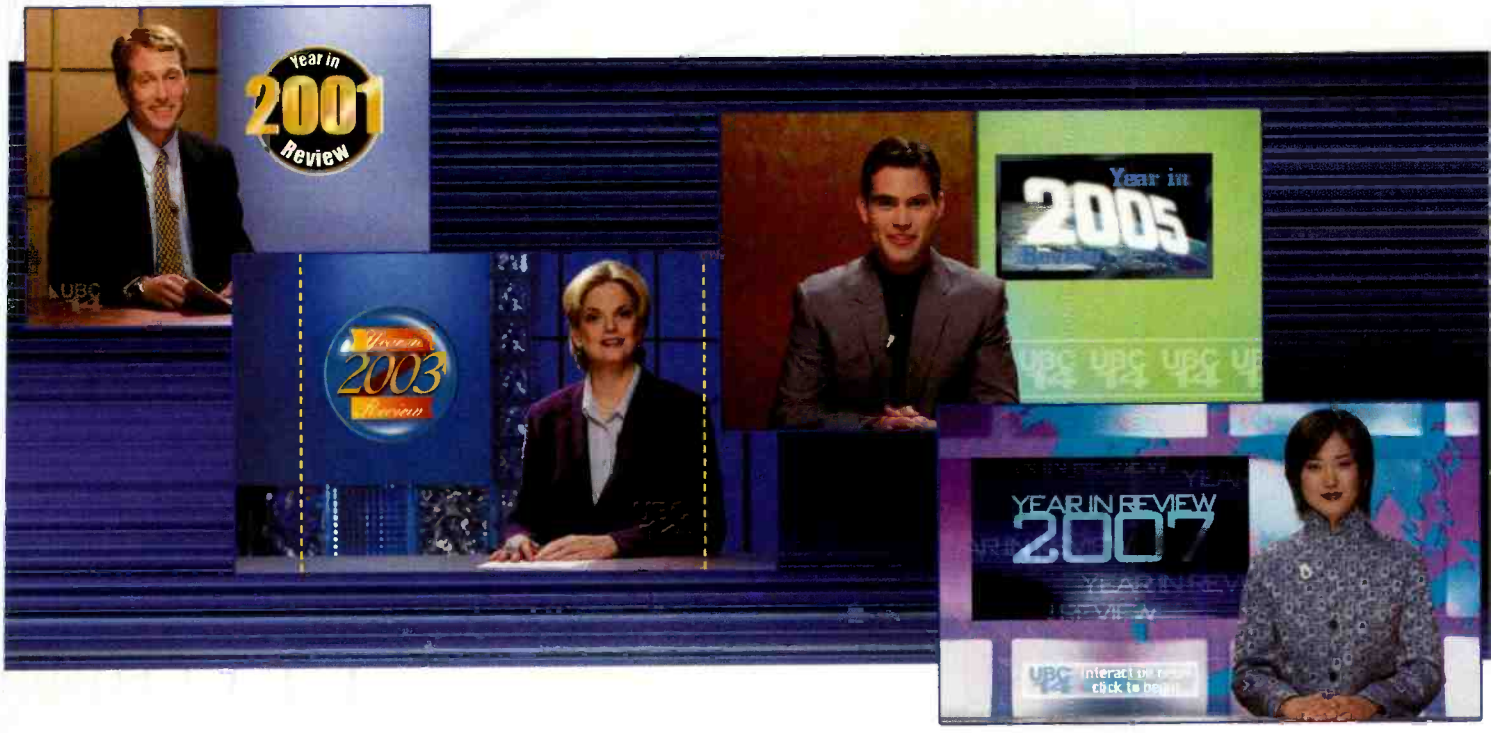

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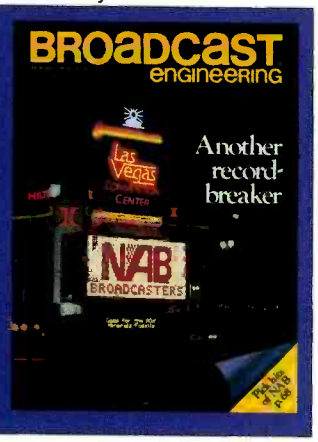
FREEZE FRAME

A look at the technology that shaped this industry

Tape formats

Name that tape format. In what year were D-2 VTRs officially introduced at the NAB convention? You must also include the three companies that showed either VTRs or prototypes. Enter by e-mail. Title your entry "Freezeframe-June" in the subject field and send it to: editor@intertec.com. Correct answers received by July 1st, 2001, will be eligible for a drawing of *Broadcast Engineering* T-shirts.



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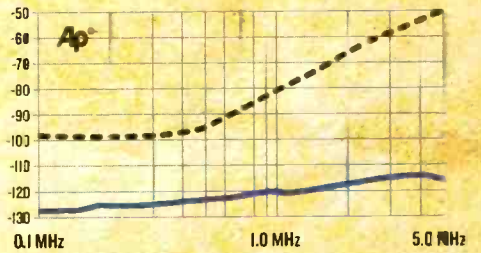

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Editorial

DTV honesty

As readers will recall from last month's column, I've made my own commitment to the HDTV revolution. I keep looking for confirmation that I haven't made a mistake in supporting DTV. In my search for such confirmation, two items crossed my desk this month about DTV that gave me pause. The first item concerned the tests conducted by the FCC on DTV reception and the second was the announcement by The Consumer Electronics Association on the sale of DTV products. Unfortunately, rather than confirming my own decision and those of our industry, they scream of a lack of DTV honesty.

Let's first look at the recent FCC DTV reception tests. In an area where there's enough mistrust to start a war, you'd hope at least the FCC could bring some credibility to the DTV reception issue. Unfortunately, exactly the opposite has happened.

The multi-page report purports to confirm the reliability of DTV reception. It contains a number of charts and graphs, as well as plenty of words delineating setup and test procedures. However, buried deep within the document are a few nuggets that cast serious doubt on the whole test process.

First, the test authors admit to "moving the receive antenna as much as one-half mile from the intended measurement point." What? That's like saying if you can't receive DTV in your own home, you'll just have to move to another house. One writer joked that it's like being told to put your TV set in the hall closet because that's where it works.

Second, the tests are purported to confirm that DTV reception is even more reliable than NTSC reception. Neat trick, considering other tests I'm aware of show exactly the opposite results. I've checked with more than a few early adopters, and no one I've talked with has experienced such amazing results. But then, this is the FCC we're talking about and who better to justify its earlier decisions by rewriting the laws of physics.

Finally, you just have to wonder how the FCC engineers can justify the testing of *indoor* antennas — *outdoors*. I don't know about you, but every set of rabbit ears I've ever used has been located inside — not outside — my home. And if I went to the trouble of building a 30-foot or even a seven-foot tower, I wouldn't put a set of rabbit ears on top.

Our next dose of dishonesty comes from the CEA. In a May 4th press release, the Association announced the sale of the "one-millionth DTV product." My question is this: Where, exactly, are these one million DTV products?

Further supporting the purported rapid DTV adoption, CEA claims that more than 250 models of DTV products have been introduced in the last three years. Wow, that's a lot of DTV stuff. Being a skeptic, I dare anyone to define for me the term "DTV product" and justify the one million units number. If there really were 250 DTV products developed, about 200 of them must have already come and gone from the market. I have a friend whose two-year-old HDTV set couldn't be repaired because the manufacturer said it was already "obsolete." That sure made him a happy early adopter.

So, let's review the state of DTV:

First, according to the FCC, we have perfect DTV reception, as long as you're willing to move your antenna up to one-half mile from your house. Second, viewers have a fantastic choice of some 250 DTV products, and one million of these products are already out there.

Do you believe all of this? I don't.

Brad Dick

Brad Dick, editor

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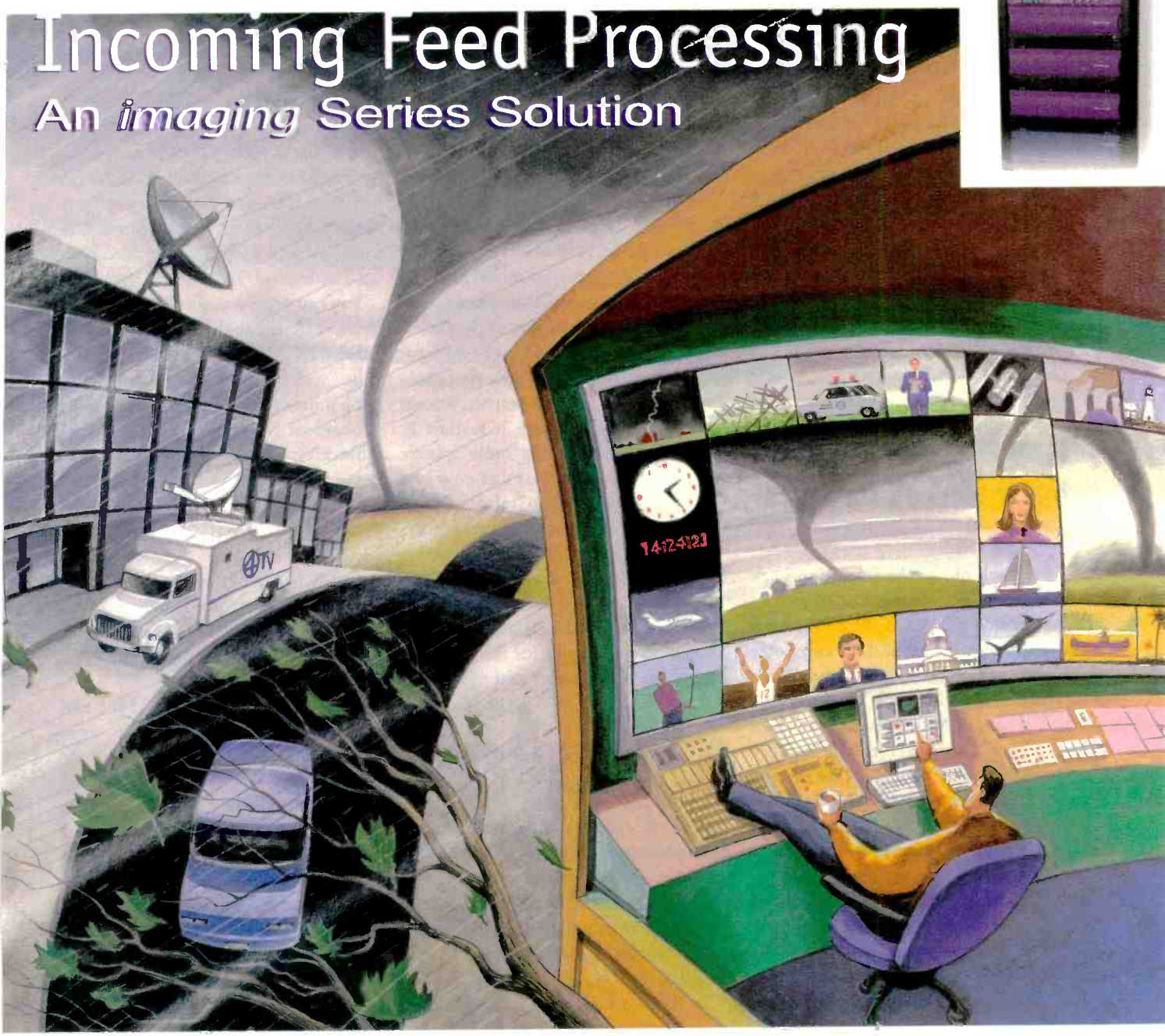

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Reader Feedback

Dear Don,

I thoroughly enjoyed your article on UPS and emergency power systems in the latest issue of BE. I was Director of Operations at Radio Free Europe from 1985 to 1995. Our entire Munich studio plant was rebuilt during that time, and the new facility included an electromechanical UPS from the Dutch firm Holec. This thing had a 400kva generator driven by an electric motor with a big flywheel to provide energy storage. When the city power failed, the drive motor would unclutch and a diesel engine would kick in and pick up the load.

It sounds like a Rube Goldberg, but it worked flawlessly. It was even delivered in its own insulated enclosure, ready for setting on a concrete pad. It had a very elaborate muffler system to keep the peace with the neighbors, too. The only indication of a power failure inside the building was a red light in the IT network center that let you know the diesel was running. The diesel had a synchronizer that would phase it up with city power when it came back on, so the transition back was glitch-free as well. The Holec ran the studios (all 30 of them) plus the transmission center and the computer center, which was huge (the third-largest VAX cluster in Europe). We had a pair of Mercedes Benz 300kva generators to run everything else. Very German and very reliable. We ran the system under load for at least one hour every week, and it ran for a minimum of half an hour whenever it started in an emergency. If memory serves, we didn't switch back to city power until it had been stable for at least 15 minutes after returning.

I've never seen an electromechanical UPS in this country, but I assume they must be out there somewhere.

I always enjoy your column. Keep up the good work.

Best regards,

WILSON LOUIS BROWN
INTEGRATION PROJECT MANAGER
EMC MEDIA GROUP

It sounds like a Rube Goldberg, but it worked flawlessly.

Don Markley responds:

Louis,

First, thanks for the kind words. Second, I find your comments concerning the big flywheel system interesting. In my own little hometown of Peoria, IL, Caterpillar is making, or at least marketing, such a system coupled with their generators. One of my clients had mentioned the possibility of using one of these systems rather than a big UPS to power their new transmitter plant — two transmitters and associated goodies. Together we had sort of dismissed the concept as a bit too Rube Goldbergish in accordance with your thoughts. Now, based on your comments, we are investigating it further. It may be the same system you used, as Cat now has very close relationships with several German firms. For example, they make a combine where a German company manufacturers the machine, and Cat furnishes the engine and markets it in the United States. Thanks for the information on its performance and reliability.

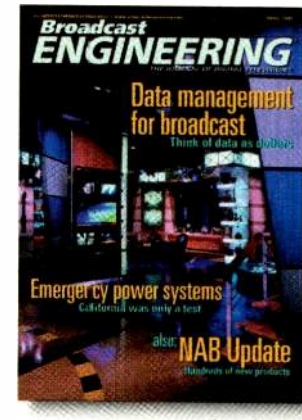
DON MARKLEY

Capturing closed captioning

To Brad Gilmer:

I just read your article on broadcastengineering.com titled "Interactive television for terrestrial broadcasters." It was a helpful description for me, and I was wondering if you had a few minutes to point me toward more detailed information.

I've been asked to look into writing software that will capture and interpret



the streams of data that are available on VBI-Line21 (all the CC and Text fields). Is there an Internet site that details the formats of the data on these fields, and any chance there's an existing Windows-based COM control that would provide me the data?

Thanks in advance,

STEVEN CRAWFORD

Brad Gilmer responds:

Dear Steve:

You are in luck. There is a standard published by the Electronic Industry Association (EIA) that describes closed captioning in all of its various forms. The standard is EIA-708B, and is titled *Digital Television (DTV) Closed Captioning.*

You can order a copy of the standard from EIA through their distributor, Global Engineering Documents (GED). The website for GED is http://global.ihs.com/. Enter EIA 708 in the Document Number Search field.

Sincerely,

BRAD GILMER

Length does matter

To Michael Robin:

What is the practical length of a 75Ω coax cable for AES/EBU applications before the signal can't be regenerated?

Thanks,

JIM MCCANN

Michael Robin responds:

Dear Jim:

Current technology allows the safe use of up to 1000 meters of 75Ω coaxial cable for the distribution of AES/EBU digital audio. This assumes, of course, that the cable is properly terminated at both ends to avoid standing waves, which result in unpredictable performance.

Regards,

MICHAEL ROBIN

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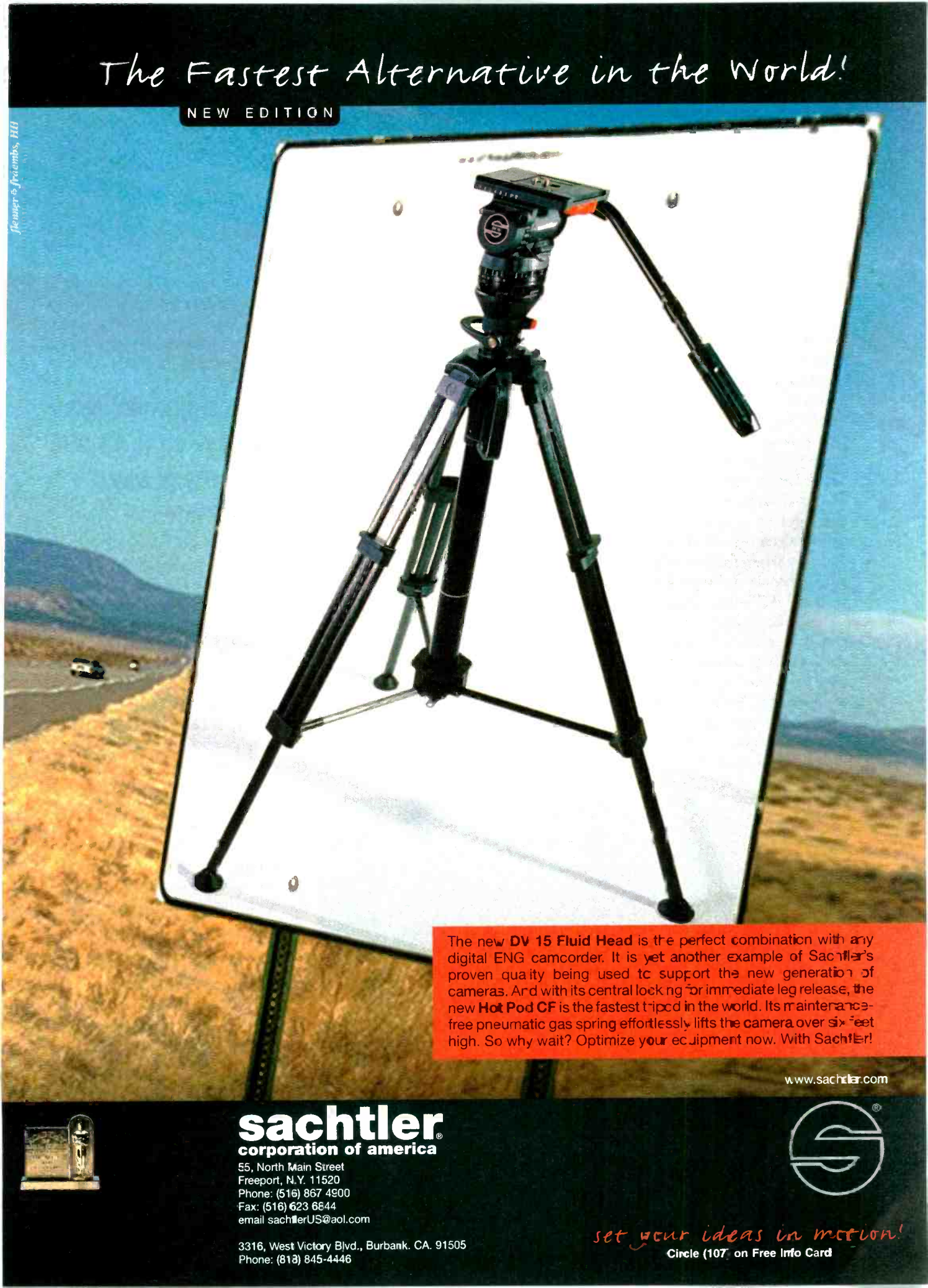

The new **DV 15 Fluid Head** is the perfect combination with any digital ENG camcorder. It is yet another example of Sachtler's proven quality being used to support the new generation of cameras. And with its central locking for immediate leg release, the new **Hot Pod CF** is the fastest tripod in the world. Its maintenance-free pneumatic gas spring effortlessly lifts the camera over six feet high. So why wait? Optimize your equipment now. With Sachtler!

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News

HDTV over Internet2

BY LARRY BLOOMFIELD

Internet protocol, commonly called IP, is something broadcasters should become familiar with, especially if the quality and utility of Internet2, a high-bandwidth network for research and educational institutions, demonstrated in two recent tests becomes standard.

At the University of Pennsylvania and the University of Grenoble in France, students put the network through its paces. Results showed clear, seamless transmissions from a network that communicates up to 45,000 times faster than modems currently in use, without the audio delays, frozen screens or jerky motion familiar to most who use conventional ISDN-type circuits.

The moderator of the Penn presentation, Lauder Institute director Richard J. Herring, sees this as the beginnings of future international videoconferencing. Penn is considering whether to participate in similar projects with universities in Germany, Finland and Britain.

Other tests of this type have been conducted between Intel in Silicon Valley and the University of Washington in Pullman, WA, but this is reported to be one of the first international efforts.

Results showed clear, seamless transmissions from a network that communicates up to 45,000 times faster than modems currently in use.

In a separate demonstration in early May, 2netFX demonstrated the commercial use of this technology by generating and decoding an HDTV broadband Internet stream that made Ethernet inventor and 3Com founder Bob Metcalfe a live part of Intel CEO Craig Barrett's keynote address at the Networld+Interop show in Las Vegas. Metcalfe was in Cambridge, MA.

What made this event different was that 2netFX was able to remotely control its HDTV streaming server, located at MIT in Cambridge, from the show floor in Las Vegas using a remote interface to manage and start the live HDTV stream of Metcalfe.

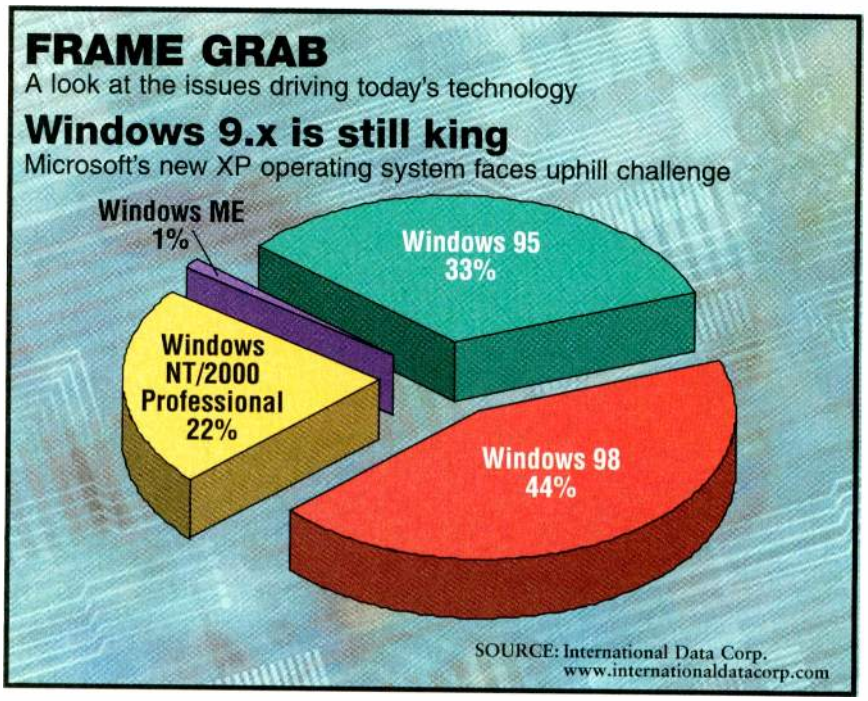
"The use of streaming HDTV in a large public forum by these two giants of the technological revolution signifies that HDTV-over-IP has arrived," commented William Reed, 2netFX's vice president of marketing.

The HDTV stream required 20Mb/s, or nearly 20 times the capacity used by typical broadband video streams on the Web today. A continuous HDTV multicast rebroadcast, on a StreamRider player, followed the live presentation.

The broadband Internet stream that made the demonstration possible was delivered via Abilene, an Internet2 backbone network that connects more than 180 universities and research laboratories across the country. Abilene was deployed through a partnership among Qwest Communications, Cisco Systems, Nortel Networks, Indiana University and the University Corporation for Advanced Internet Development.

HDTV-over-IP offers an alternative means of sending and receiving HDTV content. It provides the means for anyone to enjoy the high-quality audio and video offered by HDTV and to be a broadcaster of HDTV content.

For additional information about Internet2 visit the website at www.Internet2.edu. For more on 2netFX, go to www.2netfx.com. ■



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- ☐ Picture adjustments control input and output brightness, contrast, hue, saturation, and individual RGB control
- ☐ Intuitive user interface
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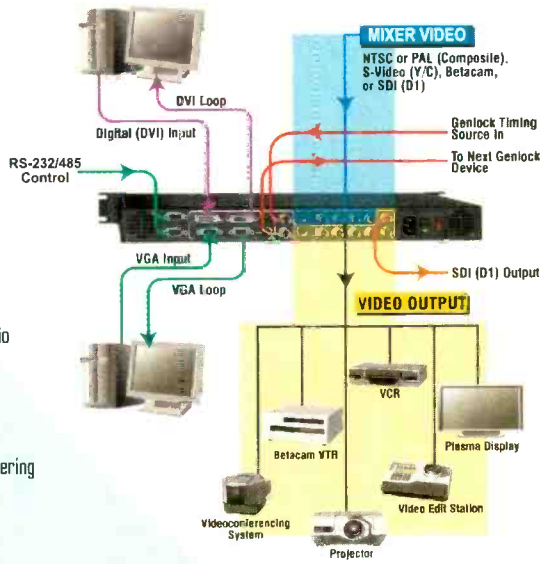
ViewMAX™-PRO Connectivity Diagram



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Special report: The state of the industry

BY JOSHUA WISE

Television has seen many changes since its introduction over 60 years ago: most significantly, the change from black and white to color in 1954, the proliferation of satellite and cable TV in the 1970s, and the debut of stereo television in 1981. Now the transition to digital stands as, perhaps, the most significant shift yet.

The arrival of the television brought about a paradigm shift in the lifestyles of virtually everyone that used one. With the spread of television, people could be entertained in the comfort of their own homes. People began to enjoy a "personal" connection with entertainment.

This increasingly personal TV experience led households to purchase multiple television sets. Eventually, many homes had TVs in bedrooms, playrooms and even kitchens. In 2000, not only did over 98 percent of U.S. households own TVs, but there were over 250 million TVs in the United States — almost one TV per person.

DBS is experiencing great growth rates, cable is being upgraded at a feverish pace and digital terrestrial is still poised for tremendous growth.

Going digital

The digital world is spreading and development is well underway for all three major TV platforms — satellite, cable and terrestrial. At this time, Direct Broadcast Satellite (DBS) is experiencing the greatest growth rates; cable systems are being upgraded at a feverish pace, often sending the multiple system operators (MSOs) into tremendous debt; and digital terrestrial, which has been thrown off by delays in many areas, is still poised for tremendous growth, even though it might be another two to four years before it begins to start catching up with cable and satellite.

Rollouts of each platform vary from country to country and are based in large part on what that country deems important for its TV viewing population. For example, the UK has over 55 percent of its TV viewers receiving terrestrial signals, and therefore has made a strong commitment to digital terrestrial television (DTTV). To be sure, they also have made strides in digital satellite, led by BskyB, and, to a lesser extent, digital cable, led by NTL and Telewest: but they have by far the most impressive commitment to DTTV.

Digital cable has quietly become a very common offering. Although it will take time for people to begin to take advantage of the service, MSOs in the United States have already invested over $40 billion in order to upgrade their networks as quickly as possible. Even European MSOs, who have historically not invested as heavily in their networks, are making sure that they capitalize on this opportunity.

DBS was actually the first platform to offer digital service. As such, it is by far the most popular digital platform at this time. DBS will continue its impressive rollout, as well as its rapid take-rate, but will eventually start to level off. Nevertheless, satellite, whether in analog or digital form, has always been in third place behind the terrestrial and cable platforms and will stay there for the foreseeable future.

Direct Broadcast Satellite (DBS)

DBS has grown significantly due to its role as a pioneer in many new services. DBS providers have begun offering channels in HDTV, as well as a wide assortment of interactive TV (ITV) services. Although ITV is largely being offered in Europe, operators in the United States and other regions who do not yet have interactive services are planning on offering them soon as well.

Satellite has carved out a significant position for itself over the past 10 years and has been demonstrating phenomenal growth around the world. Once considered simply an alternative to cable, satellite is now proving that it can give cable a run for its money, which has caused many cable MSOs to sit up and take notice. This has led the cable industry to invest heavily in future services such as interactive and video-on-demand.

Digital cable

The rollout of digital cable has been rapid in certain pockets of the world, but overall it will take some time. It is directly linked to the upgrade of cable networks to support data over cable service. In other words, if a neighborhood or region has been upgraded to hybrid fiber coax (HFC), the network can support data over cable as well as digital cable services.

Additionally, there is a drive within the cable industry to move toward a retail-market channel of set-top boxes, thereby moving the burden of STB financing to the consumer and allowing the MSOs to ramp up their rollouts. In the United States, this is happening due to the FCC pushing the market in that direction rather than any voluntary effort on the part of the industry itself. Regardless of the influence of the FCC, service operators and consumers would like to see much more competition in the equipment arena, thereby further reducing costs to the end user.

Terrestrial DTV

There has been a drive to re-evaluate the standard chosen by the ATSC for transmitting terrestrial DTV signals in the United States. The ATSC has chosen 8VSB standard, which was developed by Zenith, but pressure has been mounting

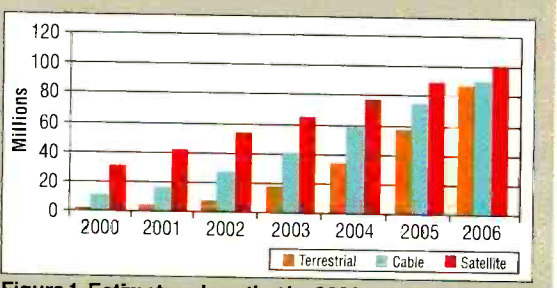

Figure 1. Estimates show that by 2006, terrestrial digital viewership will close the gap on digital cable and satellite reception. Source: Allied Business Intelligence, Inc.

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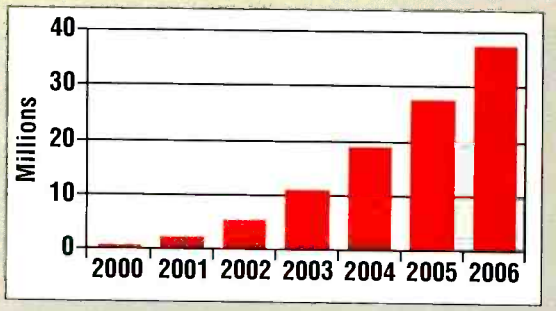

Figure 2. Sales of digital monitors will increase nearly forty-fold by 2006. Source: Allied Business Intelligence, Inc.

to consider the use of COFDM, which has been chosen by most other countries that are developing terrestrial DTV systems. There was a proposal brought to the FCC in November 1999 to open this decision for discussion, but it was rejected in February 2000. More recently, in January 2001, there was additional discussion over another round of tests conducted by the MSTV/NAB consortium. These tests generated worldwide furor due to apparent inconsistencies in testing procedure and "improper" use of a digital receiver. (The company – Broadcast Technology Ltd – claims that the receiver used in the tests was really a transmission monitor and could never perform well under those conditions.)

The FCC claims that 8VSB is the appropriate choice for the United States, despite the successes that COFDM has already demonstrated in Europe. 8VSB detractors point to studies that show COFDM to be a more robust modulation scheme. Some have asked the FCC to let each broadcaster choose which modulation to use, but the FCC has rejected this suggestion as well.

Although there are some that are crying "foul play" with regard to the decision, and still others extolling the virtues of COFDM or — more accurately, "**not** 8VSB" — the reality is that the FCC has made it clear that they have no intention of reopening the standard in any way. Therefore, it is time for the industry, and industry vendors, to decide how they see the future of broadcasting. Will terrestrial broadcasting be a legitimate contender in the struggle for viewers, or will it gradually dissolve into a niche platform as cable and satellite eat its lunch? Only time will tell, but if Congress keeps turning the screws on the DTV transition, the broadcasters are going to have to work even harder to avoid getting squeezed out of the market altogether. ■

Joshua Wise is a digital media analyst with Allied Business Intelligence, Inc.

Attendance at NAB2001

As mentioned elsewhere, attendance was down about 2 percent at this year's NAB. The count showed NAB attendance at 112,776, with 29,632 international attendees.

It's inconceivable not to send knowledgeable representation to a gathering of virtually every manufacturer and service known to the broadcast industry where, on display for the keenest of minds and eyes to dissect, are the latest developments the industry has to offer.

Nowhere, except perhaps for IBC in Amsterdam and then on a much smaller scale, does station management have the opportunity to see new technology firsthand in one venue. In many instances, attendees have the opportunity to speak directly with the individuals who conceived and designed a product. There is no way to supplant the exposure and education that can be gained at this gathering, even drawing from a number of sources.

It's just plain stupid not to include this event in the annual budget for at least one or two engineering managers, not to mention some of the non-technical personnel, all of whom can benefit from the exhibits and seminars. ■

Send questions and comments to: larry_bloomfield@intertec.com

Partnership provides DTV access on PCs

BY JIM SALADIN, SENIOR ASSOCIATE EDITOR

Capitol Broadcasting and access DTV announced their plans to partner in the distribution of digital video and data-ready PC tuners.

DTV Plus, a division of Capitol, has been working on a datacast system that streams data along with the digital broadcast signal to give broadcasters the opportunity to fully leverage their existing content and new bandwidth. This system, when coupled on the consumer end with an accessDTV Digital Media Receiver, makes it possible to display data broadcasts by digital stations on a PC monitor. The receiver package, consisting of a 32MB PCI card with tuner and video capture, system software, and an indoor antenna, is being offered by the partnership for less than $500, making it an attractive alternative to much more expensive stand-alone DTV receivers.

Capitol Broadcasting and accessDTV finalize the agreement. From left to right: John Greene, CBC; Doug Leech, accessDTV; James F. Goodmon, CBC; Dewey Weaver, accessDTV; and Sam Matheny, DTV Plus.

"There are two very important parts to this project," said James Goodmon, president and CEO of Capitol Broadcasting (which owns, among others, WRAL-DT). "First, we are making it possible to watch over-the-air television signals on your PC monitor and, secondly, we are making it possible to display data broadcasts by digital stations on your PC monitor. Simply install the card and attach the antenna."

The combined technologies better position local broadcasters to take full advantage of their traditional assets, extend and reinforce their local brands, and initiate a quicker return on their investments in digital through the use of datacasting. For example, the signal can be station-branded, can include an EPG, support sub-channels and enable datacast reception of market or show-related content.

Several thousand of the PC-ready accessDTV receivers are targeted for the Raleigh-Durham area starting this summer. The fully data-capable package will be available beginning this summer at www.accessDTV.com. ■

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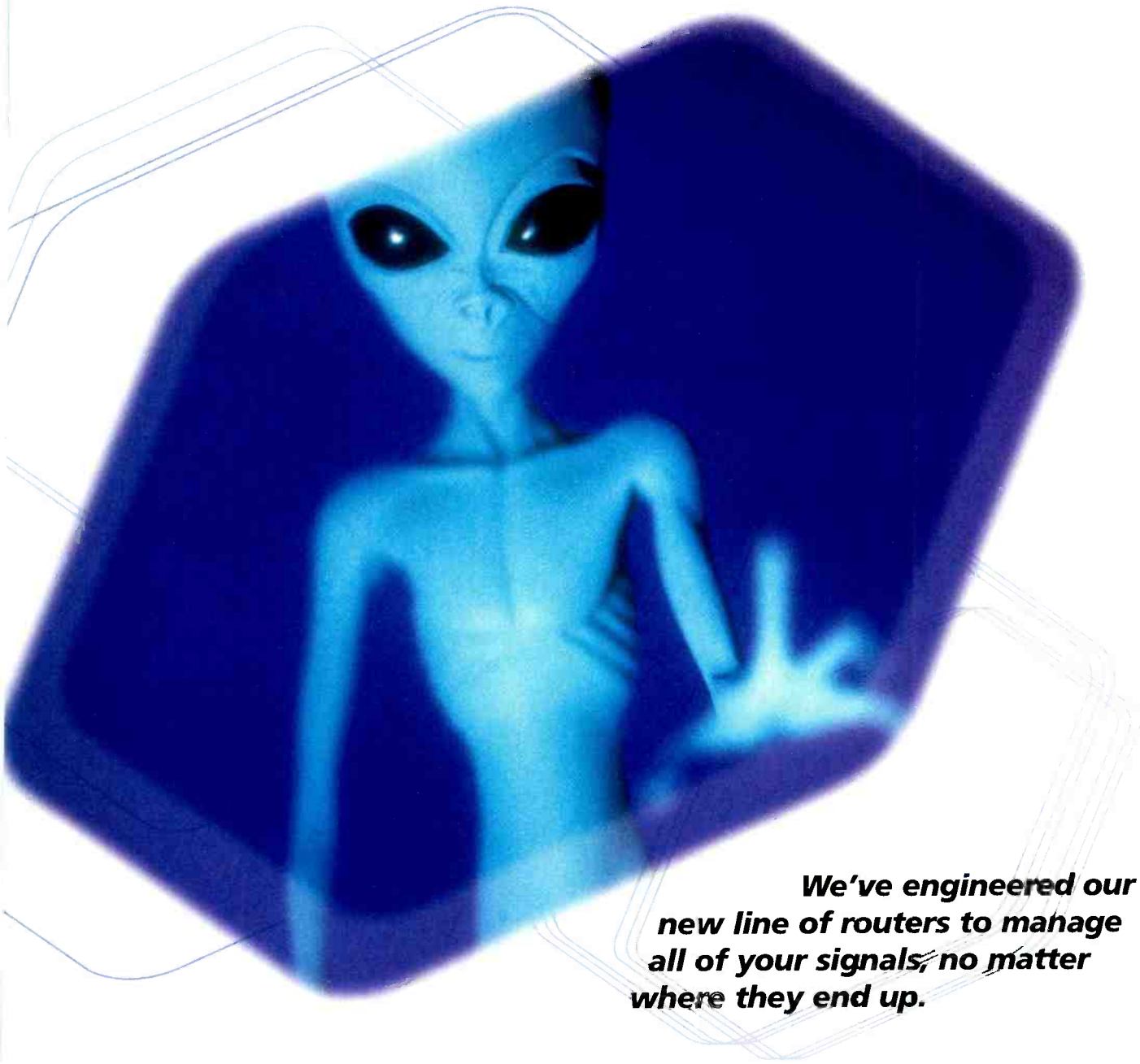

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In short, you now have the freedom to build the digital media infrastructure you need here and now, without having to worry about where you're headed. To learn more about the new Grass Valley Group line of routing solutions, visit our Web site today. www.grassvalleygroup.com/ad/routers

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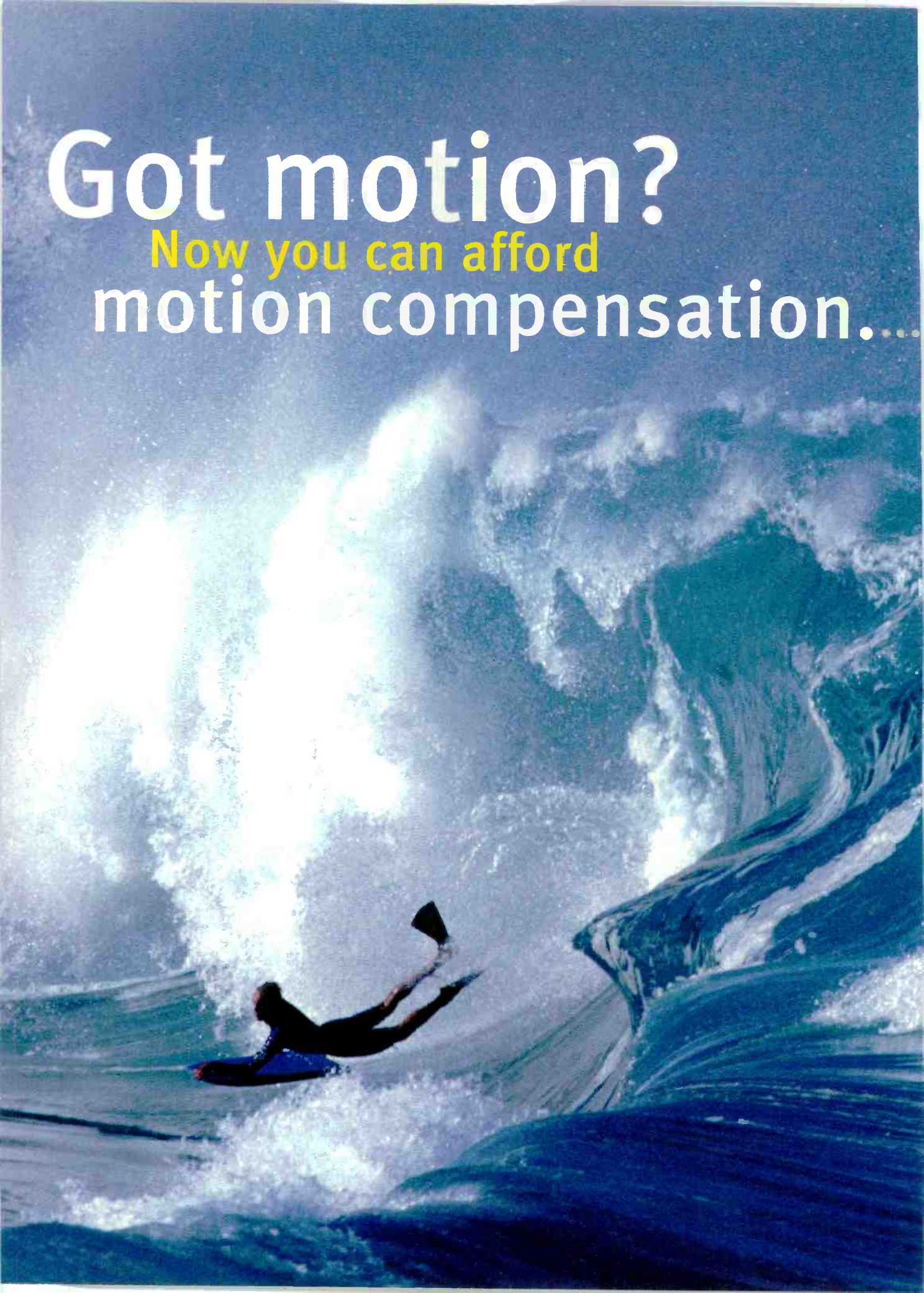
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New Commissioners named

BY HARRY C. MARTIN

The FCC has three new Commissioners, who join incumbents Michael Powell and Gloria Tristani. They are: Kevin J. Martin, Kathleen Q. Abernathy and Michael J. Copps. In addition, Andrew Levin, telecommunications counsel to the House Commerce Committee, is likely to be nominated by the White House to replace Commissioner Gloria Tristani, who has indicated she will leave by the end of the year. Also mentioned as a candidate for the fifth spot is Julie Rones, who is with the United States Telephone Association.

Martin, a Republican, was legal adviser to outgoing Commissioner Furchtgott-Roth. He is currently the special assistant to the president for economic policy. He also was deputy general counsel for the Bush-for-President Committee. Martin will be nominated for a five-year term expiring in June 2006.

Abernathy, also a Republican, is a lawyer who worked both in private practice and at the Commission before taking positions in the wireless industry. Recently she was vice president for public policy of BroadBand Office Communications. While at the FCC, Abernathy was a legal advisor to both Commissioner Sherry Marshall and Chairman Jim Quello. Abernathy's term will expire on June 30, 2005.

Copps, who will fill the open Democratic seat, has spent 15 years in the office of Senator Fritz Hollings in a number of positions, including chief of staff. Most recently, he served as assistant secretary of commerce for trade development and as deputy assistant secretary of commerce for basic industries.

Abernathy and Copps assumed their positions at the end of May. Martin will take office by July 1. The new Commissioners should give Chairman Powell the majority he needs to implement his agenda.

Dateline

July 10, 2001, is the deadline for all stations to place in their public files their problems/programs lists and quarterly Form 398 (Children's Programming Report) for Jan. 1-March 30.

Broadcast TV an outdated technology?

Over-the-air TV may be in for drastic changes, according to FCC Chairman Michael Powell. At a press conference in April, Powell raised questions as to what extent the FCC should further protect over-the-air television, because 85 percent to 90 percent of Americans now receive their programming through either cable or satellite distribution.

While Powell is fully in support of DTV and the transition process, television stations may lose some current protections. For instance, the effort by the networks to do away with the 35-percent national ownership cap, in order to further enhance their power vis-à-vis their affiliates, may get a favorable FCC reception. Powell does not think ownership caps work because, he said, government is not very good at "calibrating market decisions" for the long term.

The White House also had bad news for television broadcasters on possible analog spectrum fees. The Bush budget calls for a delay in the Channel 60-69 auction until 2004 and would postpone the Channel 52-59 auction until 2006. The problem for station owners, however, comes in a companion proposal to levy an analog spectrum fee pending completion of the transition to DTV. Although broadcasters have a friend in House Commerce Committee Chairman Billy Tauzin, all bets are off when Congress is considering a new budget.

TV renewal denied, challenger awarded license

An FCC administrative law judge (ALJ) recently issued a decision denying the license renewal application of a Pennsylvania television station and granting the competing application of the renewal challenger. The ALJ's decision is subject to appeal, but it nonetheless points to a number of areas that should be of concern to all broadcasters.

The ALJ decided the licensee was not entitled to the "renewal expectancy" that was awarded under the former renewal standards to stations that showed their performance during the previous license term was substantial and meritorious. The ALJ denied a renewal expectancy based, in part, upon the station's failure to broadcast public service programming.

The decision to award a renewal expectancy is based upon five factors: (1) the efforts made to ascertain community needs and interests; (2) the programming response to those needs and interests; (3) the incumbent's reputation in the community for serving the needs and interests; (4) the record of compliance with the Communications Act and the Commission's rules and policies; and (5) evidence of community outreach in providing a forum for the expression of local views. Here, the ALJ found that the licensee had failed to meet all of these necessary standards.

As a result of changes to the Communications Act adopted in 1996, renewal challenges are unusual. Now a licensee must be found unqualified for renewal before a challenger's application can even be submitted. Moreover, the new standards for renewal, which arguably do away with the renewal expectancy tests outlined above, are vague and untested. However, in a petition to deny or FCC investigative proceeding, the 1996 law's public interest standard would likely be interpreted in accordance with at least some of the former renewal expectancy elements. ■

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

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Multicasting: Pot of gold or black hole?

BY MARK HYMAN

If you think about it, HDTV is like a novel with big print. It may be more pleasing to the eye, but the story reads the same. Don't get me wrong, HD is pretty cool and it does have a role in digital TV. However, current trends show that HDTV is not the killer app for DTV. Consumers are not purchasing digital receivers in PlayStation 2—like numbers in order to watch HDTV.

If broadcasters want to see a surge in consumer adoption and develop revenues to offset the costs of building out DTV, then perhaps they ought to consider complementing HDTV with services, including multicasting.

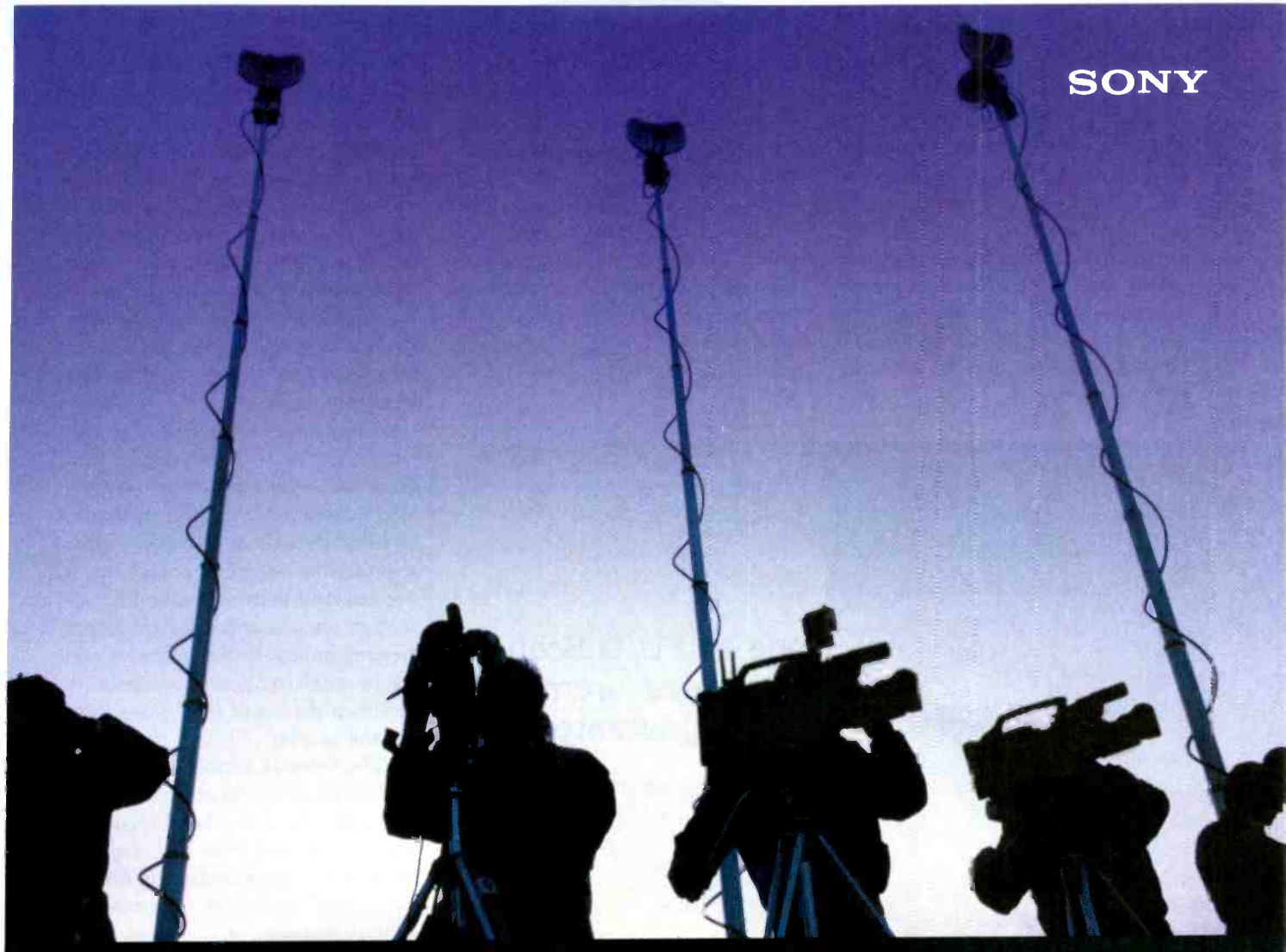
A few stations have multicast the NCAA men's basketball tournament and a few others have added a fifth or sixth network in a four- or five-station market, but there is more to consider when mulling over the multicasting model. There are five compelling factors to consider in multicasting: competitive demand, shelf space shortage, advertiser demand, viewer flexibility and the network factor.

If you want to develop revenues to offset DTV costs, then consider complementing HD with services, including multicasting.

Equipment used in datacasting trials at WGBY in Springfield, MA. Data insertion is one way broadcasters can tailor programming for viewers. Photo courtesy Thomcast.

• **Competitive demand:** Clearly, not everyone who subscribes to a multichannel television service desires to receive 75, 150 or 300 channels of TV. My mother recently got cable in order to receive her local stations, an all-news channel, a weather channel and a film channel or two. That was it. She confesses that she has never channel-surfed from one end of the channel lineup to the other. Frankly, she has no interest in Nickelodeon, MTV, TNN and (believe it or not) ESPN Sports Center. Moreover, she resents the fact that she pays nearly $40 a month to get 60 channels she doesn't even watch. She is a perfect candidate for a multicasting model that would deliver a dozen or two channels that would meet her needs for a modest fee. I am sure she is not alone in this category. Although the average number of channels available to a typical television household continues to grow each year, the average number of *viewed* channels has remained steady at about 10. Just what percentage of cable and satellite subscribers would abandon their service in favor of one that meets their needs for a significantly smaller payment (or even free) is up for debate, but the demand for alternatives to cable and satellite is present. If recent court decisions are any indicator, it is likely we will witness further consolidation in cable and satellite, thereby further reducing competition and further increasing prices for viewers.

• **Shelf space shortage:** There are a few hundred cable channels in existence, the majority of which are hoping for a channel assignment on even a few cable systems. Many are unable to gain carriage on one of the cable or satellite regional monopolies. Many cable companies are more focused on adding subscription services such as broadband and telephony than they are in additional free channels. The same goes for satellite. This trend allows precious few opportunities for newer networks. Some of these new services will pay for carriage. Faced with exclusion from cable, some of these new players may be willing to strike a financial arrangement with broadcasters. Such an arrangement



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would provide an exciting new opportunity for broadcasters to gain an additional revenue stream in return for a bit of bandwidth, resulting in more competition, more choices for the viewers and increased interest in OTA broadcasting.

• **Advertiser demand:** Another interesting trend is the advertisers' growing appetite for *narrowcasting*, the broadcast of niche programming. Consider advertisers chasing child viewers. They have all but abandoned broadcasting in favor of a handful of 24-hour cable channels serving children. Offering a variety of channels that each serve narrow demographics could provide additional revenue for stations. When a cable channel garners one rating point, it is considered a programming success. With the bar set that low broadcasters ought to explore niche programming content, despite the small audience.

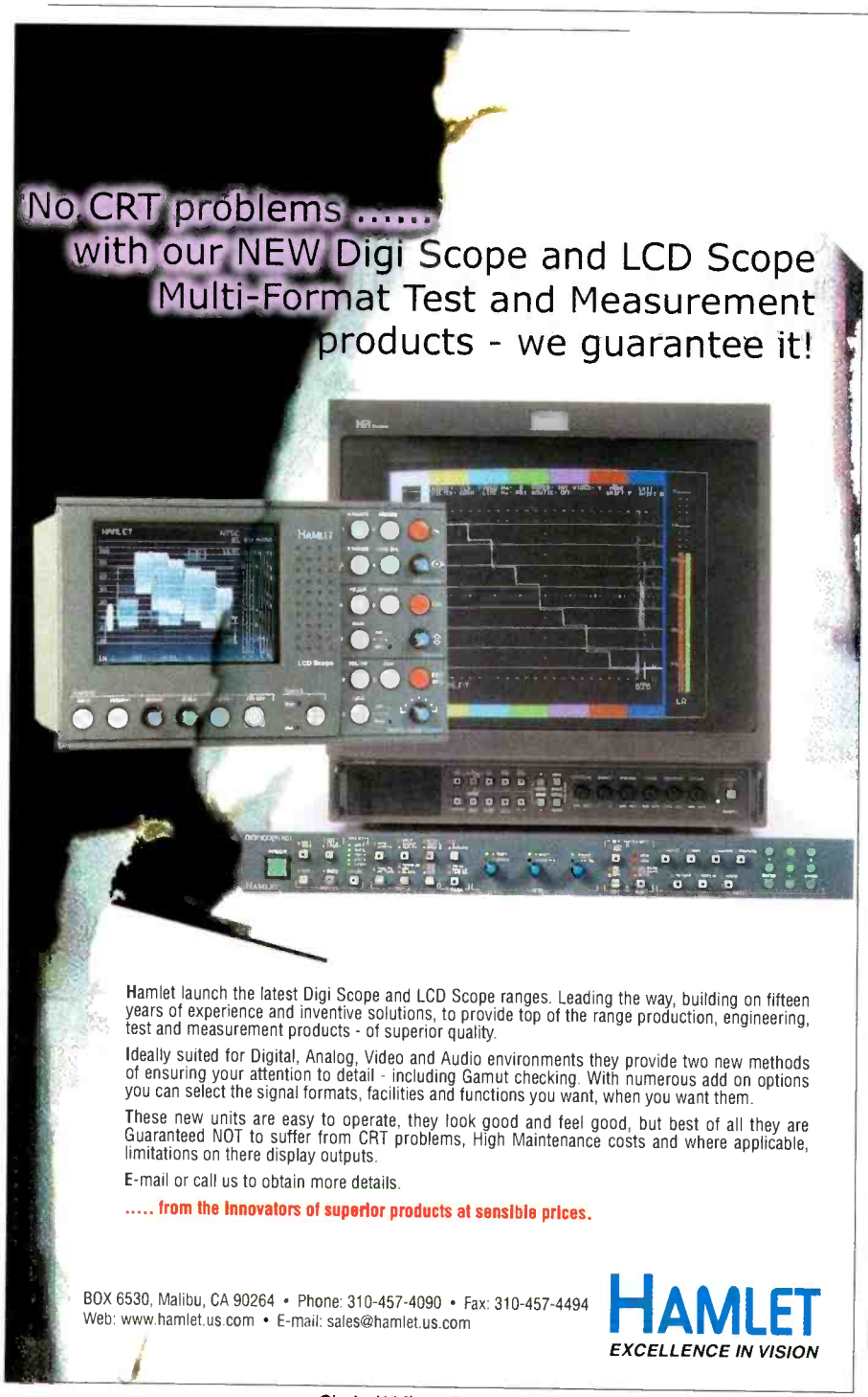
• **Viewer flexibility:** Multicasting offers flexibility for viewers, most of whom still watch more broadcast fare than cable programming. It presents opportunities to time-shift valuable local programming such as news in order to accommodate a workforce that does not have uniform working hours. In multicasting, multiple channels also can carry the same programming in various languages in order to satisfy multiple demographics.

An important component of this flexibility is the portability that broadcast television offers viewers. While there are a number of arenas in which broadcast television, cable and satellite compete, portability is not one and neither is mobility. Although we can speculate on future viewing habits, broadcasters should not be quick to discount a capability in which they, and they alone, corner the market.

• **The network factor:** Many affiliates' financial health rests heavily on their network parent. Local broadcast stations, especially those affiliated with the traditional networks, rely heavily on a single source for their content, and by extension, their revenues. What better way to protect their financial future than by developing non-traditional revenue streams? This factor is focused less on the viewers' side of the equation and more on the back-end of the business. Local broadcasters who develop healthy revenues independent of their network relationships would then find the playing field leveled to some degree, allowing them to better negotiate competitive arrangements with networks.

The decision whether or not to multicast extends beyond the notion of imitating cable. What is clear is that the promise of DTV has not yet been realized by the *status quo*-approach of broadcasting exclusively in HDTV. A more flexible approach to DTV services may offer broadcasters the opportunity to better serve their viewers and also realize new revenues to offset their digital investment. ■

Mark Hyman is vice president for corporate relations at Sinclair Broadcast Group, Inc.



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By The Numbers

BY BRAD DICK, EDITOR

In part III of our State of the Industry series, we look at facilities' spending plans for camera technology. This information was obtained from readers in April.

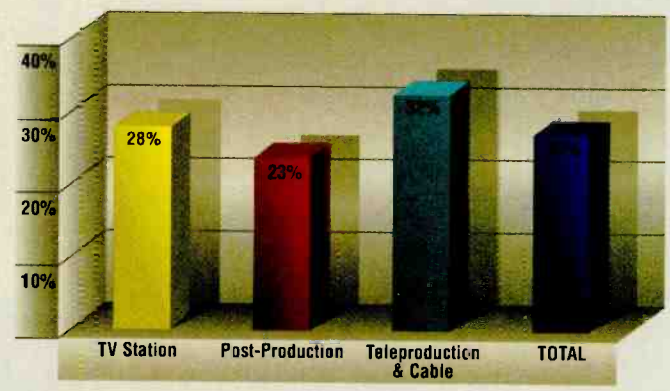
An interesting battle in camera technology appears to be building between the 4:3 and 16:9 camps. Even if HD production is developing slowly, facilities are increasingly wanting to protect their program investments with widescreen capability right now.

Even so, while few facilities are planning on HD camera purchases, those that are making the leap to HD are budgeting significant dollars toward that technology. In fact, HD camera budgets are two and a half times greater than for NLE technology. (See April, *By The Numbers*, page 32.)

An expanded *By The Numbers* special report on cameras is available on the *Broadcast Engineering* website. For additional charts and graphs concerning this survey, see www.broadcastengineering.com. Detailed comparisons of purchase plans by technology and budgets are displayed there.

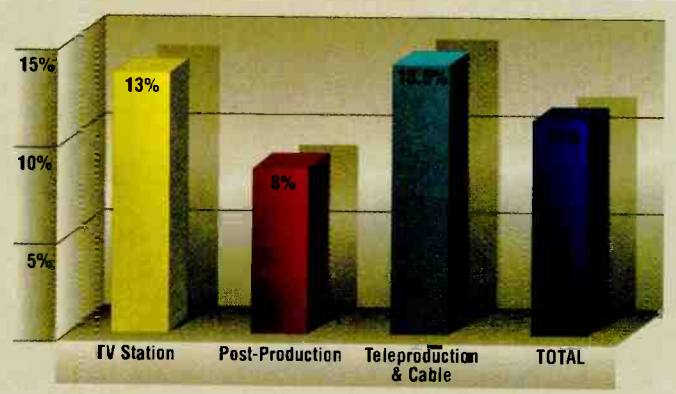
ENG/EFP is the top camera purchase

Respondents said that portable cameras were their top acquisition technology priority. From 23 percent to 32 percent said they'd be buying new ENG/EFP cameras this year. Measured overall, almost 27 percent of readers said their facilities would buy this type of new camera. When measured against planned HD camera purchases, ENG/EFP camera purchases are twice as popular as HD cameras.



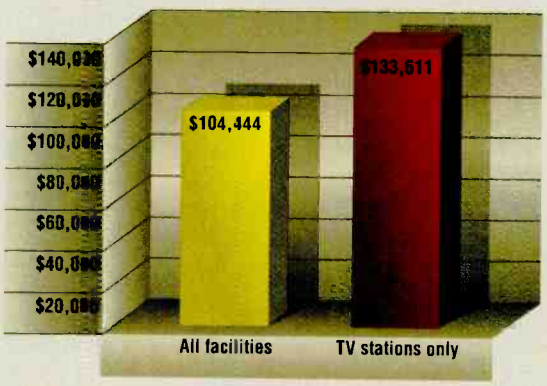
Studio cameras less popular than ENG cameras

Readers seem to be willing to stick with their current studio cameras. As few as 8 percent of respondents said they'd be buying studio cameras this year. The highest planned purchases come from TV stations, just over 13 percent. Overall, only 11 percent of facilities plan new studio camera purchases in 2001.



Portable camera budgets

While more facilities plan ENG/EFP camera purchases than any other category, the budgets for this technology are the smallest of the three types of camera purchases. Not surprisingly, TV stations plan to spend more for ENG/EFP cameras than other types of facilities. The median budget for portable cameras at TV stations is more than $133,600. Measured across all types of facilities, the budget is just over $104,000.



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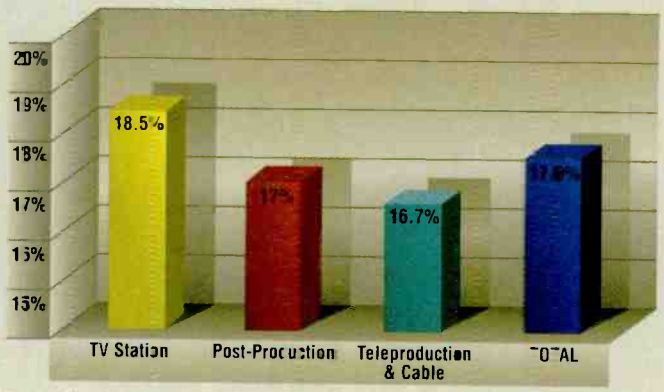
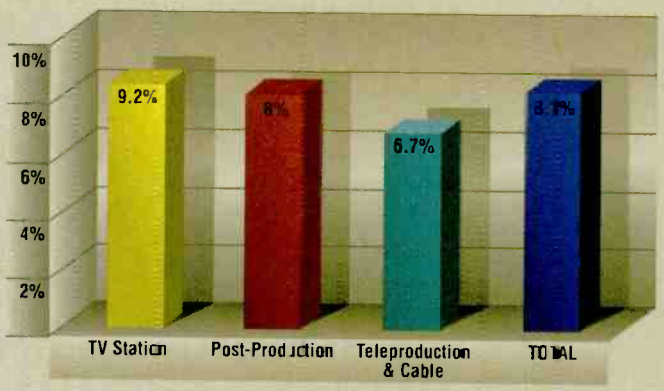
16:9 camera purchases are growing

Non-HD cameras seem to be high on readers' minds. Almost 20 percent said they'd be buying widescreen, non-HD cameras this year. Note the consistency in planned purchases by application. Also, simply put, twice as many readers are planning 16:9 non-HD camera purchases as HD cameras.



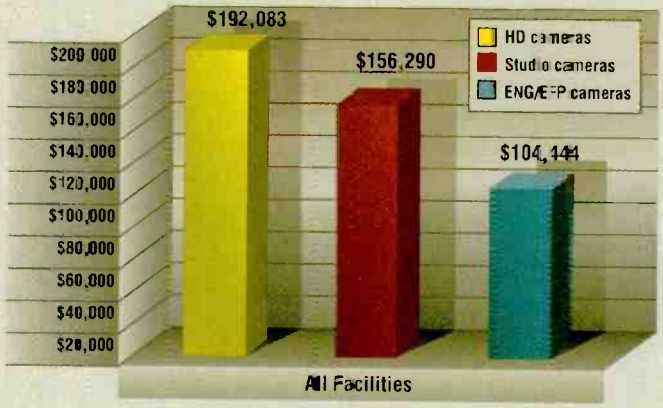
HD camera purchases

We'll get there...slowly. That's what the industry seems to be saying with respect to buying HD cameras. They are just not yet on the must-have list. Even so, TV stations lead the pack in planned HD camera purchases. There's every reason to expect the number of facilities moving to HD to increase, perhaps rapidly, as 2002 approaches.



HD budgets are large

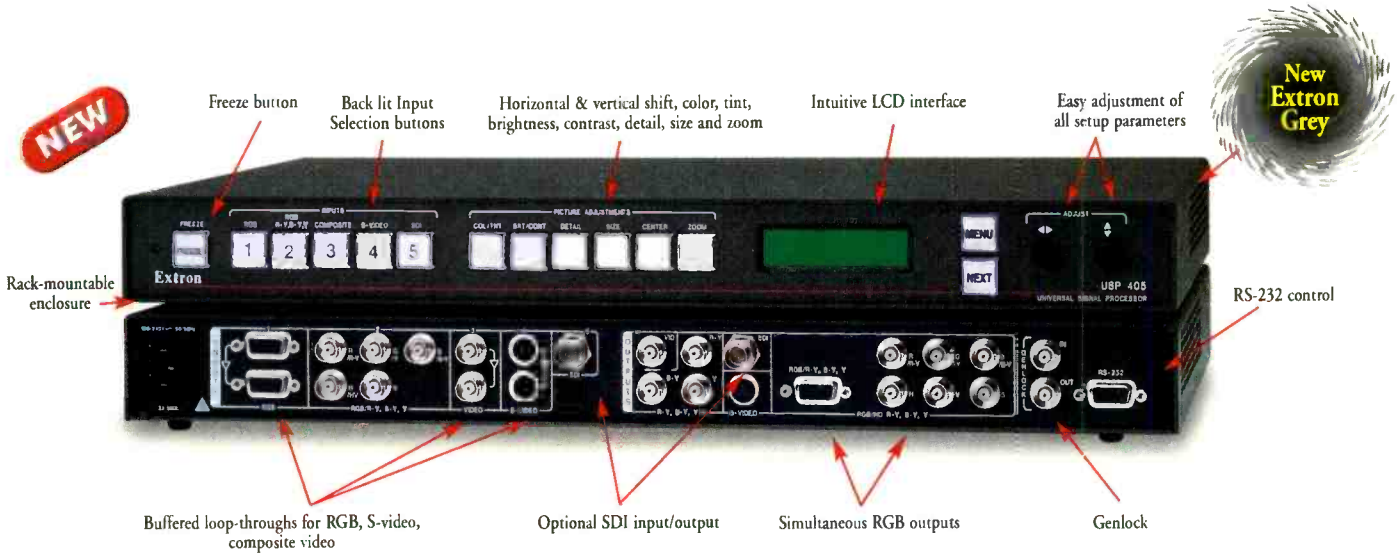
Despite the size of actual planned purchasers, sizeable budgets are being planned for HD cameras. The chart below compares the budgets for HD cameras, studio cameras and portable cameras. Twice as much is being allocated at facilities planning HD camera purchases as the median budget for portable camera buys. The typical HD camera budget is almost $200,000 which, given the pressures of today's markets, represents a significant commitment to HD technology by *BE* readers.



Additional information on the *By the Numbers* state of the industry series is available at the *Broadcast Engineering* website.

- **TV and Cable HD Camera purchase plan**
- **Widescreen cameras vs. HD cameras**

on the web www.broadcastengineering.com a member of digital media net



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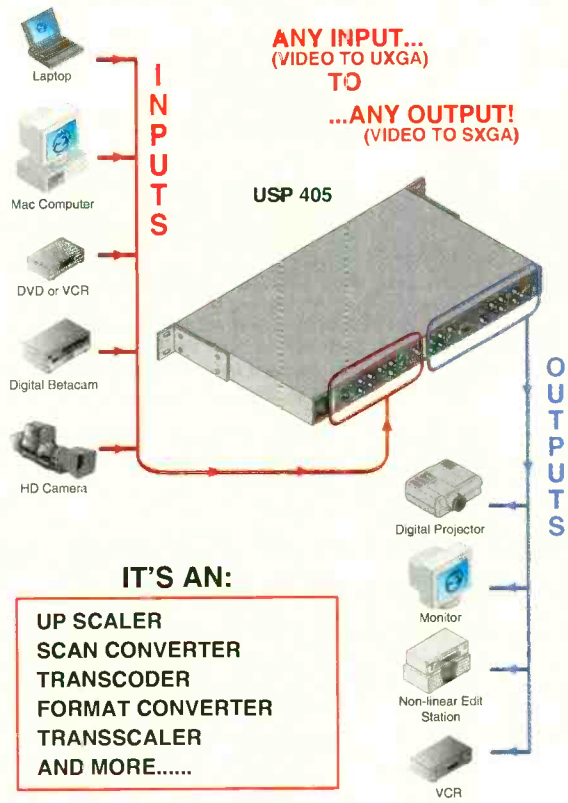

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Getting from 4:3 to 16:9

BY MICHAEL ROBIN

The ATSC/DTV standard specifies two picture aspect ratios (4:3 and 16:9). The 4:3 aspect ratio formats are, respectively, 720x480 and 640x480. The 16:9 aspect ratio formats are 1920x1080, 1280x720 and 720x480.

A period of transition, originally slated to last until the end of 2006, is expected to allow the gradual implementation of 16:9 aspect ratio DTV transmissions. During this period TV stations are expected to simulcast 4:3 aspect ratio NTSC analog signals on the currently allocated channels and 16:9 aspect ratio DTV transmissions on separate newly allocated terrestrial transmission channels. The simulcasting is planned to stop in the year 2006, or later, when all analog NTSC transmissions are expected to end and the related transmission channels assigned to other uses. In the transition period a great deal of format conversions, mostly 4:3 to 16:9, will take place.

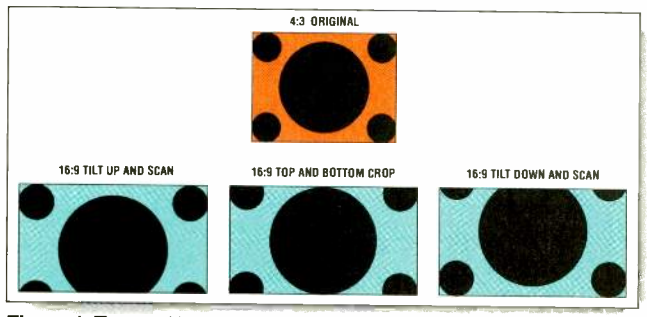

Figure 1. Top and bottom crop mode with tilt-and-scan option. The original 4:3 picture is stretched in both the horizontal and vertical direction, resulting in a 25 percent loss of vertical resolution. The viewing window can be preset or a tilt-and-scan approach can be used.

There are three methods of 4:3 to 16:9 format conversion:

•**The top and bottom crop mode:** Figure 1 shows the manner in which a 4:3 aspect ratio picture is stretched in the horizontal and vertical direction to fill a 16:9 aspect ratio screen, resulting in a 25 percent loss of vertical resolution. The viewing window can be preset or a tilt-and-scan approach can be used. Here the operator moves the window in the vertical direction to follow the action.

•**The side panel mode:** Figure 2 (on p. 34) shows the manner in which the original 4:3 aspect ratio picture is inserted in a 16:9 window, resulting in black side panels. The side panels occupy 25 percent of the horizontal space.

•**The anamorphic distortion mode:** Figure 3 (on p. 34) shows the manner in which a 4:3 aspect ratio picture is stretched horizontally to fill a 16:9 aspect ratio screen, resulting in a 33 percent anamorphic distortion.

None of the three methods offers an ideal solution. Experiments indicate that a 5 percent anamorphic distortion is undetectable and a 7 percent anamorphic distortion is not objectionable. The current trend is to combine the three methods to obtain a picture that is subjectively pleasant to the viewer.

Resizing the image

Resizing changes the original size of an image, i.e. the number of pixels used to represent the image, to an arbitrary target size. The process effectively is a change of the sampling rate of the image. Therefore resizing and resampling digital video are the same process. The image resizing has two aspects as follows:

•**Upscaling:** Generating a higher number of scanning lines (N_V) and/or horizontal pixels (N_H) by a process of interpolation. The interpolation simulates image positions that do not correspond to available samples.

•**Downscaling:** Reducing the number of scanning lines (N_V) and/or horizontal pixels (N_H) by a process of decimation.

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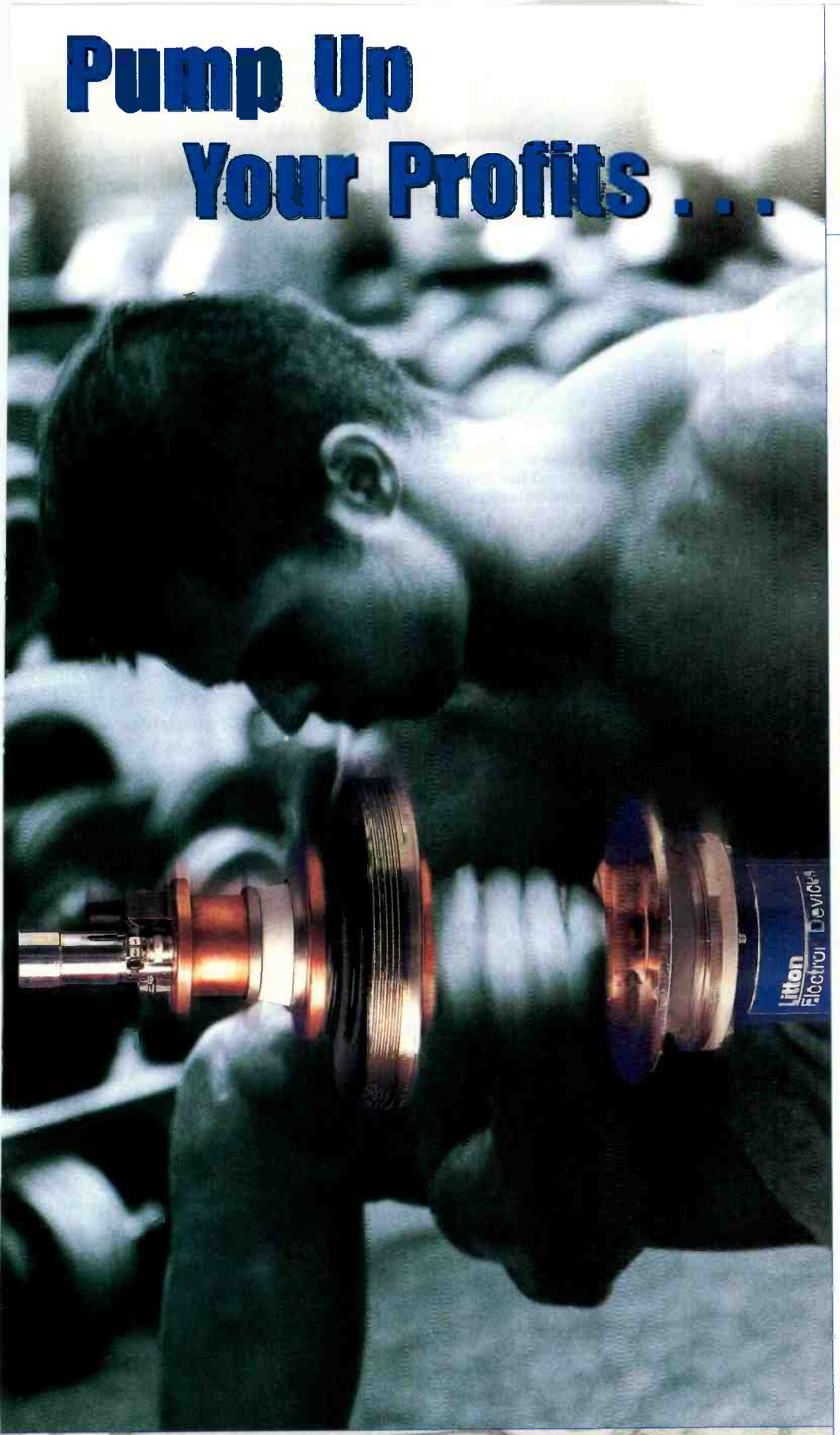

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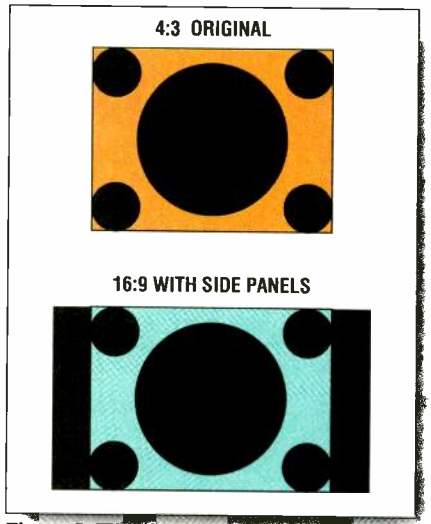

Figure 2. The side panel mode. Vertical integrity remains intact, but panels now appear on the outer edges. Some broadcasters have utilized the extra space to sell sponsorships or present other information.

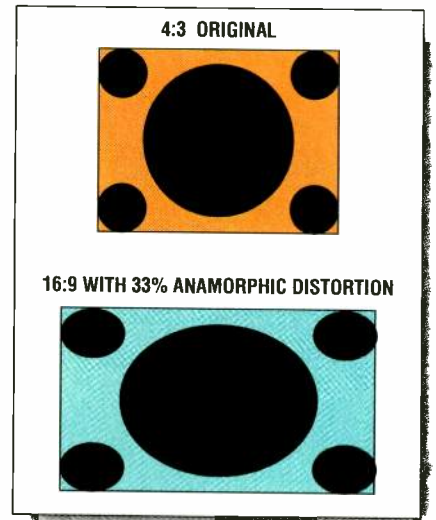

Figure 3. Anamorphic distortion mode. The picture is stretched horizontally, resulting in anamorphic distortion.

Like all processing of images in the digital domain the interpolation is achieved by performing mathematical operations on the number of samples representing the original image. In typical applications the mathematical operation is a multiplication complemented by a division. In the analog domain this multiplication process is performed by an analog multiplier and is a continuous process. In the digital domain a digital multiplier operating on each sample of the image performs it. Resizing the image affects the sampled spectrum, resulting in aliasing. Finite-impulse-response (FIR) digital filters are used to avoid aliasing.

Figure 4 describes the horizontal and vertical upscaling process. The assumed aspect ratio conversion uses the vertical cropping concept. The conceptual block diagram consists of three basic elements: the upsampler, the FIR filter and the downsampler.

TOP AND BOTTOM CROP TILT AND SCAN UPCONVERSION MODE							
720X480i (cropped to 360) 1280x720p				720X480i (cropped to 360) 1920x1080i			
HORIZONTAL SCALING		VERTICAL SCALING		HORIZONTAL SCALING		VERTICAL SCALING	
↑ 16	↓ 9	↑ 2	↓ 1	↑ 8	↓ 3	↑ 3	↓ 1
SIDEPANEL UPCONVERSION MODE							
720X480i 1280X720p (960X720 ACTIVE)				720X480i 1920x10180i (1440x1080 active)			
HORIZONTAL SCALING		VERTICAL SCALING		HORIZONTAL SCALING		VERTICAL SCALING	
↑ 4	↓ 3	↑ 3	↓ 2	↑ 2	↓ 1	↑ 20	↓ 9

Table 1. Typical upsampling and downsampling multiplication factors.

As an example of upscaling assume an ITU-R601 original picture format with the following characteristics:

N_H: 720

N_V: 360 after vertical cropping (480 x 0.75 = 360)

Assume a desired picture format with the following characteristics:

N'_H: 1920

N'_V: 1080

The ratio of N'_H/N_H = 1920/720 = 2.666... = 8/3

The horizontal interpolation consists in upsampling N_H by a factor of 8, effecting a FIR filtering and downsampling the result by a factor of 3.

A similar process is effected in the vertical direction resulting in a ratio of:

N'_V/N_V = 1080/360 = 3

In this case the interpolation consists of upsampling N_V by a factor of three, effecting a FIR filtering and downsampling the result by a factor of one.

Other conversion ratios will be used for upscaling to the 1280x720 format. Table 1 details the upsampling (↑) and downsampling (↓) multiplying factors used to convert a 720x480 picture format to 1280x720 and 1920x1080 picture formats using either the vertical cropping (tilt-and-scan) or the side panel method. Note that in the vertical cropping mode the number of active lines in the original picture is reduced to 360. In the side panel mode the number of active pixels in the HDTV 16:9 formats is reduced from 1280 to 960 and from 1920 to 1440 respectively.

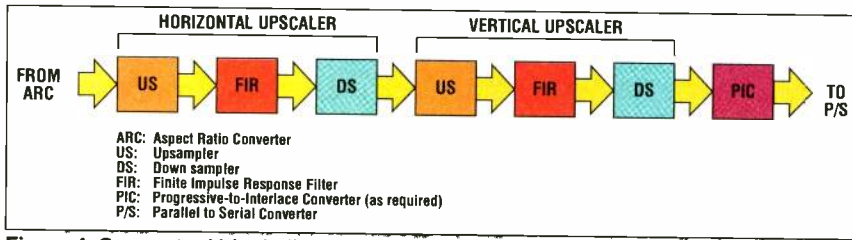

Figure 4. Conceptual block diagram of an upscaler.

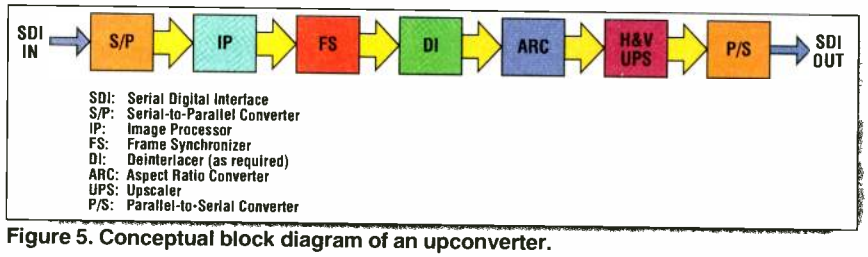

Figure 5. Conceptual block diagram of an upconverter.

The upconversion

Upconversions will be used in the short run to modify 4:3 aspect ratio SDTV-originated local programs for insertion into 16:9 aspect ratio DTV network feeds. In the long run, upconversion will be used to convert 40 years of SDTV legacy programming to DTV formats. Figure 5 shows the conceptual block diagram of an upconverter. It has several basic functions:

•**Serial-to-parallel conversion (S/P):** It is assumed here that the input signal is ITU-R601 bit-serial with a bit rate of 270Mb/s. If this is not the case then the source signal format has to be suitably converted. In any case it is preferable to use digital component signal sources to avoid NTSC artifacts.

•**Image processing:** The image

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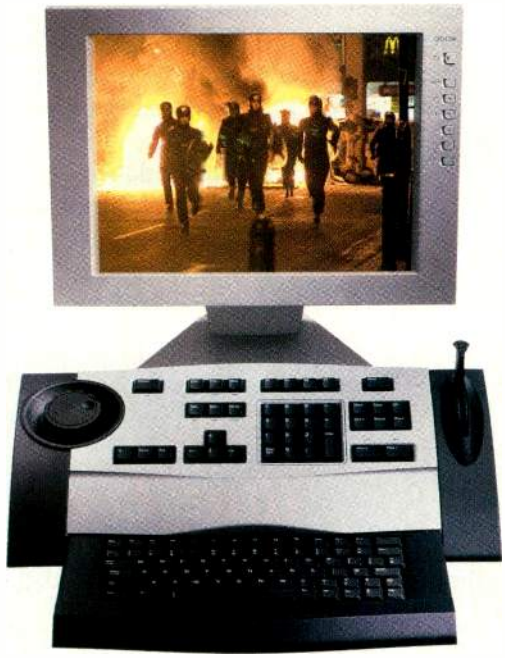

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processing function is essentially a picture cleanup process aiming at reducing the noise and removing NTSC (e.g. crosscolor) and MPEG artifacts introduced by previous signal encoding, decoding and distribution processes.

•**Frame synchronizer (FS)**

•**The deinterlacer (DI):** The interlaced-to-progressive conversion transforms interlaced fields into progressively scanned frames. Calculating the "missing" lines in an interlaced field accomplishes this. Sophisticated techniques require field memories to avoid "judder" effects resulting from motion in the image.

•**The aspect ratio converter (ARC):** This function implements the type of picture format modification such as vertical cropping with tilt-and-scan, side panel or anamorphic distortion. Each of these approaches has its disadvantages.

•**Upscaling (US)**

•Horizontal upscaling: Generating a higher number of horizontal pixels (N_H)

•Vertical upscaling: Generating a higher number of scanning lines (N_V)

•**Parallel-to-serial converter (P/S):** Conversion to SMPTE 292M

Downconversion

The term downconversion applies to hardware that reduces full HDTV image data to form an SDTV resolution picture. The process of reducing the sampling rate is called decimation. In our May 2001 article we discussed the three 16:9 to 4:3 aspect ratio conversion methods, namely the horizontal cropping, the letterbox and the anamorphic distortion. In the digital domain these aspect ratio conversion methods will use downsampling.

Downconversion will accommodate viewers using 4:3 aspect ratio television receivers and watching 16:9 aspect ratio originated pictures. NTSC stations will use downconverters to feed the NTSC transmitter with 16:9 originated signals. In addition, given the large number of analog 4:3 format NTSC receivers in use, it is unrealistic to expect that all these receivers will be discarded in 2006. In all likelihood a large number of set-top converters/decoders will be used to convert the 16:9 DTV transmissions to feed the 4:3 NTSC analog receivers. These set-top decoders will use some type of format downconversion.

Figure 6 shows a simplified conceptual block diagram of a downconverter. ■

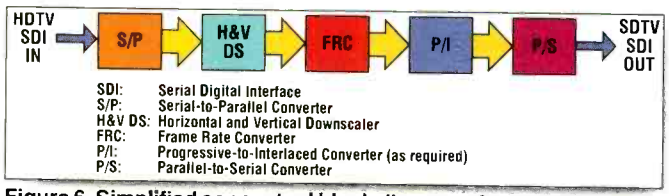

Figure 6. Simplified conceptual block diagram of a downconverter.

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

SEND Send questions and comments to: michael_robin@intertec.com

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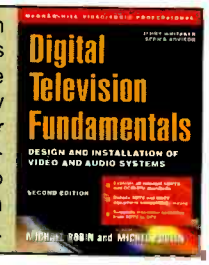

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Fibre Channel storage

BY BRAD GILMER

As the computer world moved from mainframe computing to the distributed world of desktop systems, there were a number of technologies available for interconnecting equipment. Ethernet, High-Performance Parallel Interface (HIPPI), SCSI, ATM and a number of other legacy technologies existed or were under development. As computers became more powerful, the need for high-bandwidth connections increased. We have seen the development of Ethernet in its 10, 100 and now Gigabit flavors; HIPPI has continued to evolve; SCSI has grown to include Ultra-SCSI and other variants; and ATM has seen broad deployment as part of the telco infrastructure. Each of these has benefits and limitations.

Fibre Channel started out as a way to move high traffic volumes between systems without the overhead associated with Ethernet and without some of the cable headaches associated with HIPPI and SCSI. To a large degree, Fibre Channel has succeeded.

One of the keys to moving large files on a network is to move the data in large blocks without a lot of header information in between. While individual packet payload size is 2048 bytes, Fibre Channel allows the designer to string a large number of payload packets together into a sequence for delivery. A sequence may be as large as 4GB. Furthermore, Fibre Channel recognizes sequences at the hardware level. This means that large sequences can be delivered to a device without requiring a lot of processing power to read and interpret header information on the packets.

For many years, storage devices were an integral part of the server itself. Typically, servers were connected to disk drives using IDE or SCSI interfaces. The problem with this approach is that it is limited by the constraints of either IDE or SCSI (limited cable distance and limited number of available drives), and it does not allow efficient sharing of high-bandwidth data such as video.

Fibre Channel leverages existing technology. It allows manufacturers to continue to use SCSI software commands, but replace the limited IDE or SCSI physical layer with a new architecture.

Some fifteen years later, how is it going? Things look good for Fibre Channel these days. It has been adopted as part of the core infrastructure for server-to-server transfer by a number of vendors in the broadcast television market. While interoperability problems exist, it is possible to put together Fibre Channel systems using off-the-shelf components. To a large extent, Fibre Channel does deliver the performance it promised in the early days. If systems are designed as point-to-point, performance is even better.

Before we get into a discussion of Fibre Channel storage, let's review some basics about Fibre Channel. First, Fibre Channel allows three common topologies; point-to-point, arbitrated loop and switched. Second, it allows designers to employ two very common protocols; Internet Protocol (IP) and SCSI. This allows them to easily migrate existing products that are either IP- or SCSI-based to Fibre Channel. Finally, unlike ATM, Fibre Channel block sizes are large, making it a good match with the very large file sizes typically found in video. Characteristics of Fibre Channel are listed in Table 1.

One of the keys to moving large files on a network is to move the data in large blocks without a lot of header information in between.

Fibre Channel at a glance

- Data rates up to 100 MB/s for single loop and 200 MB/s for dual loop
- Distances of up to 10km over fiber optic cabling, although there are advances that extend this to over 100 miles, and up to 47 miles over coax
- Protocol independence — support for ATM, SCSI, IPI-3, IEEE 802, SBCS, HIPPI and IP
- May employ point-to-point, loop and switched fabric
- Requires SCSI-like bus arbitration with non-simultaneous I/O unless dual loops are employed
- May be used as either a storage interface or a network topology
- Has a limit of 127 devices in a FC-AL, and 16 million devices in switched fabric
- Uses absolute addressing
- Performance remains constant as distance increases

Table 1. Key characteristics of Fibre Channel.

What is Fibre Channel?

Fibre channel is a two-way (duplex) communication channel that can be used to interconnect a wide variety of computers and storage subsystems. Figure 1 (on page 40) shows an example of this type of system. Each computer or storage subsystem is a node that has both a transmitter and receiver. Data can be transmitted and received across a Fibre Channel link, which can be a copper wire (up to 25 meters), a short-wave optical fiber (up to 500 meters) or a long-wave optical fiber (up to 10 kilometers). There are three main classes of service available with Fibre Channel. Class 1 is a dedicated connection for point-to-point operations. Class 2 provides a connectionless

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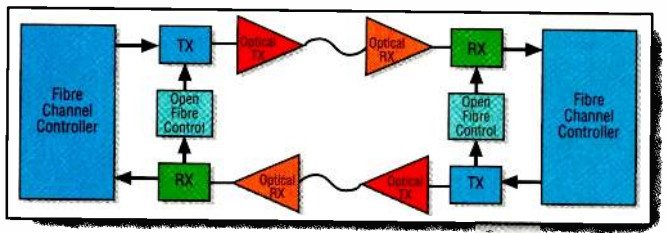

Figure 1. Fiber optic systems offer broadcasters a solution for transferring large video files between computers and storage subsystems.

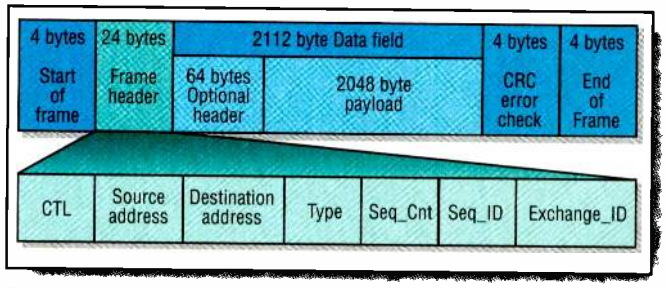

Figure 2. The frame structure of Fibre Channel facilitates the delivery of data across Fibre Channel fabric.

operation that requires a confirmation from the receiving node. Class 3 is a connectionless service that requires no confirmation. This is the class typically used for storage subsystems. Fibre Channel can support a number of software protocols, of which the two most important are SCSI and IP.

Fibre Channel frame structure

Data is sent across the Fibre Channel fabric as payload contained in Fibre Channel frames. The 2K payload is surrounded by a header and footer, which help direct the frame through the network and correct errors that may have occurred in transmission.

After the Start of Frame, there is a Frame Header. The header contains information about where the frame came from, where it is going, and other information that helps the data in the payload to be correctly organized at the receiving end. Then comes the payload, the data to be transferred across the network. After the payload, there is a four-byte CRC error check and finally a four-byte End of Frame marker. (See Figure 2.)

Fibre Channel layer structure

Fibre Channel is designed in a layered structure. These layers, illustrated in Figure 3, are defined as FC-0 through FC-4. Much like the ISO layer model, they specify different functional components of the overall Fibre Channel technology. FC-0 defines the physical link to be used to connect the components. This includes physical measurements of connectors and fibers along with electrical parameters.

FC-1 defines the way data is encoded and decoded (commonly called the transmission protocol). It also defines how errors are handled. The information transmitted over a fiber is encoded eight bits at a time. When data is sent across a fiber optic cable, a scrambling algorithm is used to make sure the data is DC balanced, meaning that the signal being transmitted does not have a long string of ones or zeros. Two bits are added to the packet during the scrambling, making for a total of 10-bit encoding.

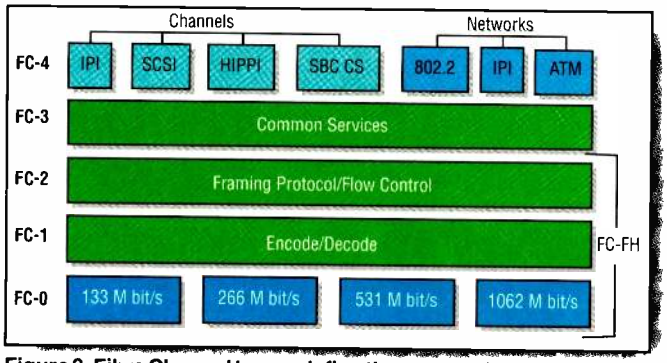

Figure 3. Fibre Channel layers define the nuts-and-bolts operation of the Fibre Channel technology, from the physical link between components to the application interfaces that can be used over Fibre Channel.

The Signaling Protocol (FC-2) layer serves as the transport mechanism of Fibre Channel. FC-2 defines the framing rules for the data to be transferred between ports, the different mechanisms for controlling the three service classes and the means of managing the sequence of a data transfer.

The FC-3 level of the FC standard is intended to provide the common services required for advanced features. These features include combining multiple ports to aggregate bandwidth, the ability for more than one port on a device to respond to the same address, and multicasting, which allows one device to send to multiple destinations on the network.

FC-4 defines the application interfaces that can be used over Fibre Channel. While a number of interfaces are listed, the predominant ones are SCSI and IP. SCSI is primarily used to connect disk devices to servers across a network. IP is used for FTP and many other commonly used IP applications.

Topologies

Fibre Channel fabric can be configured in a number of different ways depending on the requirements and performance required across the network.

Point-to-point is the simplest and least expensive topology to implement. It also is self-explanatory. In an equipment pair, the Fibre Channel Gigabit Linking Modules (GLMs) are connected back to back. No hubs or other control devices are needed. Costs are low, installation is simple, the bandwidth on the network is well defined, and control and interoperability issues are limited; so resolving technical issues is a breeze.

The next step up in Fibre Channel topology is the Fibre Channel arbitrated loop (FC-AL). Figure 4 illustrates a single FC-AL. FC-AL has several advantages. As with point-to-point, it is low cost and external hardware is not required. In small configurations it is simple, and for that reason it is easy to troubleshoot. It is also expandable, with up to 126 devices per loop. Single-loop FC-AL does have some problems though. First, it is prone to failure. Since it is a single loop, a break anywhere in this loop crashes the entire network. Second, in a single-loop configuration, Fibre Channel does not support simultaneous communications. This can seriously limit bandwidth on the network.

Broadcasters will find that most vendors employ a dual-loop configuration.

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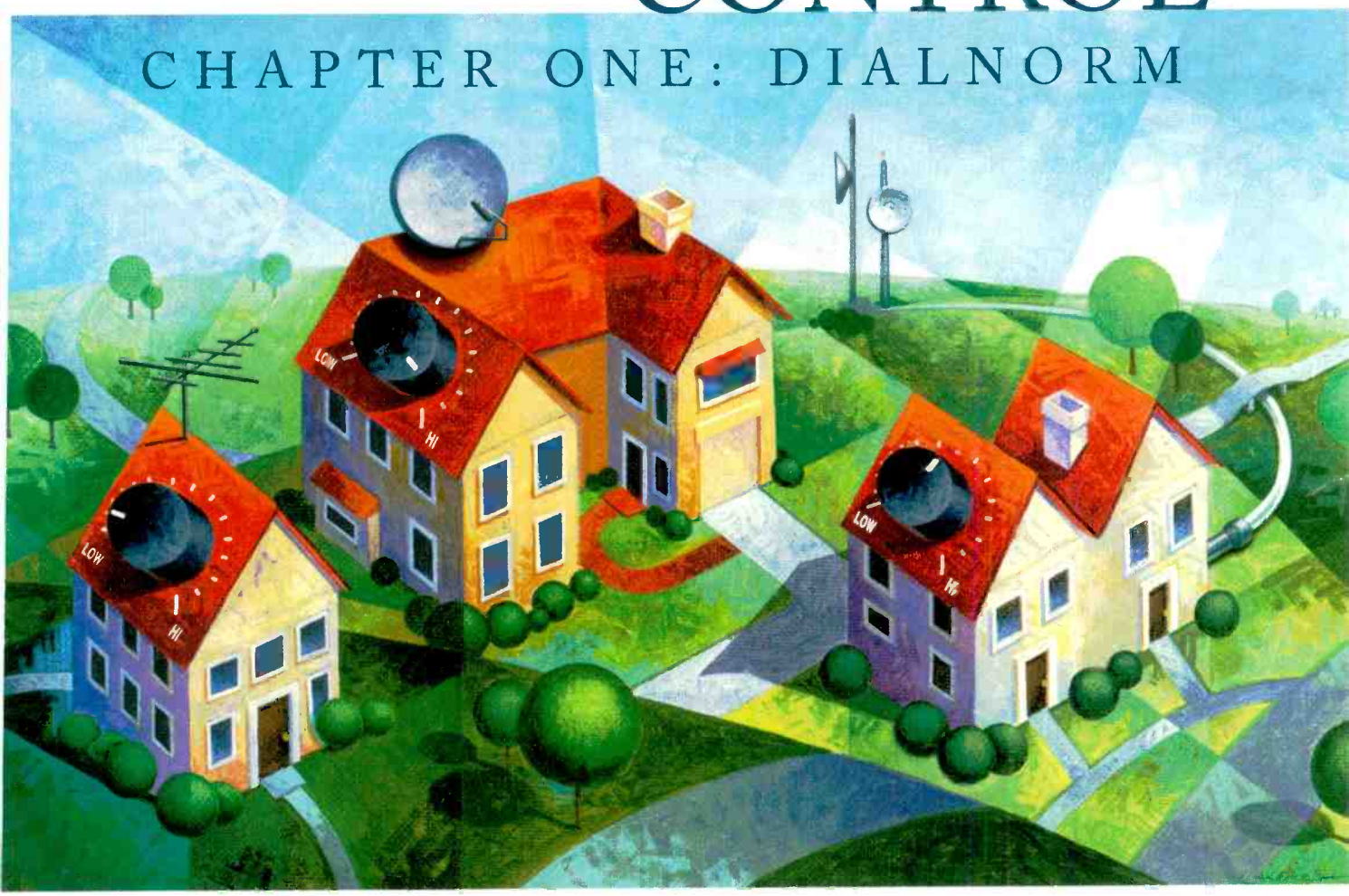

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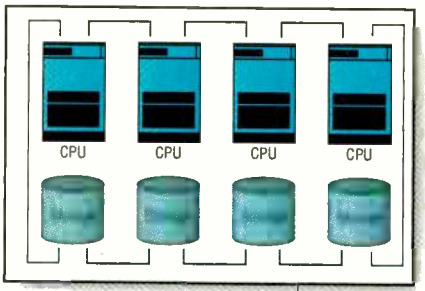

Figure 4. Fibre Channel Arbitrated Loop serial storage architecture.

The dual-loop FC-AL eliminates the single-loop failure mechanism. If one of the loops fails, the other assumes the load. A dual-loop FC-AL also allows simultaneous communications between devices, greatly increasing bandwidth available. While the cost of dual-loop topology may be greater, for most applications the security and performance increases are worth the increased costs.

The third common Fibre Channel topology is switched fabric. If you are familiar with switched Ethernet networks, you understand the basic premise behind switched Fibre Channel.

Switched fabric works by connecting full-bandwidth pipes between any two devices that wish to communicate. This allows many devices to communicate at the same time, it increases the effective bandwidth available for each device dramatically, and it provides fault tolerance in large networks. Of course, all of this comes with a large price tag —anywhere from $20,000 to $100,000 and beyond depending on the complexity of the switch. Also, if you are looking for switches with full redundancy and SNMP monitoring, your choices at this point are limited.

Fibre Channel is one of the best ways to move large amounts of data within a facility. Its ability to put together a large number of packets into a single sequence for delivery is one of its key strengths. This allows Fibre Channel to deliver high actual throughput with a small amount of overhead. ■

Brad Gilmer is executive director of the AAF Association and president of Gilmer & Associates, a broadcast consulting firm.

A Fibre Channel primer

Let us stop and explain the options for a Fibre Channel arbitrated loop. Hubs are devices that attach multiple nodes to a Fibre Channel-arbitrated loop, with all nodes sharing the 100MB/s bandwidth. Hubs on the market today provide the connection of between five and 12 nodes. The hub allows devices to be added to or taken off the loop without impacting loop operations. A major advantage of a hub is that if any one link fails, that link is removed and the other links continue to operate.

Switches provide multiple connect ons as well — typically eight or 16. Switches are more expensive than hubs, but can operate multiple concurrent transmissions at 100MB/s. As an example, one server can be communicating through a switch to a disk subsystem at 100MB/s, while another server is communicating with a tape library through the same switch at 100MB/s.

Another component is a Fibre Channel router. This is a device that can communicate with an SCSI cable on one side and a Fibre Channel link on the other side. It is useful if you want to attach a tape library that doesn't have a Fibre Channel controller to a Fibre Channel loop.

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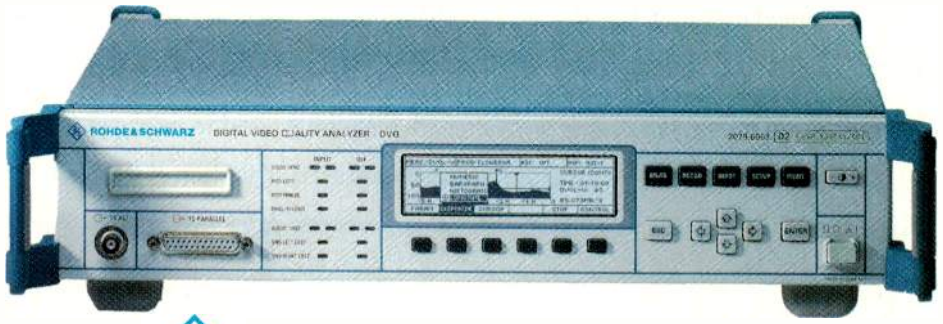

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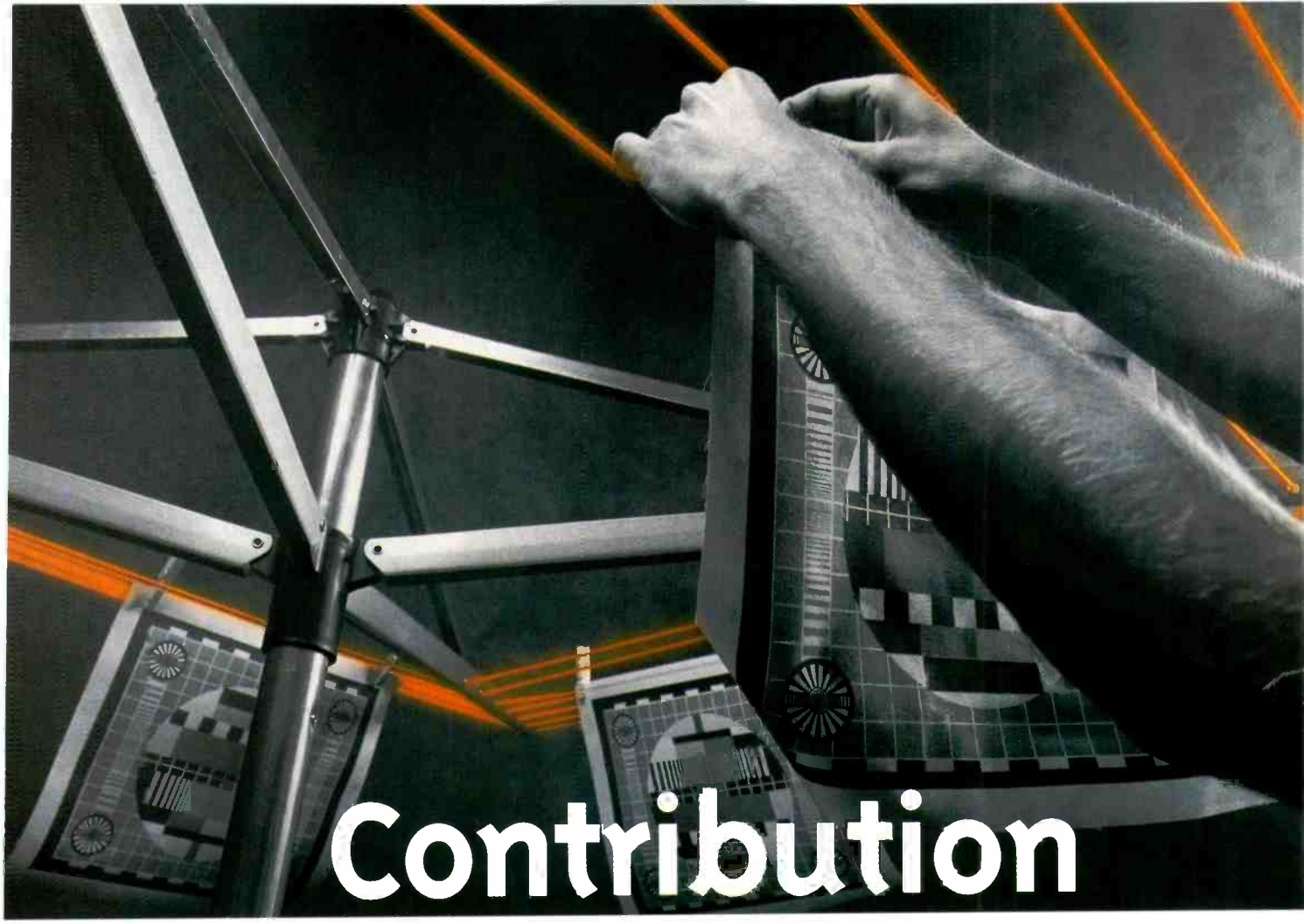

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Preproduction issues in streaming

BY STEVEN M. BLUMENFELD

Preproduction for streaming is an interesting topic and one that is not commonly covered. Streaming, unlike broadcast video production, requires extra care when capturing images for encoding and packetization.

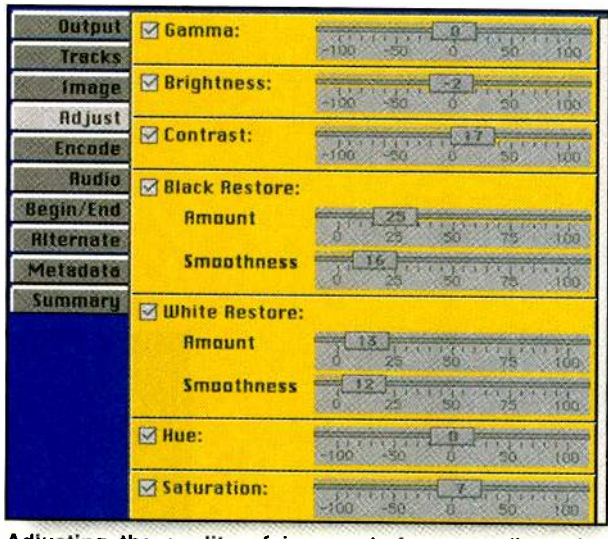
It is important to plan how your content will be delivered. Knowing ahead of time whether your viewing audience will be receiving your content over the Internet with 28.8 modems or on corporate LANs with 10MB to their desks makes all the difference in the world. Once the technical parameters of delivery are known, you need to give thought to how the content will be used. Determine what kind of information must be gathered and what metadata needs to be incorporated during production. Additionally, consider the difference in how the various media players interact with the data.

Most corporate networks today are large and, comparatively, the Internet is a behemoth. But it's still not big enough or robust enough to handle uncompressed audio/video. We can't easily stream data at 670MB/s over it. So we must capture our content and be prepared to compress it. The worst thing you can do to a digital signal is to compress in one format and then decode and re-encode in another — talk about garbage in garbage out.

Keep your compression signal path clean. What does this mean? First, try to ensure that the devices used are not additive to the signal. In the digital chain you should keep the transcoding from one codec to another to a minimum. If you are going to capture your content in a compressed format try to deliver in that format.

If you have to shoot in DV and need to deliver in many different formats, cut and edit in the native format, and then only transcode the final material.

If you have to shoot in DV and need to deliver in many different formats, cut and edit in the native format, and then only transcode the final material. Just prior to final transcoding you may want to use various adjustments to the content to guarantee high-quality images and more efficient file size. Below are explanations of some of the adjustments that can be made using encoding tools on the market.



Adjusting the quality of images before encoding with preproduction tools like Media Cleaner Pro can bring broadcasters' streaming content through compression with a minimum of picture degradation.

Gamma: used mainly to adjust for differences between Macintosh displays and PCs

Brightness: controls the overall luminance value of the image.

Black/white restore: functions enable better compression of the solid black and white areas of the video by reducing the noise in the luminance.

Image size: converts non-square pixel formats to square so that video will display properly on computer monitors.

Telecine: removes the 3:2 pulldown and only encodes the original 24 frames, which reduces the bit rate by eliminating the video artifacts.

Blur: allows better compression by softening the edges of the images and reducing the differences between adjacent pixels.

Watermarking: lays a graphic file over the top of the video. Warning –text and graphic overlays usually cause the encoder to spend more bits to get these areas right. You can get away with this at higher bit rates but avoid it if you are trying to squeeze every last bit.

Codec: allows you to choose from a number of compression algorithms. A lot of people have been using the International Standards Organization (ISO) MPEG-4 codec lately to deliver high-quality video compression at low data rates.

Key frames: forces an I frame at a specific locations such as scene changes, fast motion sequences. This gives you a much better image, of course at the cost of more bits.

Video data rate: Here is where you get to set your final data rate based on your intended audience. Set the rate too high to get better-looking images, and you limit the number of users who can access it. Set it too low and who would want to watch? As a rule of thumb broadcast quality video is achieved with as little as 500Kb/s and near-DVD qual-

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ity at 750Kb/s using MPEG-4.

Adjustments can also be made to the contrast, saturation and hue of the image.

Media Cleaner Pro is my weapon of choice for making these adjustments. It has many features to help you to make adjustments to video for streaming and supports all the major codecs. Since most of my streaming content is meant for our internal network I stick to the broadband streaming settings. In the case where the content is to be downloaded and not streamed I try to use Variable Bit Rate MPEG-2 (DVD).

Media Cleaner Pro allows you to manipulate almost every aspect of an image during the encoding process. The best way to learn about these powerful settings is to practice. I usually edit a 30-second representative test piece of my content, and then start playing with the settings. Beware — a little goes a long way. ■

Steven M. Blumenfeld is currently the GM/CTO of AOL – Nullsoft, the creators of Winamp and SHOUTcast.

Preproduction with Flying Spot

BY LAURA COLLINS, ASSOCIATE EDITOR

Streaming is offering broadcasters new options for revenue generation, and more efficient compression codecs and better Internet connections add to the value of these options by offering the potential for broadcasters to deliver higher-quality content over the Web. Preproduction before encoding can allow broadcasters to take advantage of this potential.

Beginning with the highest quality signal possible going into compression prevents bits from being used to encode noise or artifacts. Adjustments also can be made specifically to improve the end experience for Internet viewers. Broadcasters have the knowledge and the high-end production tools to provide high-quality streams, but not always the time or staff. In these cases, choosing an encoding firm like Seattle-based Flying Spot as an encoding partner may be an option.

Flying Spot's Digital Media Group has done a range of projects including trailers for Dreamworks and Warner Brothers. Experienced operators at the firm provide content producers with "hand-made" encodes by looking at each project individually and using high-end production tools to preserve content quality going into compression.

This type of experience is perhaps the largest benefit encoding firms offer broadcasters. They encode material for the Internet every day, and have learned what to watch for and how the project will turn out. They also offer the benefit of quick turnaround, allowing time to make improvements to the final result.

Sam Atkinson, director of streaming media for the Digital Media Group of Flying Spot, suggests that broadcasters selecting an encoding partner look carefully at the steps the firm takes to maintain quality before encoding/compression. An encoding firm should use two-pass encoding, rather than one-pass, for analysis before encoding. ■

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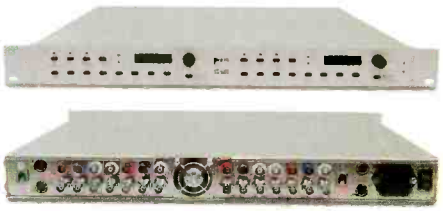

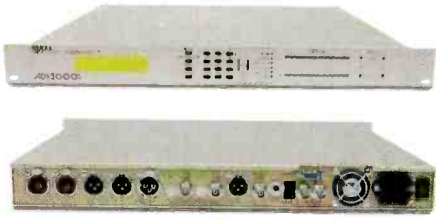

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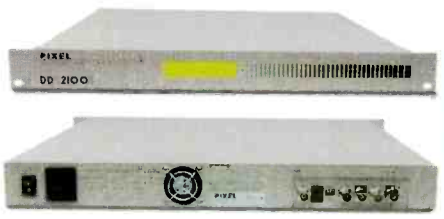

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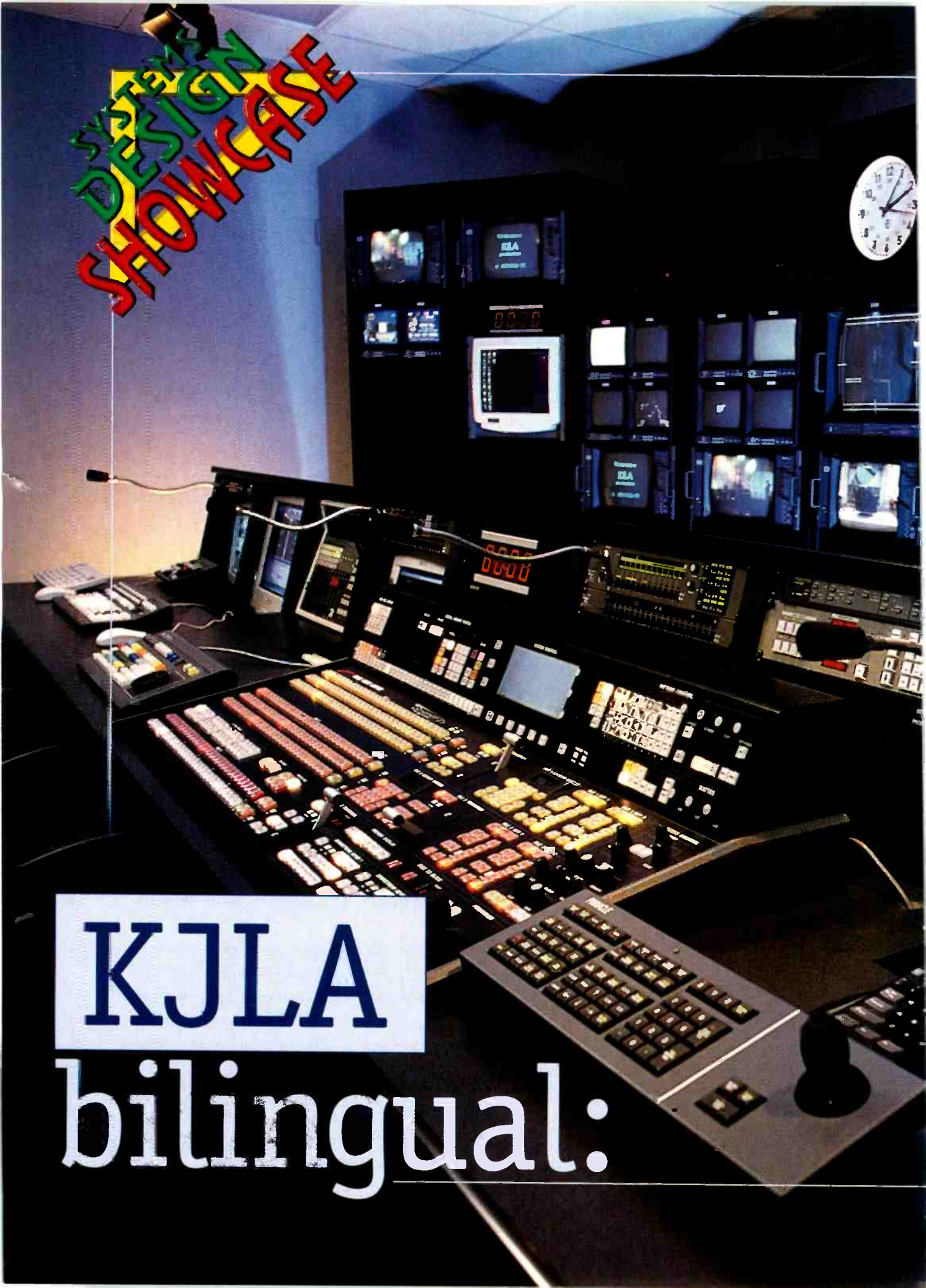
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MORE CHANNELS, BETTER PRODUCTION

By Dennis Feuchtinger and Gordon McComb

Los Angeles is home to 21 percent of the country's Latino population – the largest concentration in the U.S. The market for Latino television programming is an attractive one: 58 percent are under 30 years of age, a prime demographic for advertisers keen on tapping into a younger, more mobile consumer audience.

The majority of Latinos in the Los Angeles basin are bilingual and many speak both Spanish and English fluently. Of the 41 television broadcast channels in the Los Angeles area, 10 devote some or all of their broadcast day to Spanish-language programming and almost all offer Spanish as the SAP choice.

Against this competitive landscape, independent bilingual station KJLA decided it not only had to upgrade its facility to digital for the inevitable FCC-mandated DTV transition, but also needed to expand and improve its production capabilities. To do this, KJLA needed to move to a larger facility.

Upgrade plans began in late 1999 when station management contacted CheSystems, a Burbank, CA-based systems engineering and integration company.

KJLA originally wanted to expand the existing analog router to 64x64 and add another channel of analog audio allowing a program audio channel and a channel for SAP. The station's server would be expanded for more storage. After CheSystems' initial review of present and future requirements, including the planned growth of the station, it became clear that the station's plan would not support the expansion anticipated by station management, nor would it support broadcasting more than one channel or an improvement in production quality.

CheSystems proposed an enlarged system that included a central machine room housing a 128x128 SDI router with four channels of analog audio, timecode routing and RS-422 routing for machine control and vastly improved production capabilities.

KJLA produces digital programming for LA's bilingual market. The Production Control Room of its new facility, shown above. Photos courtesy CheSystems. Photographer: Radomir Samardzic.

Fortunately, the serious work of planning the new facility coincided with NAB 2000. CheSystems used this as an opportunity to discuss product and delivery schedules with manufacturers and to schedule hands-on equipment demonstrations for KJLA production and engineering personnel. This shortened both the time required for choosing equipment and the lead time between equipment order placement and equipment delivery, which helped keep the project on schedule.

Heathcote and Associates was given the task of taking an existing building used primarily for audio production, The Complex in West Los Angeles, and converting it for use in television production. The design criteria called for a main equipment room, a production/online edit room, a production audio room, a master control room, a nonlinear edit room, a future Avid room, and a makeup/greenroom, all on raised flooring for cable access. Plans for revamping the facility were completed and approved in late May and construction began.

To meet project milestones, the technical facility had to be built and tested off-site.

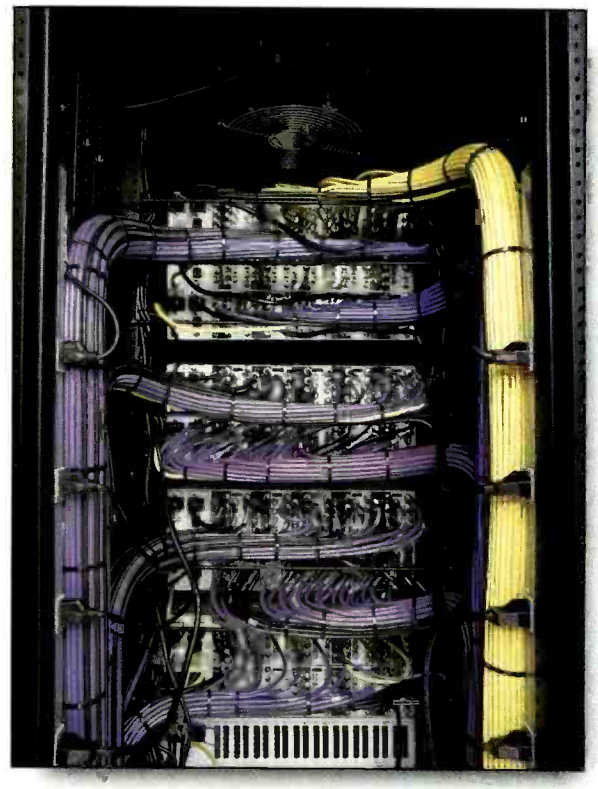
The lease on KJLA's Tarzana facility would expire Nov. 1, 2000, which meant that the move would have to be completed by late October. It soon became apparent that if project milestones were to be met, most importantly the on-air date, a large portion of the technical facility would need to be built and tested off-site during the building construction period.

As the system design was finalized, CheSystems took delivery of the equipment racks and patch bays at its facility in Burbank. Because the router frames would not be available for eight weeks, CheSystems used dummy "dressing frames" for testing.

In the next four weeks the entire I/O path (router to patch/patch to router/patch to equipment) for all levels of the router was completed and tested. All cables internal to the machine room were landed at patch and dressed to the equipment location, and all long runs to and from the routers were fabricated with a connector at the router end and prepped to pull at the other. After testing, the cable harnesses were removed and boxed to be reinstalled on site.

During the initial build of the new facility, between late July and early October, KJLA's administrative, engineering and production departments remained at the former location. In October, the departments began migrating to the new facility as portions of it were completed. This created some challenges, as it meant that part of the engineering infrastructure was at the old facility, and part was at the new.

For KJLA's engineering staff, Master Control was the first to be moved. A fiber link provided by Pacific Bell connected the production and on-air facility at the old location with Master Control at the new facility. This allowed the station to remain on the air with no interruption when switching between the old and new facilities.



Careful attention to cable management makes future changes and maintenance much easier.

Training for new equipment was conducted over the construction period. For the first phase, KJLA edit personnel went to CheSystems' Burbank facility for training on the Pinnacle Nitro NLE and in particular the Adobe After Effects software. This gave the staff a place to concentrate on the new technology, free from the noise and distractions of the facility under construction. Final training was held at the new facility after all major components had been installed and tested.

Blueline's Station Master automation system controls the two channels that KJLA broadcasts.

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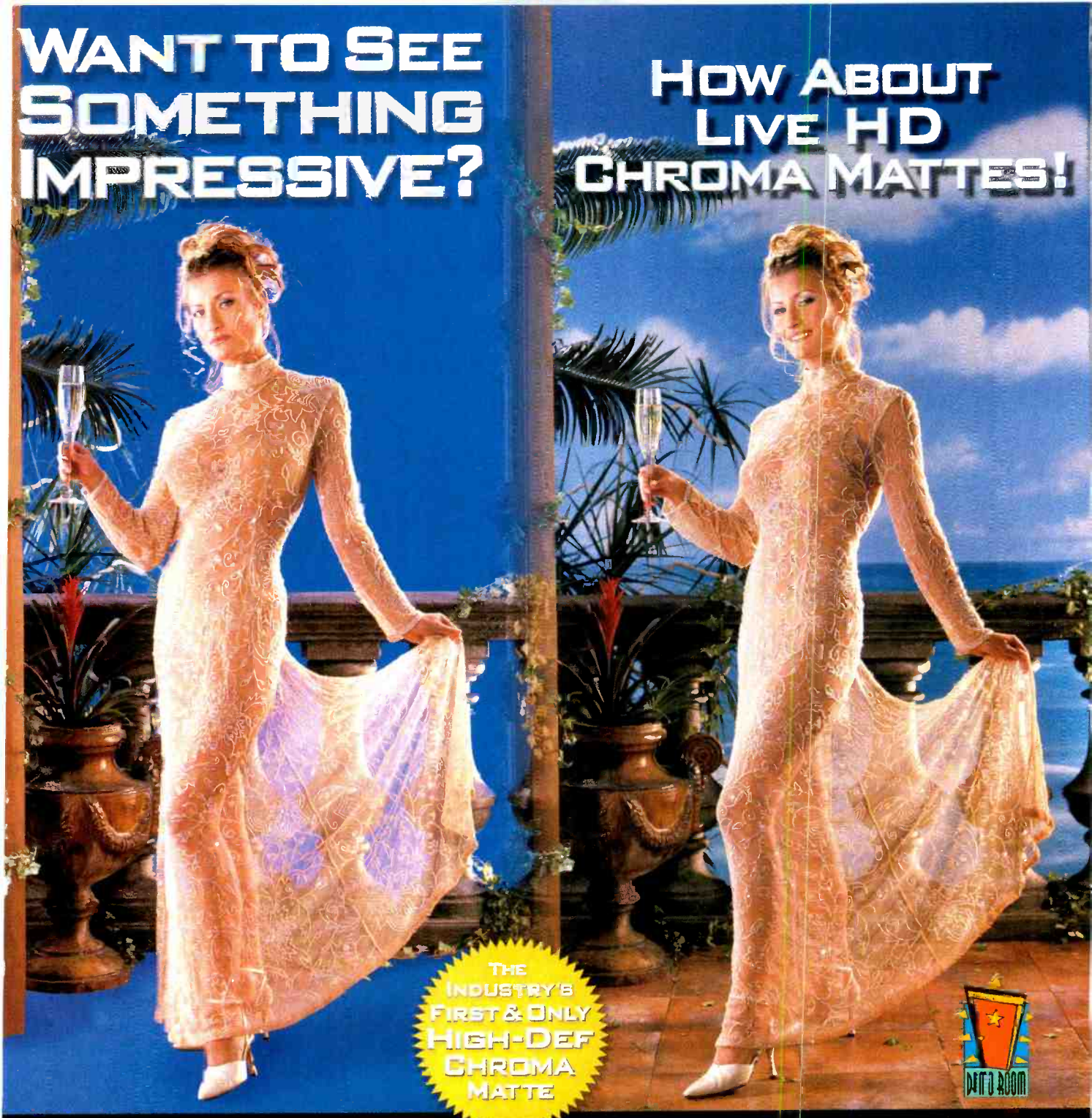

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The main equipment room handles signal ingest, routing and patching in the new facility. Signals going to and coming from analog equipment are converted to digital to eliminate the need for special routing or patching.

Live interactive productions

Production of the live shows continued at the old KJLA studios until the third week of October. The station then aired reruns of its programming while the new studios at The Complex were being completed. In all, KJLA's live programming was suspended for less than four weeks. On Nov. 17, 2000, the first live show produced at the new facility aired.

KJLA produces a minimum of two hours and as much as three hours per day of original programming. Its flagship show, *LATV Live*, is an interactive music video production that highlights Latin music with Spanish Pop, Rock en Espanol, Salsa, regional Mexican, Latin Hip-Hop and dance. With the expanded production capabilities this has grown to a four-camera production (three studio cameras and one ENG camera on SteadiCam) and uses live VJs to announce each video. The show also features live, in-studio bands several times a week, on-air viewer call-ins and contests. Music videos for the production are accessible on the production server, making handling live requests much easier than if the clips were on tape.

The move to The Complex — originally built in the late 1970s for recording such musical acts as Fleetwood Mac, The Eagles, and Earth, Wind, and Fire — gave significantly more legroom for KJLA staff. The station has room for future expansion, as well as more elaborate productions. The Tarzana facility provided only 1200 square feet for both technical areas and sound stage. KJLA now enjoys more than five times the space, with a 3000-square-foot production studio and over 2800 square feet in the technical areas.

In total, The Complex spans approximately 27,000 square feet, which, in addition to KJLA's dedicated studio, includes two other sound stages and two recording studios.

A marriage of analog and digital

While all video signal processing and routing within the new facility is digital, organization of program material is a mixture of analog and digital. It was decided in the planning stages of the project that audio would remain, for the time being, analog.

Most tape formats, including VHS, U-Matic, DV, DVCAM, DigiBeta and Betacam SP, are supported to some degree in the facility. A large number of independent productions are used in programming at KJLA, and the editors never know what kind of tape is going to be dropped off. The only thing they haven't received yet is Betamax. In fiscal 2001, management hopes to offer independent producers access to Ikegami HL-V75W-series ENG camcorders using DVCPRO50 format. The technical quality of their product will be improved greatly by this, and ingest and post production at KJLA will be much easier.

> KJLA's live programming was suspended for less than four weeks while the new studios were being completed.

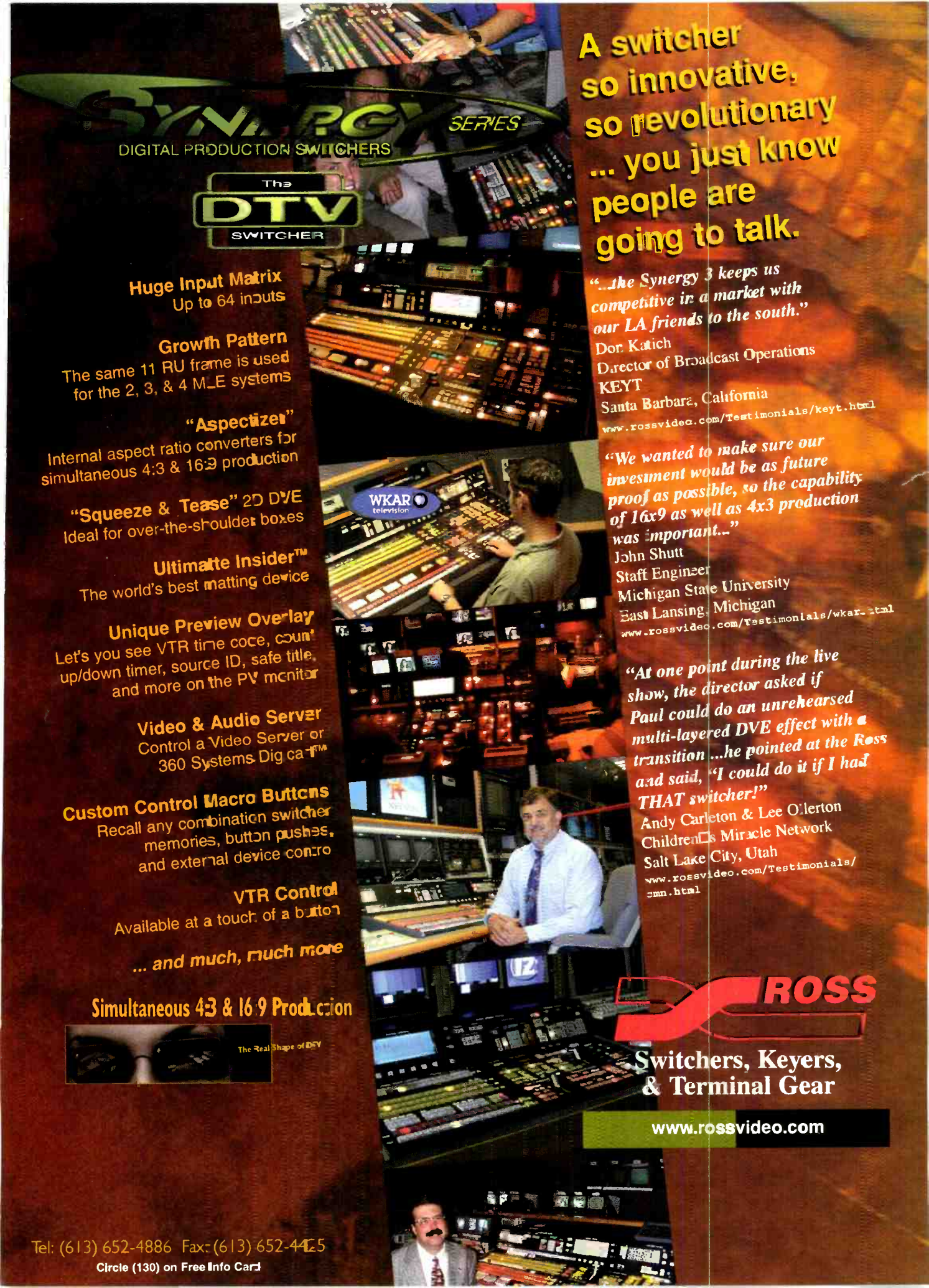
Each piece of analog video equipment is treated as an island. The digital signal to the equipment is converted to analog by a dedicated D>A, and the analog signal from the equipment is converted to digital by a dedicated A>D. To the operator, the analog equipment appears on the router as a digital source or destination with no special routing or patching required for its use. In a live-to-air environment, this cuts mistakes dramatically.

Panasonic DVCPRO50 decks provide digital tape recording and playback for production, editing and program playout from Master Control. DVCPRO was chosen over Digital Beta because of its lower acquisition cost, smaller tape size (which decreases the storage space requirements) and lower tape costs.

Currently KJLA broadcasts an analog signal on channel 57, with additional cable coverage to approximately two million households in Los Angeles and the near surrounding area. KJLA is also uplinked in digital form to Galaxy 11 to ensure the highest-quality signal is delivered to the cable headends.

Equipment

At the heart of KJLA's new facility is the Pro Bel Eclipse router, with 128x128 SDI video, 128x128 four-channel analog audio, 64-square RS-422 machine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control router and a 32x32 timecode router. Control panels for the router are spread throughout the facility, and the router communicates with the Blueline StationMaster automation system and the production switcher via RS-422 connections.

Every signal path in the new facility is patched. Bittree video patch panels were chosen for their extended bandwidth and reliability. By using the Bittree audio patch panel with the three-pin ELCO connector, CheSystems was able to trim days off the pre-build and realized a near zero percent failure of the connection during the initial fabrication and the final installation. Each patch bay cable harness was terminated to the connector, labeled and dressed, then easily removed for installation once the equipment was moved to the new facility.

> While all video signal processing and routing within the new facility is digital, it was decided that audio would remain analog for the time being.

Ross Video supplied the Synergy 3 production switcher, equipped with squeeze and tease, border generators, preview overlay, chromakey on all levels, 12 timed aux bus outputs, two pattern generators per MLE, and redundant power supplies. All inputs to the Ross Synergy 3 are SDI and are mapped using a GUI at the control panel. Ross also supplied distribution equipment for SDI, analog reference and audio, frame store synchronizers, analog-to-digital decoders, and digital-to-analog encoders.

Pinnacle provided the two servers, a MediaStream 700 and a Thunder. The MediaStream is used in Master Control for ingest and program playout, controlled by the Blueline StationMaster automation system, and the Thunder is used as the production server. Ten workstations use *ThunderBrowse* to view and trim edit sequences on the production server from the production offices on the second floor of The Complex.

DVEXTREME, FXDeko and Lightning still stores from Pinnacle Systems are used in the production control room during live productions and during edit sessions. Using Pinnacle's BroadNet, these devices can move graphics and text across the network, including to the Nitro in the NLE room.

An audio room within the main production room contains a Yamaha O2R digital audio mixer used for studio production and a Mackie 36-input board used with live music productions. For edit sessions a Grass Valley Group AMX-170 is used, controlled by the Editware D500 digital edit controller.

The monitor walls and consoles in the main production room and Master Control contain a mix of 10-inch, 14-inch and 20-inch Ikegami color monitors, all with SDI input cards. A router salvo takes the monitor wall in the production control room from studio production configuration to edit configuration.

Communications for the facility is handled by a 72-port Clear Com Compact72 system. The Compact72 is programmed for seven main channels: audio, Master Control, director, camera, engineering, talent and security. A security channel was included as it will be required for live audience productions in the studio. On the studio floor, only the camera intercoms are hard wired, all other intercom stations are wireless.

A bright outcome

With just three months of planning and design and a six-month window for construction and systems integration, KJLA has moved into a new facility. This project with its nearly impossible timeline took careful planning, creative engineering and a huge amount of trust in the decision-making process of the project team, which included CheSystems, the project architect, the building contractor, equipment manufacturers, and management and engineers from KJLA. ■

Dennis Feuchtinger is vice president of engineering for CheSystems. Gordon McComb is a freelance technical writer.

Project team

KJLA
Francis Wilkinson, general manager
Kenneth Brown, chief engineer

Engineering consultants and systems integrator:
CheSystems, Inc.
Martin Grahl, design engineer
Dennis Feuchtinger, design engineer
Tim Tschopp, design engineer
Frank Hoffmann, design engineer
Bob Young, project management
Dmitry Vayner, installation supervisor
12 really good wiremen

Project architects:
Heathcote and Associates
Gary Heathcote
Elizabeth Perez

Manufacturer assistance

Ian Croft, Pro Bel
Wes Crenshaw, Blueline Technologies
David Brand, ASG Burbank, Clear Com
Ken Gould, Ross Video
Doug Ordon, Pinnacle Systems
Mike Buchanan, Bittree

Equipment list

Pro Bel routers
Blueline station automation system
Bittree patch bays
Ikegami monitors
Ross switcher, terminal gear
Panasonic DVCPRO50 equipment
Pinnacle servers, CG, still store
Pinnacle DVE, nonlinear editing
Videotek test equipment
Tektronix test equipment
Editware online digital editor
Clear Com intercom system
Grass Valley Group edit audio mixer
Yamaha digital production mixer
Mackie production audio mixer

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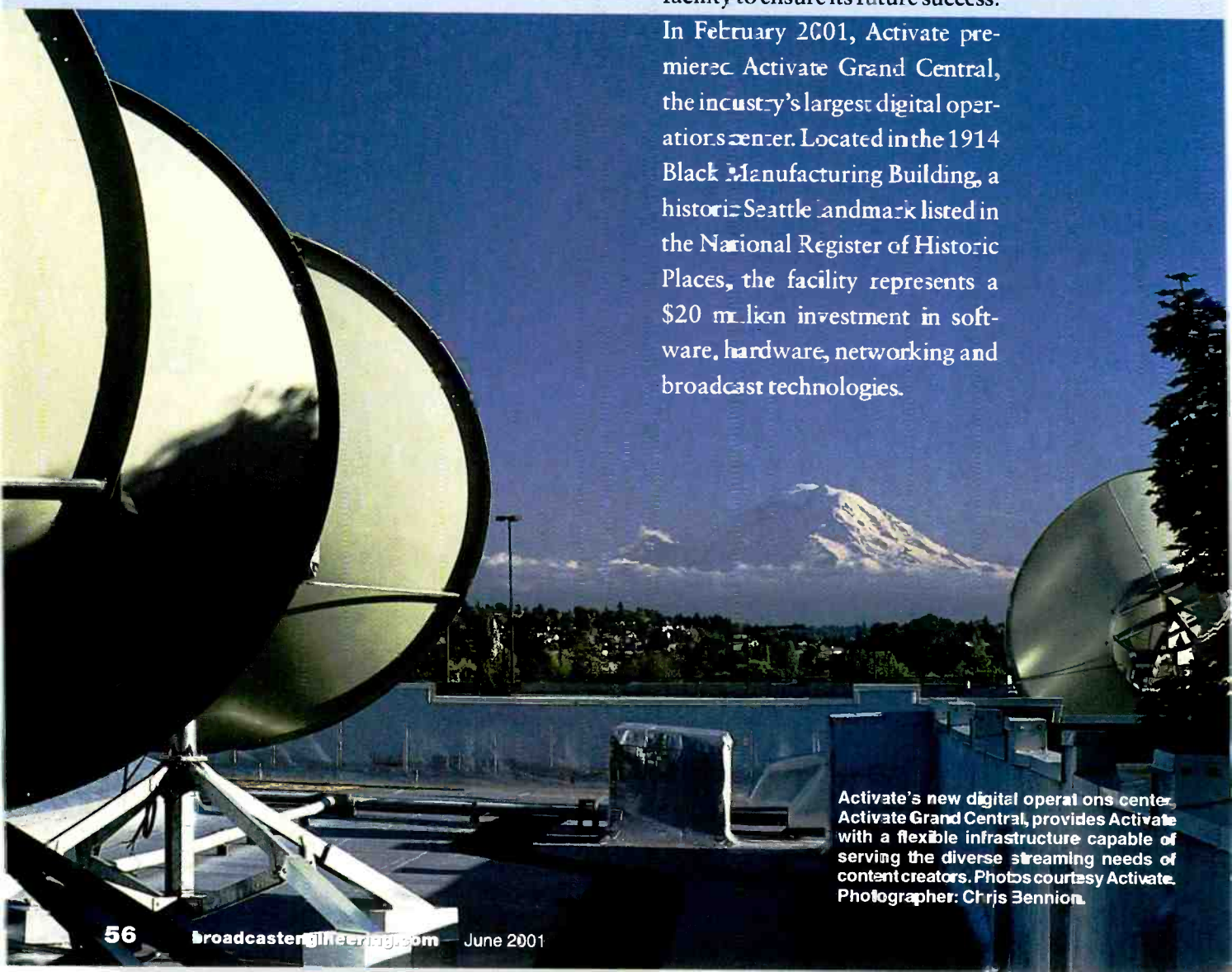
SYSTEMS DESIGN SHOWCASE

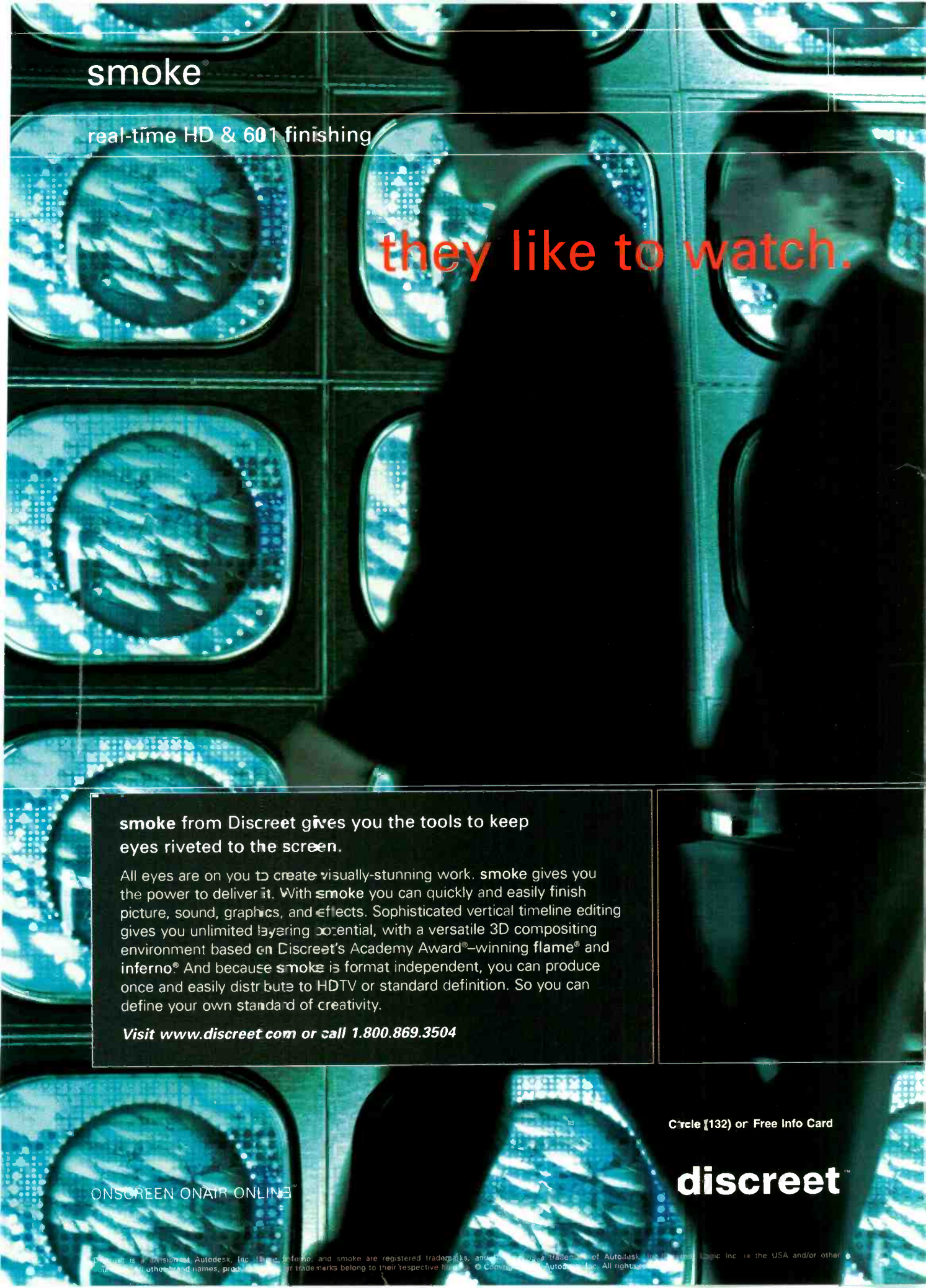
Activate Grand Central

By Scott Whitcomb

In early 2000, Seattle-based webcasting service provider Activate recognized the growing demand for Internet broadcasting and decided to expand its current facility to ensure its future success. In February 2001, Activate premiered Activate Grand Central, the industry's largest digital operations center. Located in the 1914 Black Manufacturing Building, a historic Seattle landmark listed in the National Register of Historic Places, the facility represents a $20 million investment in software, hardware, networking and broadcast technologies.



Activate's new digital operations center, Activate Grand Central, provides Activate with a flexible infrastructure capable of serving the diverse streaming needs of content creators. Photos courtesy Activate. Photographer: Chris Bennion.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Activate Grand Central was constructed as a highly flexible, all-digital facility to increase streaming quantity and quality across the Internet or Intranets. Activate felt that the facility of a successful streaming media provider needed to incorporate resources that would enable it to provide application services, signal capture, production and distribution of content ranging in form from compressed MPEG to native resolution HDTV.

A critical part of this 24-hour redundant facility, which combines broadcast, satellite and network management operations, is a flexible infrastructure that can be reconfigured based on business requirements. Activate Grand Central incorporates processes in the broadcast systems infrastructure much like those used in network systems infrastructure. One of these concepts is called an independent data frame (IDF), which provides clear demarcation points based on geographic locations, work processes and the function of specific spaces. Instituting these wire-management crossconnect systems requires planning early on to set aside space.

Design criteria

In addition to flexibility and scalability, the central design philosophy for the expansion was to be future-proof, capable of staying current with all of the evolving rich media formats, and compression/encoding/streaming technologies. This enables Activate to provide additional product offerings. An integral part of the design philosophy was efficient capital expenditure, format flexibility (Windows Media, Real, QuickTime, H.323, H.320, .mp3, .mp2, .mpg, .mpeg 2 and 4, .avi, .mov.), Gigabit ethernet Network structure, advanced control/monitoring, finite physical space, seismic and historic landmark preservation.

In addition to flexibility and scalability, the central design philosophy for the expansion was to be future-proof, capable of staying current with all of the evolving rich media formats.

Activate contracted Doyle Technology Consultants Inc. to assist in bringing all of these requirements together. Doyle Technology was one of the few integrators in the industry that had completed projects in the streaming media Internet space. They understood network management issues and brought extensive broadcast experience. Activate and Doyle Technology have a common understanding that as the digital migration continues, content providers and distributors will be dealing with file-based material. This file-based media will be cached in servers both locally and remotely at the "edge." Media files are complex in structure, so the ability to manage many simultaneous live and on-demand streams of many separate platforms is essential. The more malleable the signal acquisition, distribution and network management, the easier it is to preserve these complexities.

Challenges and innovations

Activate engineering and the Doyle Technology team recognized that they were venturing into new territory given the hybrid nature of the combined technologies utilized in Activate Grand Central.

Primary systems specified for the design were operated by software command and control agents, as well as GUI-based remoting tools. All of the software and networking protocols had to interoperate, without interfering with the core media transport networks to Activate's streaming server farms. Automation capabilities had to be kept in mind as a secondary implementation need.

As the storage experts, EMC² addressed Activate's rich media storage and networking NAS/SAN concerns with their Symmetrix and Celerra systems. In addition, Activate was already confident with the EMC² equipment, having already used its systems for Internet hosting and server farms.

Workflow/equipment

The audio/video infrastructure is built around a 512x512 Nvision Envoy 6904 super-wide-bandwidth digital video routing matrix. The large size of this router is due to the single-to-many or many-to-many I/O relationships. The facility utilizes an Nvision Envoy 7256 AES routing matrix incorporating time division multiplexing (TDM) technology for more flexible digital audio routing. Activate's existing PESA

From the video monitoring and media wall in Activate's network and satellite operations center, operators monitor the progress of the signal within the facility, from ingest of incoming feeds through signal processing.

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Jaguar analog router was repurposed for additional flexible signal-quality monitoring of incoming analog feeds such as satellite, Vyvx and off-air. All encoding and tape-capture workstations have 32-button router panels and all QA and monitoring workstations use full X-Y matrix router control panels. This allows any source or destination to be brought up for close-in examination and troubleshooting using Tektronix Model 764 AES Audio phase/level scope and 601M serial digital video waveform/vectorscope. ClearCom intercom systems provide aural interconnect between the stations and the central machine room.

ADC products were selected for distribution, patching and wiring infrastructure components and connectors. Belden Plenum-grade digital coaxial cable and CAT-6 compliant Mediatwist provided 1.8 million feet of copper interconnection. Panduit CAT-6 connectors and patchfields were used exclusively throughout the LAN and WAN networks.

Digital glue systems for A/D and D/A quality pre-processing were selected from Snell and Wilcox, Leitch, and AJA based on the best value for their intended purpose. A mixture of standard and very high-end systems was employed to ensure that migration to all digital standards would be cost effective.

Network management is achieved through Activate's proprietary software tools and a routing matrix from CCC Network Systems. The matrix gives each encoding technician the ability to to route keyboard, VGA and mouse between multiple servers. This system allows Activate to manage several hundred encode platforms from just a few user stations. Activate presents a medium-resolution proxy image of the encode station desktop(s) at encode and QA workstations. If the encode session requires attention, the offending encoder is accessed by the KVM matrix and viewed on a 19-inch VGA monitor with full control of all keyboard and mouse functions.

> The more malleable the signal acquisition, distribution and network management, the easier it is to preserve the complexities of media files.

The Network Ops Center (NOC) and Satellite Ops Center (SOC) video monitoring and media wall utilizes an RGB Spectrum QuadView Multi-Input Display Processor and a Zandar DMX-16 Multi-viewer with VU monitoring, for quantity and versatility of source and network management display respectively. Images are cast onto the Draper rear screen with Hughes/JVC high-end projectors. Standard video monitors are a mixture of Ikegami and Sony broadcast quality, and digital hi-res Dual 9-inch, 13-inch and 19-inch products.

Satellite acquisition is provided for with the multiple DH Industries 3.7M C/Ku

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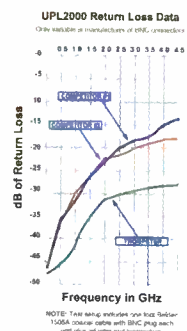

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Band TVRO antennas, DTH, and 2.7M antennas. Receivers are a mixture of analog and digital products from Standard Communications, Scientific Atlanta, NDS/Tandberg, G.I. and Wegener. Automated control of the receivers and antenna positioners is also implemented.

Networking infrastructure for signal acquisition and distribution is built entirely on a fiber backbone utilizing Cisco and Foundry Networks routers and switches, which exit a "fat-pipe" Optical Connection from XO communications.

> A day after its formal unveiling, Activate Grand Central withstood a 6.8 magnitude earthquake.

With this infrastructure, Activate has complete ingress of acquired signals via fiber, Vyvx, ISDN, Internet, VoIP (voice over Internet protocol) and POTS lines. These sources are then processed into Windows Media, Real, QuickTime, .avi and .mpeg formats for redistribution and archiving over Internets or Intranets. Encoding is performed on a multitude of Compaq Proliant DL380 servers with the fastest Pentium Class Dual processors, memory, power supplies and hot-plug SCSI hard drives with RAID, running Microsoft Windows 2000 OS.

Activate Grand Central facilities' changes also were significant. Seismic Zone 3 compliance was mandated throughout the design. A 20,000 square-foot raised floor had to be installed at a height of 24 inches due to the amount of cabling and HVAC loading anticipated. HVAC cooling was bolstered with an additional 175 tons from multiple Leibert air handlers. Electrical service from Seattle

The Envoy AES/SDI super wideband router (above) from ADC/NVision gives Activate control over the increasing range of streaming formats.

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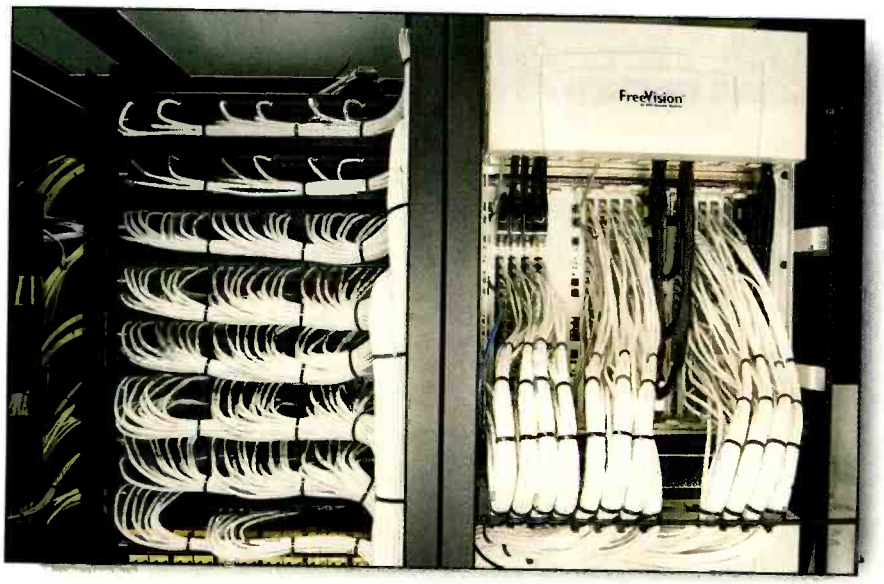
The satellite antennas at Activate provide the flexiblity in signal acquisition that is key to meeting the need for streaming content.

City Light was increased from 750 amps to 3000 amps. To back up this critical power, Activate specified a fully redundant UPS System comprising a 1MW diesel generator, a Cutler-Hammer automatic transfer switch, and 30 minutes of battery support power at full load. For the security of Activate Grand Central, multiple pan/tilt and motion sensing cameras, electro-mechanical locking mechanisms and pre-active fire suppression systems also were implemented.

The final implementation and testing of the 11-month collaborative project was both non-intrusive and intrusive in nature. The state-of-the-art Activate Grand Central is a unique combination of traditional broadcast quality production, network operations, service monitoring and Webcasting functionality. The facility houses the only fully wideband digital audio/video router and provides the most signal ingress capacity in the streaming media industry. Activate Grand Central uses a digital signal from end to end to deliver the highest-quality audio and video content.

A day after its formal unveiling, Activate Grand Central withstood Seattle's 6.8 magnitude earthquake, allowing Activate to experience the most complete two-day, end-to-end capability and construction test one could have imagined.



This FreeVision routing system simplifies network management by allowing a few operators to manage the encode sessions on several hundred encode platforms.

The hybrid facility came together miraculously with all of its complexities, but as all systems integration projects go, this was not without its hurdles. These included late-timeframe equipment changeouts, Beta revisions of equipment and software, product delivery, stock market changes and a hyper-flexible business model. The operational learning curve of the technical staff was severe and the cutover of live on-air services to the new center was a delicate ballet.

Prior to the completion of the facility, Activate was pushing its existing resources to 125 percent at times. Thanks to Activate Grand Central, the company's production and service capacity has been increased tenfold. Activate is poised to enter the new millennium as the leading Webcasting company, servicing the booming streaming media market through its new engineering infrastructure, Activate Grand Central. ■

Scott Whitcomb is director of broadcast engineering for Activate.

Design and integration team

Activate

Scott Whitcomb,
director of broadcast engineering

Kerek Edwards,
director of broadcast operations

Mitch Stewart,
manager of technical operations

Melissa DeLaurentis,
facilities manager

Doyle Technology Consultants

Greg Doyle, president

Barry Ballanger,
director of engineering

Alan Cunningham,
director of field operations

Tony Tarango,
project integration manager

Carroll Construction

Kelly Carroll,
Construction General Contractor

SPACE Architectural

Dave Helton

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HJ16X8B *Standard*
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Antennas: The necessary evil

BY DON MARKLEY

Antennas are somewhat like a heart beat, every station must have one. With the gleeful implementation of DTV, most stations enjoy the pleasure of having two. Again like a heartbeat, if an antenna isn't there or if it doesn't work right, everything else is moot. Without the antenna, the only viewers will be those who receive the station by a direct cable feed. That is similar to being on a heart-lung machine. It works for a while but doesn't last in the long haul.

At a recent seminar by Zenith, the problem of meeting the Commission- designated sign-on date for commercial stations was discussed in some detail. Based on the number of stations that have yet to sign on their digital facilities, approximately 100 stations per month must start broadcasting with some DTV facility from now until May 2002. In comparison, making pigs fly might be easier.

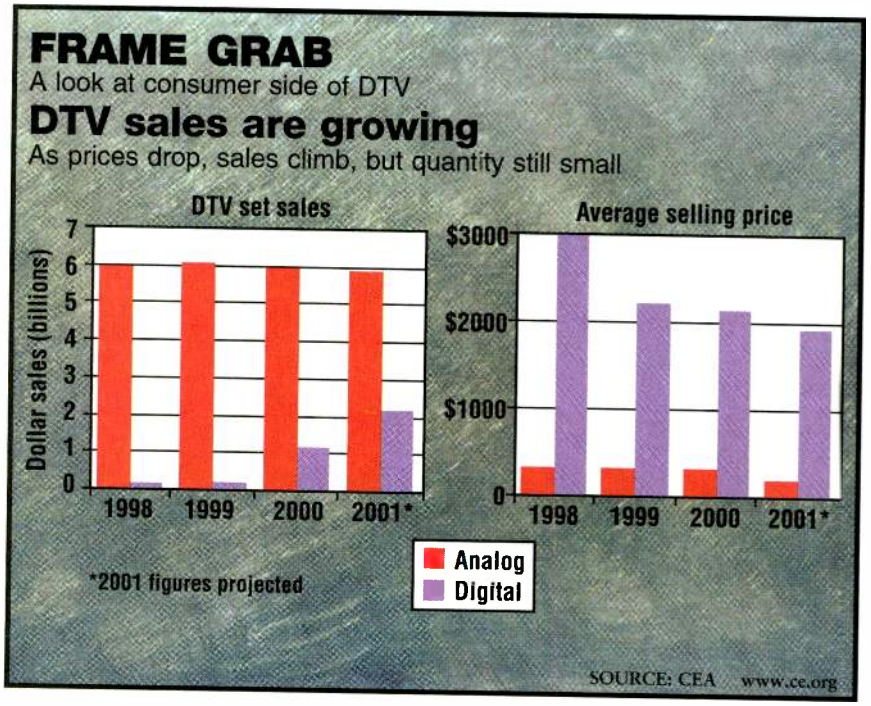
That returns us to the problem of the antenna, transmission line, tower and construction scheduling. Right now, antennas are residing in storage or on trailers waiting installation. Last winter was unusually difficult in many of the Northern states for tower construction or antenna installation. Numerous construction crews have experienced more down time than usual due to bad weather and wind. Therefore, the whole DTV scheme may have suffered regarding its time table. As discussed in this column previously, there are a limited number of crews capable of working on very tall towers. Yet, a lot of new towers were necessary to accommodate the many new antennas. Old towers have a tendency to be fully loaded based on their original design criteria. The addition of one or more new antennas caused modifications to be needed that, in many cases, required a new analysis in accordance with ANSI/EIA/TIA 222F. Guess what? Many old towers simply can't comply.

Old towers have a tendency to be fully loaded based on their original design criteria.

The point of this is very simple. If a station does not have its DTV antenna and the necessary tower work on order and, hopefully, scheduled with some margin for delay, the odds are high and growing that it won't be on the air by May 2002. The transmission line probably isn't as big a problem as the antenna and tower. There are several manufacturers out there for that product and the delays indicated by those manufacturers don't seem to be unworkable. The antenna is a problem. Some manufacturers are backed up for several months.

If an order is placed today, the antenna will probably not be delivered before late fall — just in time for winter. If normal delays are encountered in finishing any needed tower work due to the winter weather or if any difficulty is found in getting a tower crew scheduled, the May sign-on simply isn't going to happen.

The Commission is offering an out. Stations will be allowed to sign on with reduced facilities as long as they place a required level of signal



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over their community of license. To do that, a construction permit must have been granted and a Special Temporary Authority (STA) must be applied for. Your station's consulting engineer can help determine the minimum power and height necessary to meet that requirement. However, an antenna still will be needed along with transmission line and a transmitter. With less than a year to go, timing is going to be a problem.

The station is faced with two choices. One is to purchase an antenna that will be used only for the temporary facility at lower power. Some stations are looking at the smaller antennas that were originally low-power TV antennas and that have been beefed up to handle higher power. Indeed, there are a lot of stations using those antennas for the long term and they seem to be working out very well. Those antennas depart from the traditional main antenna systems in that they are side-mounted and use semi-flexible transmission lines from one or more power dividers to the elements. Power handling capabilities of 30kw or 40kw are available for that type of antenna. Its gain and VSWR performance is very good and the price is fair. At the lower power levels, the use of 3-inch or 4- inch transmission line is common, with some stations simply using semi-flexible transmission line instead of rigid.

No realistic engineer can argue that panel antennas don't work well.

Some stations are using this option with the intent to replace the lower power antennas with larger, high-power models at a later date before the big channel give-away. That will allow them more time to make the larger purchase and make any needed tower modifications. Indeed, when one of the channels goes away, the options are available of either using the old main antenna on the original channel for DTV or replacing it on the tower with a new main antenna on the DTV channel. Remember, in most cases, the station may select its original channel as the one to keep and give up their DTV assignment.

The problem with purchasing a small antenna and line for temporary DTV use is that it will have very limited value when taken out of service. Used transmission line is often avoided by stations unless they are totally familiar with its history. Used antennas have an extremely limited value unless a buyer can be found who needs that specific channel. It also should be remembered that there will be a glut of used antennas on the market when all stations go back to one channel, when and if that ever happens.

The other choice, and probably the

better one if the DTV channel is to be chosen for retention by the station, is to buy the higher-powered antenna and line now even if it is to be operated at lower power for some time. That would result in the older NTSC channel being the one to be discarded with less long-term cost to the station. While that might be an attractive option, it returns the station to the big problem of the earlier paragraphs — if it isn't on order now or very soon, it may not be possible.

There are alternatives. The first and most obvious is to share an antenna with one or more other stations. The traditional hardware for sharing would be the panel antenna and that is still a very viable option. No realistic engineer can argue that panel antennas don't work well. There are simply too many of them in operation, even right here in this country, for that argument to be supportable. Of course, shared antennas of any type, including panels, require some compromise between users in selecting the design performance. But, they will do the job. In addition, almost all of the major manufacturers now have two-channel antennas in their product line for first adjacent channels. Those certainly apply to many stations that received either n+1 or n-1 assignments. The dreaded n+1 problem has dropped by the wayside as several manufacturers now have combiners available that have solved the filtering problem. That includes the major houses such as Dielectric, RFS and Andrew.

There are other antennas available that will permit operation with a slot type radiator over a broader range of channels. For example, the Dielectric/TCI slot panel radiator covers the entire UHF band. RFS has a slot antenna that covers up to a 10 channel range. Units such as these permit a great deal of flexibility in sharing antennas between stations. There is at least one application currently under consideration that would combine four adjacent channels with a fifth non-adjacent channel into one antenna. The antenna isn't the problem in this case but the combiner is going to be a bit of a problem.

It is time for the engineering departments to push a bit harder. While it is realized that the suits up front may be having a problem determining to authorize the necessary orders, it is time to leave the golf course alone for a little while and make some decisions. Two things are certain. One is if the orders aren't placed soon, there will be a lot of stations not on the air with DTV by May 2002. The second is that if the station doesn't make the magic date, the engineer will be blamed for missing the date without regard to memos, pleas, manufacturing delays, tower crews or weather. Someone is going to take the heat and you can bet it won't be the front office. Get those resumes ready. ■

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

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Mixing for surround

BY ROB FRITTS

Over the past couple of years, the DVD has been infiltrating more and more homes. VHS tapes are becoming ancient archives, and families are enjoying higher-quality video and multichannel digital audio. Satellite and HDTV broadcast are delivering multichannel audio as well. What does this mean for the post-production studio's sound mixers?

More speakers for starters — a lot more. The preferred multichannel format is 5.1 surround, which is being delivered by two popular companies in all the hi-fi stereo shops in town. The first is Dolby Digital. Dolby Digital delivers 5.1 discrete surround sound channels via a new method of digital audio coding developed by Dolby Laboratories, called Dolby AC-3. Although this method was originally developed to carry 5.1 channels to film, because of its flexibility in handling multiple bit rates and channels, it has become a standard for some of the following formats: DVD, laser disc, digital cable, satellite TV and even some video games.

Not to be overshadowed by Dolby Digital, DTS also delivers 5.1 surround. DTS can be found on more than 200 DVD titles, players and audio receivers. DTS also is the only format to carry seven discrete audio channels via DTS-ES; an extra channel is added to rear. Dolby Digital also has a format that delivers an extra channel to the rear — Dolby Digital-EX. Dolby Digital's EX format is not discrete as it uses matrix encoding to hold information for an additional rear channel. The biggest difference between these formats is their bit rate or data compression. DTS delivers at a 4:1 ratio while Dolby Digital delivers at 12:1 ratio. Why go into such detail about these two formats? When mixing in surround, it's very important to know the specifications and limitations of the format to which you are mixing.

Mixing in a surround environment creates an added dimension, so less time is spent using effects to create a sense of depth.

Let's start with the speakers and their relationship to the mixer/sound designer. Because the two 5.1 formats mentioned earlier are meant to handle full frequency and dynamic range in all channels, including the surrounds (except for the .1 or "boom" channel), it's recommended that all five speakers match. All of the speakers should have the same timbre characteristics, creating a smooth frequency response between them. The speakers, including the center speaker, should be placed equidistant to the mixing engineer's position. Front right and left speakers should be at 30-degree angles to the center, while the two rear speakers should be at 110 degrees from the front speakers. With those in place, no matter which way you turn — 90 degrees to the right or left, or 180 degrees to the rear — you should be able to reproduce a satisfactory stereo image between any set of speakers.

Now that the speakers are in place, it's time to calibrate. At a record level of -20dbfs using bandwidth-limited pink noise, set all five speakers to 85db SPL. A standard Radio Shack SPL meter set to C-weighted and slow response is ideal for calibrating speakers. Once you've calibrated those speakers, turn them off and begin to calibrate the .1 channel or subwoofer speaker. Adjust the subwoofer 6dB lower than the other five speakers. The frequency range audible to humans is 20Hz to 20Khz and is divided into 10 octaves. A subwoofer with a crossover frequency of 80Hz will handle the two lower octaves of 20- to 40Hz and 40- to 80Hz, so the subwoofer's total output should be lower than that of the other five speakers. Remember, it is important to use a test signal that contains the full spectrum of audio frequencies.

Now let's turn our attention to mixing and the importance of bass management. All surround-sound, hi-fi receivers have a bass management circuit built into them. That circuit takes all the frequencies below 80Hz out of the five main speakers and mixes them into the subwoofer, providing more use out of the subwoofer than the occasional "boom" effect. This gives the speaker system a greater frequency response down to 20- to 25Hz. So, because the vast majority of consumers have this bass management circuit in their system, if you are not bass man-

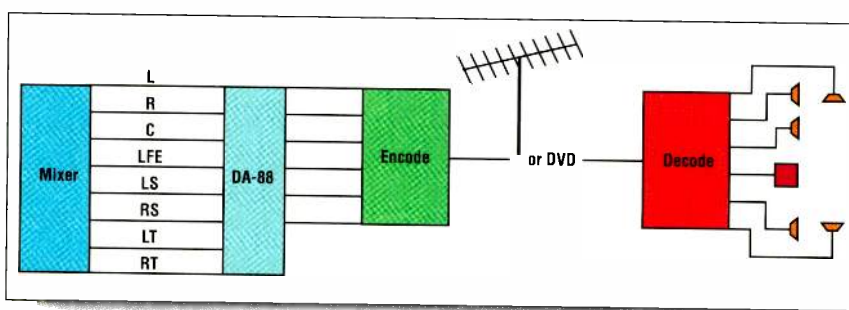

Figure 1. Signal flow in audio production, from the mixer to output at the speakers.

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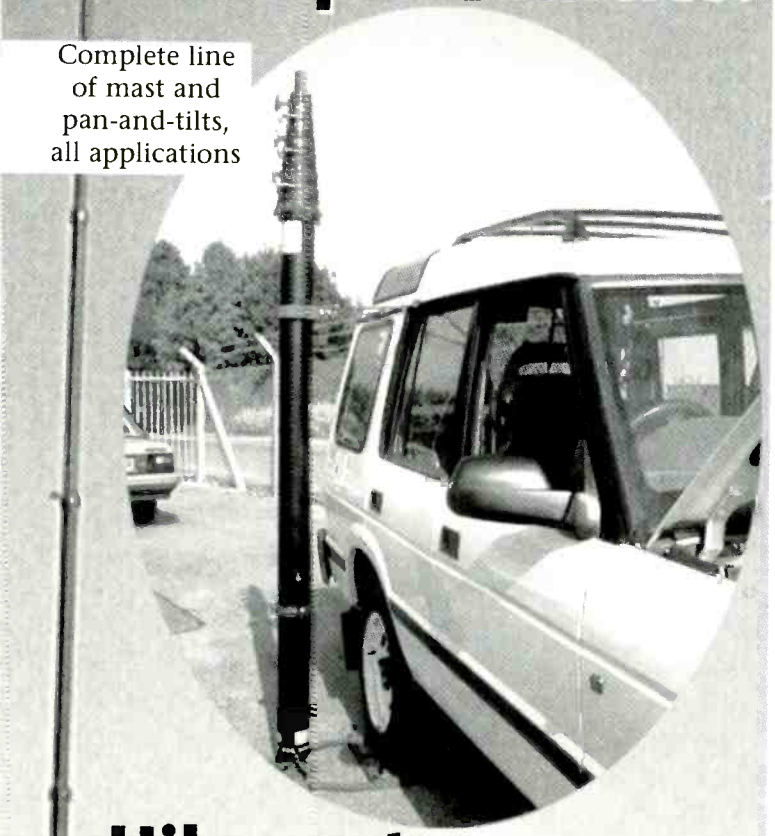

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Mixing for more channels in new 5.1 formats makes speakers more integral to mixing rooms like this one at Henninger Digital Audio. Matching speakers placed equidistant to the mixing engineer's position should produce a satisfactory stereo image between any set of speakers.

aging while mixing, then you are not hearing what the people at home are hearing. This could result in unwanted rumble that you can't hear while mixing.

Mixing in a surround environment creates an added dimension, so less time is spent using effects such as reverbs and delays to create a sense of depth, although those effects can be used to greater enhance the performance. With multiple speakers creating a sense of depth, you can even make a mono source sound big and dimensional by panning it across the multiple speakers. If you listen to many surround mixes of music, you might find that the center channel is not used as much as you would think. The importance is not as great as it is in mixing to picture. However, that center channel can offer a more uniform mix no matter where you sit in the room. Mixing stereo fields between front right and center speakers, and doing the same on front left and center speakers do this. That method creates a more uniform and balanced image on either side of the "sweet spot"— the center listening position located within equal distance to all speakers.

Stereo compatibility is just as important because the majority of the viewing audience still can only listen to a stereo or, even worse, a mono mix. Many encoders and DVD discs will automatically downmix, but the results are unpredictable and many times unsatisfactory at best. Always go between surround, stereo and even mono when mixing to make sure the mix translates the way in which you intended.

Unlike the days of Quadraphonic surround, today's surround formats are here to stay, so it's up to the sound designers and mixers to deliver a creative listening experience. ■

Rob Fritts is an audio mixer for Henninger Digital Audio.

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Fiber optic safety

BY DAVID LINGENFELTER

Fiber is seeing more use in station and transmission facilities as the bandwidth demands of communication channels increase. Because of this it is important to become aware of the high-level issues of fiber use and how to take appropriate safety measures when working with it.

The installation of fiber is simple, but does require some special skills and tools, and training in their use. This is particularly true when installing connectors, as they are sensitive to light-coupling loss. Several companies offer training covering the technology, tools, techniques and safety issues. Safety protection issues while working with or repairing fiber optic cable fall into three general categories: eye protection, fiber fragment control and safe use of chemicals.

Probably the first item that comes to mind is the danger to the eye due to high-intensity light. Light sources for fibers are lasers, Vertical Cavity Surface Emission lasers (VCSEL) and LEDs. Different manufacturers will use different sources depending on the intended use of the product. A laser is typically used in higher-speed and longer-distance applications using single-mode fiber. LEDs are used for cost-sensitive and shorter-distance applications and are popular for lower-bandwidth, multimode requirements.

The light from these emitters is in the near-infrared (800nm to 1400nm) and infrared regions (above 1400nm to 3000nm) and cannot be seen. ANSI Z136.2-1997, a standard on fiber optic safety, classifies the emitters into service groups ranging from SG1 to SG4. An SG1 emitter is considered safe based on current medical knowledge. This is what is normally used in fiber systems for carrying video or data in a broadcast facility, but some amplifiers can employ vision-damaging SG3. Infrared light does not trigger normal visible bright light reactions in the eye, so it is best to develop a habit of never looking into a fiber that may be lit.

If the far end of the fiber is not under your control there could be light being radiated from the end being repaired.

Typically, a person is working with fiber to install or repair connectors. Connectors must have low light loss. Air gaps between the fiber ends, angular misalignments, lateral offsets, ends cut at an angle (tapered air gap), core size mismatching, and dirt and scratches can reduce coupling efficiency, causing light to be lost.

When installing connectors, determine what the link is used for and the light emitter at the far end, if there is one. Take note, if the far end of the fiber is not under your control there could be light being radiated from the end being repaired. During the inspection of such a small area, you'll need to use magnifying glasses. This will concentrate and focus any light being emitted from the fiber onto your retina. The ends of the fiber are small, and therefore sharp, so you may be looking closely during an inspection. Beware of any laser or VCSEL emitters. Any emitter that falls into SG3 requires eye protection. Safety glasses that protect the eye from high-intensity light (visible or invisible) are available. These glasses are specified by the frequency and the attenuation of the light. Some glasses are made to cover a range of frequencies. These glasses reduce the light reaching the eye by absorption. This prevents reflections off the glasses into the local environment. While these glasses are expensive, they are required to protect your sight and should always be worn when working with fiber.

Additional equipment is sometimes available that is helpful. A light power meter can indicate whether the fiber is powered up at the instant of being checked. In addition, inspection scopes are available with absorption filters. If you are using such a device, insure the absorption filters are correct for the wavelength of the light source being used. Light radiating from an open fiber will diverge and the energy will decrease rapidly with distance. Using an inspection microscope concentrates and focuses the light onto the retina.

Another hazard encountered when working with fiber is exposure to small glass fragments made during the connectorization process.

In the process of cutting and trimming the strands on fiber optic cables, you'll create small fragments of glass or plastic that can get into the skin and

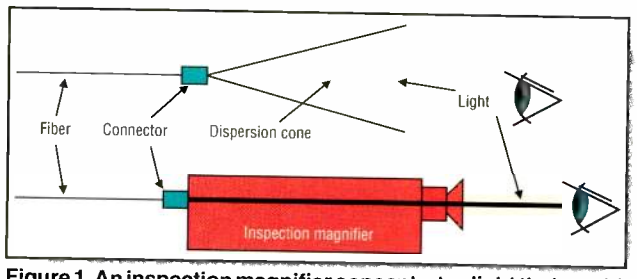

Figure 1. An inspection magnifier concentrates light that would otherwise disperse, making it doubly important for operators to protect their eyesight by using absorption filters or safety glasses when connecting fiber optic cables.

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cause irritation. Due to the size and clarity of the fragments, they can be hard to find and remove. Wear gloves and don't rub your eyes.

The best protection is the prevention of the problem in the first place. Use a dark mat as a work surface so fragments can be seen. A resilient mat works better as it will give a bit and make it easier to pick up fragments with tweezers. This mat also should be chemically resistant.

Keep the area work area clean. Use a disposable trashcan for fiber scraps that is designed to be sealed to contain them. This small trashcan could be a plastic bottle with a screw-on cap or something similar that can be tightly closed after the job is done. It need not be expensive, just secure storage for the fragments so you can dispose of used containers and have a new clean one available.

Keep a safety kit containing the necessary tools on hand. Several companies make and sell fiber optic safety kits containing a polishing/work mat, fiber scraps trashcan, tweezers for removing splinters, safety glasses and gloves. Some may contain cleaning supplies as well. You can augment this as needed. The safety glasses in the kits are normally clear and offer mechanical eye protection. If SG3 light emitters are being worked on or if there is the possibility of your encountering them, then laser safety glasses of the proper frequency need to be purchased and used.

If SG3 light emitters are being worked on laser safety glasses of the proper frequency need to be purchased and used.

In addition to the danger to the eye and skin from light and fiber fragments, another safety issue is exposure to the prep and cleaning chemicals. These are chemicals used for cleaning prior to installing connectors, the chemicals used to install the connectors, and the chemicals used in the installation of the fiber.

To comply with OSHA requirements, Material Safety Data Sheets (MSDS) for the chemicals should be available and referred to for specific precautions and instructions. This sheet should be read and filed with the others for future reference. Before handling a chemical for the first time, you should become familiar with its MSDS.

The typical chemicals used for cleaning will be isopropyl alcohol and acetone. Connectors will come with epoxies or require the use of a particular epoxy in their assembly. Other chemicals could be cable lube and gels. Operators should keep the effects of these chemicals in mind when connecting fiber optic cable. ■

David Lingenfelter is director of engineering for The Evers Group.

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a new identity for the third millennium

On December 6, 2000, Thomson-CSF changed its name to **Thales** (pronounced Talis). Thomson Tubes Electroniques, a wholly-owned subsidiary of Thomson-CSF, became **Thales Electron Devices,** and Thomson Components and Tubes Corp. became **Thales Components Corporation.** Named after a famous Greek mathematician and philosopher, Thales offers broad-based expertise in high-technology applications, especially communications. The Thales group operates worldwide and has 65,000 employees.

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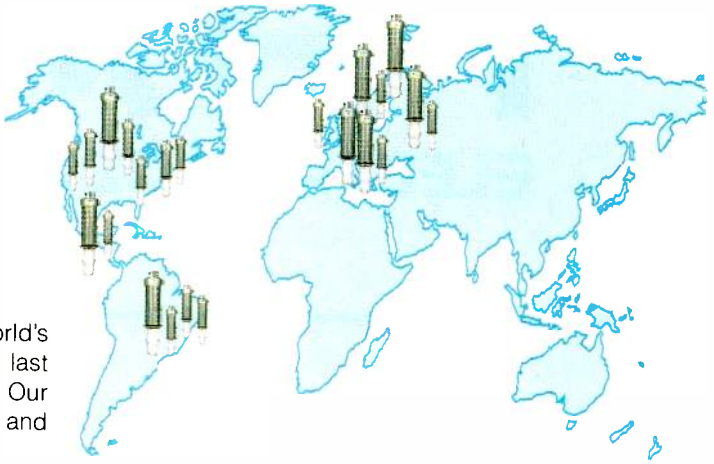

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Thales Electron Devices is now one of the world's leading IOT suppliers, delivering 100 tubes last year for new transmitters in the U.S. alone. Our tubes are also in service in Brazil, Mexico and several European countries.

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A fast-growing IOT family

Thales Electron Devices presented the largest choice of new products at this year's NAB show, reflecting our active development strategy and confirming our commitment to across-the-board services. For example, we rolled out the TH 790, the most powerful IOT on the market, the TH 770 CD, featuring a depressed collector, and the TH 740 medium-power IOT. Through this broad lineup, we meet the industry's full range of power, performance and technology requirements.

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In July 2000, Thales Electron Devices acquired Siemens' Berlin-based tube operations. Our broadcast range now includes the popular RS 1034, RS 1054 and RS 1036 series of UHF TV tubes, as well as various radio tubes. All of these tubes are now available directly from our New Jersey facility.

By adding Siemens' tube business, TED not only expands its range of radio and TV transmitter tubes, but also guarantees the long-term availability of these tubes for all customers.

Siemens' Berlin-based manufacturing operations are gradually being transferred to our Thonon plant, near Geneva, the world's largest facility dedicated to power grid tube design, development and production. The transfer started in early 2001 and will be completed in March 2002. Everything is carefully planned to ensure supply continuity for all products, along with full technical support.

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Like all TED IOTs, the TH 790 is a plug-in device for easy installation without having to disassemble the cavity. Connections for the cavity and water cooling system are also quick and easy.

NEW

TH 770 CD
Higher efficiency, simple design

The new TH 770 CD IOT reflects the latest research into depressed collectors, as well as our constant focus on easy integration and operation. It is an upgraded version of the TH 770, boosting efficiency by 15% through the addition of a depressed collector stage.

Like all IOTs in our range, it uses a water/glycol cooling circuit. The TH 770 CD, introduced at NAB 2001, delivers 25 kW of power in 8VSB mode. And the depressed collector technology is ideally suited to higher-power IOTs. The TH 770 CD is fully compatible with the TH 18770 cavity already widely used at transmission sites around the world.

NEW

TH 15700
State-of-the-art LDMOS solid-state driver, full compatibility with our IOTs

For the first time ever, Thales Electron Devices is offering a solid-state amplification solution. The brand-new TH 15700 solid-state module provides a simple, compact driver for the final IOT amplification stage. By adding this latest product to its IOT range, TED can now deliver a complete amplification package for digital or analog UHF power transmitters.

The TH 15700 uses latest-generation LDMOS 2 GHz technology and operates in the 470 to 870 MHz band. The water or water/glycol-based cooling system is designed for full compatibility with the TH 770 IOT. It delivers over 700 W of power and the driver is compatible with either 8VSB or COFDM standards. In addition, it features reflected power, temperature and current overload protection. Delivered as a compact case, the TH 15700 is installed directly on the TH 18770 IOT cavity and hooks up very easily.

One major advantage of the TH 15700 driver, compared with other transistor-based technologies, especially those using air-cooling, is that it considerably shrinks the drive section of the transmitter, for significant space savings. The driver is a separate catalog item, available alone or in conjunction with our IOTs and associated cavities.

SEE US IN 2001 AT:

New England Broadcasters	6/21 Manchester, NH
Texas Area Broadcaster Meeting	8/15 - 8/17 San Antonio, TX
Central NY Regional Convention	9/13 Verona, NY
Pittsburgh Chapter 20	10/10 -11/10 Monroeville, PA
Arizona Broadcasters Convention	10/17 - 10/19 Phoenix, AZ
Electronic Media Expo	10/24 - 10/25 Seattle, WA

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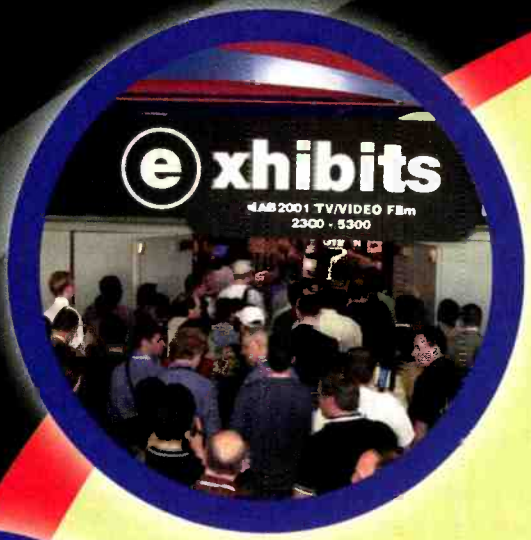
Phone: (1-973) 812 90 00 - Fax: (1-973) 812 90 50
www.tccus.com

Circle (147) on Free Info Card



NAB RePLAY

82 Pick Hits
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92 Product Jackpot

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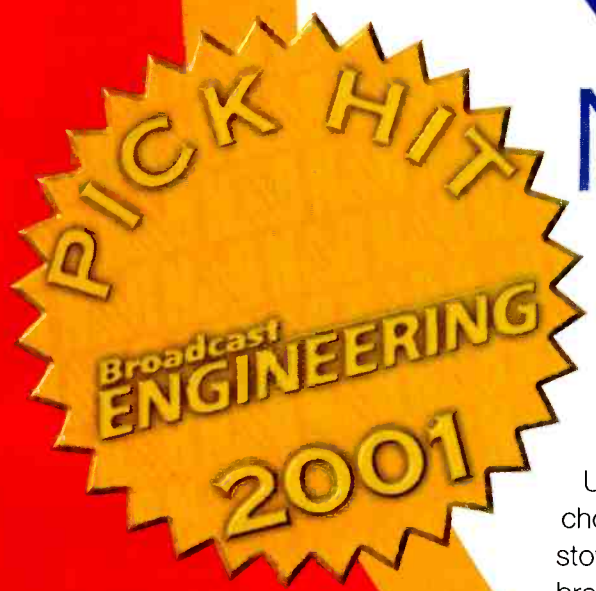
PICK HITS of NAB 2001



Now in its 16th year, *Broadcast Engineering's* Pick Hits have long set the trend for excellence in broadcasting. The awards are chosen by a panel of industry experts who search the floor for the best and brightest of NAB's new crop of products. Those experts then meet before the show's final day to determine the winners based on a product's positive inpact on the intended user's everyday work.

Unlike other awards, *BE*'s Pick Hits are not chosen by the magazine's staff. Awards are bestowed by industry professionals from all walks of broadcasting and production, people who face the everyday challenges of keeping a facility up and running at its best.

Congratulations to this year's winners.

AgileVision AGV-1000 MPEG Master Control Switcher/Server

This software-based system can manipulate and store multi-program MPEG transport streams, as well as integrate a full array of functions into one box: a splicing system that can manage up to six programs in the output transport stream, a re-multiplexer, data and logo insertion that can display four logos simultaneously in HD and SD programming, and PSIP capability. The AGV-1000 can seamlessly insert compressed HD or SD program content from its internal file servers, which offer a standard 16 hours of capacity at 19.39Mb/s (upgradeable to 200 hours). The AGV-1000 supports data from external PSIP authoring systems. When controlled by an external PSIP authoring system, it will accept and insert data into the proper PSIP table in the outgoing transport stream.

609-514-4032; fax 609-514-4029; agilevision.com

Circle (350) on Free Info Card

AJA Video HD10A A/D Converter

The HD10A is a compact, 10-bit, A/D HD converter that can add an HD-SDI output to HD cameras and computers, VTRs or other analog-only HD equipment. The HD10A accepts full-bandwidth RGB or YPbPr analog HD and outputs three duplicate HD-SDI signals. It works in 1080i50/59.94/60Hz, 1035i@50/59.94/60Hz, and 720p@59.94/60Hz with internal or external sync (tri-level).

800-251-4224; fax 530-274-9442; aja.com

Circle (351) on Free Info Card

Broadcast Microwave Services Carry-Coder

This portable module for video cameras provides wireless digital transmission of camera audio and video signals, installed in a backpack or plugged on to the back of most cameras. The Carry-Coder offers high- and constant-quality sound and pictures using digital transmission and MPEG-2 A/V compression. Using COFDM modulation, operation in multipath environments is stable and interference free. It is 4:2:0 MPEG-2-compliant to MP@ML, features one video channel, two audio channels and a data channel, and offers professional YUV and composite video interfaces. The RF output frequency is adjustable from 1.99- to 2.70GHz with 250kHz resolution.

858-560-8601; fax 858-560-1637; bms-inc.com

Circle (352) on Free Info Card

5D ColorFront star*dust Film Mastering and Restoration System

Star*dust, to be developed as a resolution-independent module of 5D Cyborg, 5D's integrated effects editing environment, and available as a plug-in for Discreet, brings a number of tools for film mastering and restoration, including automatic and operator-assisted motion-estimated dust, blotch and hair removal tools that are adaptable within a broad set of parameters to handle different types of source material; vertical scratch detection and removal, including non-stationary scratches; 3D motion-adaptive recursive noise and grain reducers; detail-adaptive sharpen and blur tools; and automatic histogram image equalizers.

Available via 5D: 310-394-7824; fax: 310-394-7924; five-d.com; colorfront.com

Circle (353) on Free Info Card

Evertz F9-2410MD HDCAM Monitoring Downconverter

The F9-2410MD downconverter mates with the 50-pin connector on the rear of the Sony HDW-F900 HDCAM and uses the full-resolution digital data output from the camera to provide full-image, downconverted composite analog outputs for local and remote monitoring. It can also output HD-SDI and downconverted 601 SDI both with embedded data. Supports all HD video formats from the F900 and in the case of 1080p/24sF will do a 3:2 pulldown on the downconverted outputs for flicker-free viewing. The lightweight unit also features an integrated battery mount for easy installation and use, and is available in several versions that provide various complements of analog and digital downconverted outputs as well as HD-SDI outputs.

877-995-3700; fax 905-335-3573; evertz.com

Circle (354) on Free Info Card

Horita PTR Portable Timecode Reader

The PTR reads SMPTE/EBU timecode at multiple frame rates and displays the time and/or user bit data on a two-line LCD display. Frame rates of 24-, 25-, 29.97- and 30fps can be read and displayed from 1/10 play speed up to 3x play speed, in forward or reverse direction. The frame rate and drop/non-drop frame status can also be displayed. Simple-to-use read and write functions allow quick and easy capture and review of up to 50 timecode "points of interest," which are saved in non-volatile memory (even with the battery removed). When using the PTR to take production notes in the field, only the two digit "WR/RD" entry number need be jotted down, not the entire timecode value, as the timecode for any entry number can be easily recalled later.

949-489-0240; fax 949-489-0242; horita.com

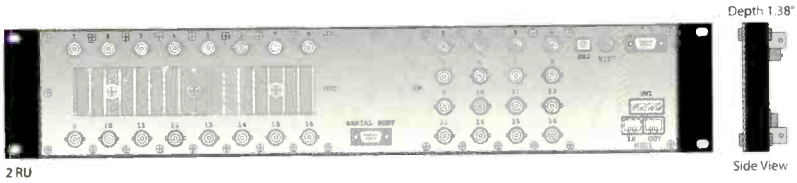
Circle (355) on Free Info Card

Lightwave Communications DVI-Fiberlynx Display Extension System

The DVI-Fiberlynx allows a keyboard and display to be located up to 1000 feet from the CPU. Digital video, keyboard, mouse and serial signals are transparently transmitted by fiber optic cable, eliminating RF interference and allowing for a complete interaction from a remote location. The system consists of a transmitter with the CPU and a receiver located with the display/keyboard — connected by a fiber optic cable. The Fiberlynx supports most digital video standards with configurations for either DVI or SGI formats.

800-871-9838; fax 203-874-0157; lightwavecom.com

Circle (360) on Free Info Card



Miranda NTW-HD1616 Serial Digital Router

The HD1616 is a 16x16 high-definition serial digital video router with universal wideband technology to allow simultaneous switching of digital video signals from 143Mb/s up to 1.5Gb/s. HD1616 has automatic cable equalizing on all inputs and re-clocking with automatic standard selection on all outputs. Vertical interval switching is provided on a video reference input with PAL/NTSC color black. The built-in RS-232 (optional RS-422) interface allows user control of the router via 16-CrossSoft PC-software or other third-party control systems.

514-333-1772; fax 514-333-9828; miranda.com

Circle (361) on Free Info Card

Miranda Densité Universal A/V/HD Distribution Amplifier

The compact design of this DA puts 20 DA modules of any signal type installed in any combination in a 2RU frame. All modules and components are hot swappable and can be quickly configured. The frame is fan-cooled and offers redundant power supplies and fans that can be monitored and provide status reporting via GPI, RS-232 serial port. An optional enhanced controller card with Ethernet connectivity is available for full monitoring capability from a remote control panel, a PC, a Palm Pilot or a control network.

514-333-1772; fax 514-333-9828; miranda.com

Circle (362) on Free Info Card

Panasonic AJ-HDC27V Variable-Frame HD Cinema Camera

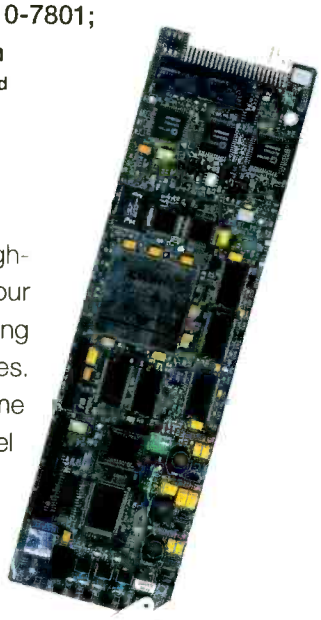
The AJ-HDC27V, which is capable of operation at 24fps plus a wide variety of other frames rates, offers unique variable-frame selectivity so that cinematographers can choose from a wide range of frame rates — including 4- to 33fps (in one-frame increments), 36fps, 40fps and 60fps, providing the capability to overcrank or undercrank the camera to achieve fast- or slow-motion effects. The camera's shutter speed automatically tracks frame rate changes ensuring consistency of look. It offers 46 minutes of record time in standard 720/60p format on DVCPRO large-size cassettes.

800-528-8601; fax: 323-436-3660;
panasonic.com/broadcast
Circle (363) on Free Info Card

Rohde & Schwarz DVQM Digital Video Quality Analyzer

The DVQM analyzer enables the assessment of picture quality according to subjective criteria to become an objective real-time measurement method. Picture quality is assessed from artifacts produced by digital compression. The method is based on the analysis of video data and can thus also be used where no reference video material is available. Real-time capability and independence from a reference signal makes the DVQM effective in the quality assessment of digital, DCT-coded video sequences. Uses the analysis of DCT-coded video data applied to the DVQ in an MPEG-2 transport stream to determine the quality. Quality analysis being performed in real-time, so that any potential quality degradation can be immediately recognized and remedied.

410-910-7800; fax: 410-910-7801;
rohde-schwarz.com
Circle (364) on Free Info Card



Ross Video CDK-111 Digital Master Control Switcher

The CDK-111 single-card keyer/mixer card suits a multitude of situations where high-quality digital video keying, mixing and synchronizing needs to be performed. All four channels of the CDK-111 have full frame-synchronization capability with infinite timing adjustment. This makes it easy to install and helps eliminate many system-timing issues. On-board memory along with its image-capture capability makes displaying freeze frame or animated logos easy. Control over the CDK-111 is available via GPI, local control panel and RS-485 protocol.

613-652-4886; fax: 613-652-4425; rossvideo.com
Circle (365) on Free Info Card

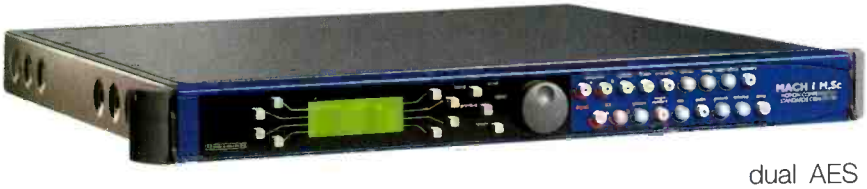
Sencore AT1506 8VSB RF Signal Analyzer

The AT1506 provides over-the-air, real-time monitoring of 8VSB signals. Using a Broadcom 8VSB decoder, the AT1506 is capable of measuring error vector magnitude (EVM), modulation error ratio (MER), RF level, pilot level, equalizer loading and margin above threshold. It also graphically displays the RF spectrum, including adjacent channels, an 8VSB constellation display and an eye diagram display. Multipath can be analyzed by looking at equalizer tap values and frequency response. The 8VSB demodulator is mounted on a PCI card, so upgrades to new generation demodulators is possible.

800-SENCORE; fax: 605-367-1006; sencore.com

Circle (366) on Free Info Card

Snell & Wilcox Mach1 M.Sc Standards Converter



Mach1 offers high-quality motion compensation in a 1RU box, which makes on-site, motion-compensated standards conversion possible for mobile uses including outside broadcasts, sports and ENG applications. I/O formats are 10-bit serial digital and composite video, with dual AES digital audio I/O. An ergonomically designed front panel allows rapid access to key functions, with an LCD display providing information on signal parameters. Other key features include aspect ratio conversion, linear conversion mode using four field, four-line aperture, 2x SDI inputs, 2x SDI outputs, and composite/YC output of all world standards.

408-260-1000; fax: 408-260-2800; snellwilcox.com

Circle (367) on Free Info Card

Sony PFM-42B1 Flat Panel Plasma Monitor

This 42-inch monitor features 1024x1024 pixel resolution for sharp detail and strong color reproduction. The 3 1/4-inch thick, 65.5-pound panel is equipped with an advanced scan converter that can intelligently reproduce a wide range of digital video signals (including SDTV and HDTV) and UXGA computer signals. Users can change aspect ratios from standard 4:3 to 16:9 format to accommodate DVD presentations and widescreen broadcasts. The monitor offers a 160-degree viewing angle for maximum viewing area and 20 video memory settings for quick recall. Accepts S-video, composite, RGB and YUV inputs.

800-686-SONY; fax: 201-930-4752; sony.com/professional

Circle (368) on Free Info Card

Sony XPRI Content Generation System

The XPRI is a long-form nonlinear editor and finishing tool built on the Windows 2000 platform. The system is resolution independent, capable of operating in uncompressed HD and native HDCAM for efficient storage, as well as an SD mode with support for SD uncompressed, IMX/MPEG-50, and low-resolution MPEG. The HD and SD interfaces are identical and the system can store HD and SD material simultaneously. For integration with other systems, popular EDL formats such as BVE, CMX and OMF are supported, as well as popular media formats including AVI and Quicktime. The system also provides of number of unique editing features like dual digitizing, which allows two SD streams of video to be digitized simultaneously, greatly reducing digitizing times regardless of tape format. External control panels (audio controller, jog/shuttle knob, track ball and z-ring, and a media bar) are all USB hot swappable and programmable for individual operator customization.

800-686-SONY; fax: 201-930-4752; sony.com/professional

Circle (369) on Free Info Card

TASCAM DM-24 Digital Mixing Console

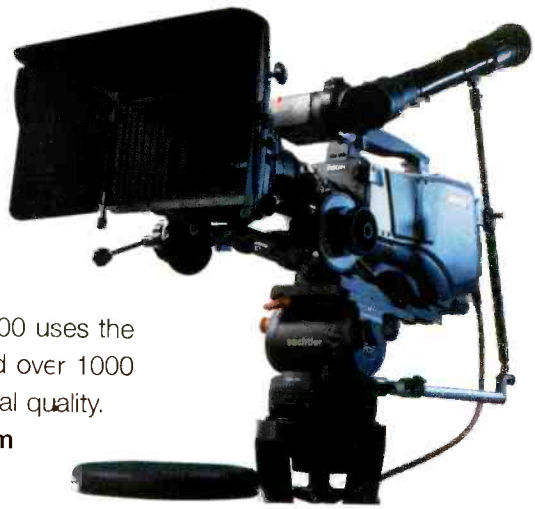
The DM-24 is a cost-effective small-format digital console offering flexible 24-channel/eight-bus configuration, plus eight additional channels for returns, a standard 24-channel TDIF digital I/O interface and eight-channel ADAT optical digital interface, as well as two stereo AES/EBU interfaces, two stereo S/PDIF interfaces and two option slots for additional interface modules. The DM-24 offers on-board 24-bit AD and D/A converters as well as built-in automation. Two built-in effects processors on each channel offer reverb, spatial effects and mic/speaker modeling effects.

323-726-0303; fax: 323-727-7635; tascam.com

Circle (370) on Free Info Card

Thomson/Philips LDK-7000HD Digital Camera

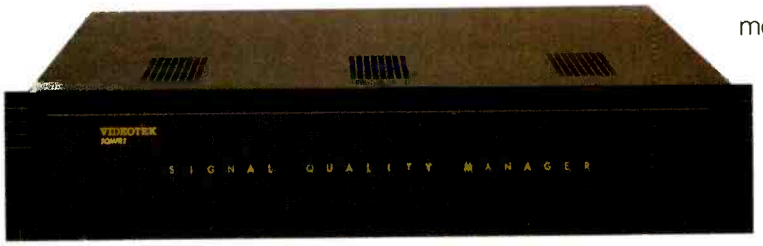
The LDK-7000HD provides native operation that additionally supports true progressive frame rates that are common for film-like applications, including 1080p24, p25 and p30. Operation at 720p even allows frame rates that enable slow-motion applications. Switching between formats is achieved within the camera sensors where a total of 4320 vertical pixels are available. The 7000 uses the TriaxHD transmission system, enabling HD video to be transmitted over 1000 meters using industry-standard triax cable without any loss in signal quality.



800-962-4287; fax: 818-729-7710; broadcast.philips.com

Circle (371) on Free Info Card

Videotek SQM Signal Quality Manager



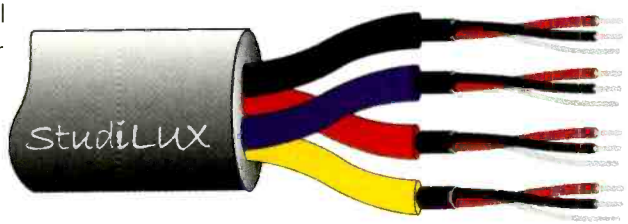
The SQM is a multi-format audio/video system that provides monitoring and signal quality measurements from both local and remote locations. The system is based on a multiple card and frame design that gives the user customized choices to meet current and future needs. The input cards measure and analyze video and audio from multiple sources including composite analog video, serial digital video, analog audio, AES/EBU audio, embedded audio and MPEG formats. The SQM instantly reports any errors to a master control point through simultaneous monitoring of all inputs offering real-time alarms with logging. Additionally, frames may be cascaded to build a system capable of monitoring and reporting on thousands of signals.

800-800-5719; fax: 610-327-9295; videotek.com

Circle (372) on Free Info Card

WireWorks WireLux Line of Wire and Cable

The WireLux line includes mic, pair and multi-pair cables. The small size of InstaLux provides easy termination preparation, and its 100 percent shielding makes it a good choice for internal rack wiring. It is conductive thermoplastic shielded with a drain wire to eliminate braided, spiral, or foil shields. StudiLUX cable consists of four or eight individual InstaLUX cables in one durable overall outer jacket. Designed for use in installation applications as well as for studio cabling between equipment, StudiLUX is available in 500-foot spools. The line also includes Ultralux, a flexible multi-pair interconnect cable with 4-, 8-, 12- and 16-pair versions, and Musilux, a 100 percent shielded microphone cable.



877-WIRELUX; fax: 908-686-0483; wireworks.com

Circle (373) on Free Info Card

2001 Broadcast Engineering NAB Pick Hits Judges

Steve Damas, WGBH
Aram Friedman, American Museum of Natural History
Karl Renwanz, Video Transfer
Dan Stark, Stark Consulting
Marcus Weise, Marcus Weise and Associates
Scott Griffin, The Systems Group
Ed Williams, KPDX Engineering, Portland
David Warner, Crawford Communications
Tony Salgato, 24-7 Studios
Paul Black, Loral SkyNet
Marvin Born, Dispatch Broadcast Group
Mike Betts, Broadcast Training Partners

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Audio

By Tom Patrick McAuliffe

The annual party in the desert for the National Association of Broadcasters is really five shows in one; TV, radio, audio, 3-D animation and multimedia. Broadcasting, audio, the Internet and video are all intertwined these days and this is the show of shows for all of it.

Over 500 audio-only exhibitors showed their wares; digital audio workstations (DAW), microphones of every description, AC-3 audio encoders, audio processors, monitors, audio streaming solutions; and more were on display. The audio heavyweights were in full attendance TASCAM, Otari, Shure, Telex, Sonic Foundry, Sennheiser, Mackie Designs, AKG, Sonic Solutions and others.

Full surround-sound capability, high-resolution audio up to 24-bit at 192kHz, automation and networking features are cropping up across the board, from flagship systems on down to mid-level products. Of course DTV is not the only factor driving today's digital audio technologies like audio webcasting and DVD-A, but it isn't hurting it either. NAB2001 endeavored to offer both products and seminars aimed at helping the broadcaster find audio solutions that will solve the digital transition puzzle.

5.1 Surround Sound is coming to your home sooner or later because practically every TV set sold has a Surround Sound system onboard. Given this, NAB 2001 saw the television industry finally get serious about making decent 5.1 broadcast sound.

New products at the show also included the Logic 3SC, a networkable 5.1 audio post system. The latest generation in AMS Neve's successful Logic series of integrated post systems, Logic 3SC offers high-speed audio editing and mixing. The system features ESP menu-free mixing, giving all the channels, outputs and automation needed to deliver complex surround mixes quickly and efficiently. It was typical of the new DAW tools shown at NAB.

Euphonix showed its System 5-B, a broadcast console providing multiple channel paths of full 24-bit/96kHz digital signal processing. The 5-B offers the V2.5 software suite, which includes a modular post-production panel equipped with PEC/Direct monitor controls allowing 32 external inputs to implement console functions.

Ward-Beck offered its SerialBoxx, a versatile rack-mounting card frame and a series of plug-in amplifier modules designed to take analog and digital video signals. Ward-Beck debuted serial digital video, AES audio, analog video and analog audio cards.

Solid State Logic introduced version 2.7 if its Axiom-MT mixing software. New features include automatic mix latency through the Mix Align feature and the choice of four EQ algorithms, as well as the ability to cycle through aux pages for quick interrogation of channel auxes.

In the wireless microphone market Lectrosonics showed its 200 series wire synthesized wideband UHF wireless microphone systems.

Studer launched its On-Air 2000M2 digital mixer, which includes extended functionality with an input configuration

The *Tiger* Advantage is clear to see

The PESA **Tiger** is the most recognizable routing switcher in the industry. The reasons for the **Tiger**'s overwhelming success are easy to see.

The PESA **Tiger** is adaptable to a wide range of requirements. Standard frames can be populated with a mixture of analog and digital cards in increments of 8 inputs and 16 outputs. This architecture makes expansion very affordable.

Many leading mobile production companies specify the PESA **Tiger** due to its proven reliability and rugged construction. Its compact size is another great advantage.

PESA control options for the **Tiger** are very flexible, too. The versatile **3500** series control systems support a wide range of panel choices. The PESA **e-Route** provides TCP/IP based router control from the desktop.

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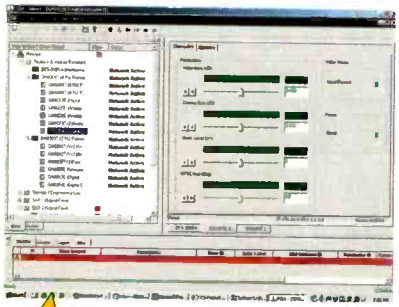
NAB 2001 Product Jackpot



Leitch introduced its Pilot, Windows-based control software that allows easy configuration, control, monitoring and secure access to networked equipment.
Circle (375) on Free Info Card

Harris introduced its MASTERplus, a high-definition master control processor module designed for multiformat operation supporting 1080i/720p/480p.
Circle (376) on Free Info Card

Miranda presented the Densité, which puts 20 DA modules of any signal type installed in any combination in a 2RU frame. All modules are hot swappable.
Circle (377) on Free Info Card

Mackie Designs showed its D8B digital mixer, which provides 56 inputs, 8 output channels, 100mm motorized faders and 12 aux sends.
Circle (378) on Free Info Card

PESA Switching Systems introduced the Cheetah routing system, which handles SDI and HD, as well as non-standard digital signals in the same frame.
Circle (379) on Free Info Card

Sony showcased its XPRI nonlinear editing system, which provides support for SD PAL, NTSC and HD1080-50i/60i/24 signals.
Circle (380) on Free Info Card

router and a newly designed exterior.

Clear-Com offered its I-Series intercom systems. The I-Series offers 32 backlit keys assignable as talk, listen or talk with listen.

In the support arena, Wheatstone showcased its Wiremax studio integration system for cabling and connectors, Shure showed its new P4800 System Processor, and Axon offered its Synapse, a 4RU modular signal processor offering remote control capabilities. Audio-Technica showed new versions of its U100 Series camera-mount UHF wireless systems.

Calrec launched its Alpha 100 console, featuring an assignable digital control surface. The 100 provides 48 multitrack/matrix outputs, 20 aux buses, eight audio groups and four main outputs.

DVD-R, DVD-RW, DVD+RW, DVD-RAM continue to battle it out as does DVD-Audio for acceptance and implementation. The newly established DVD Forum of Manufacturers held informal meetings to further discuss the adoption of the 'DVD-Multi' standard, which it hopes will solve the incompatibilities between the various DVD formats. As part of the trend towards strategic partnerships announced at NAB 2001, DVD software makers Spruce Technologies, Minnetonka Audio Software and Digital Theater Systems Inc. announced the world's first integrated solution for previewing, authoring and encoding DTS surround audio into DVD creations. Both Panasonic and Pioneer introduced combination DVD-RAM/DVD-R and CD-RW recording solutions. Apple also joined the DVD and digital audio recording wars in a big way announcing the Mac would support both as base line offerings.

Traditional ATR (Audio Tape Recorder) manufactures Akai, Deva and Nagraa among others, showed new digital solutions. Fostex showed an innovative DVD audio post-production unit that will feature Ethernet connections and record in SD II or broadcast .wav without any conversion and is HDTV compatible as well.

With one of its largest booths in recent years audio industry veteran Digidesign, a division of Avid Technology, previewed DigiStudio, a new initiative that allows worldwide collaboration within any Pro Tools audio system on the Internet. It will be accessible via the Digidesign Production Network (DigiProNet.com). The new sharing system, DigiStudio-enables Pro Tools to build upon the Pro Tools 5.1 software. Users can exchange stereo, multi-channel surround tracks and mono tracks in multiple file formats directly over the Web.

Dolby Labs also showed new solutions for surround sound and continued its push for Dolby E encoding. New offerings included the DP570 audio solution for monitoring multichannel metadata information making searching a vast library audio clips a quick and simple affair. Dolby Digital, with its 5.1 separate channels, is now the backbone of the rapidly growing home-theater trend. For DVD, Dolby Digital is a standard audio format worldwide, meaning every DVD player in the world can decode it. Dolby Digital is also a fully approved audio format for DVB, as well as the audio format for the ATSC digital television standard, and the digital cable standard SCTE. ■

Tom Patrick McAuliffe is a former television and radio broadcaster, singer and journalist.

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BSEE, MBA

Kerry Cozad
VP, Broadcast
25 years experience
BSEE

Bill DeCormier
Sr. Engineer
24 years experience
BS Engineering Physics

John Schadler
Principal Electrical Engineer
14 years experience
BSEE, MSEE

Jim Stenberg
Manager, RF Systems
5 years experience
BSEE

Ernie Mayberry
Sr. Director, Antenna Systems Management
26 years experience
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Cameras

By Jim Saladin, senior associate editor

DTV begins at the camera. It's the first glass in "glass to glass" and, for broadcasting purposes, the most important. As such, it's also one of the most important purchases you can make. And ironically, with only five or six manufacturers in the market, it is also one of the most difficult product lines to properly evaluate.

Digital cameras are a mature technology. Largely, what delineates camera lines is no longer great spans of technology, but smaller considerations – feature sets, weight, compatibility, convenience. Cameras are a buyers market in that the camera you want with the features you want probably exists. Finding it among the multiple product lines offering distinct, but not exclusive, feature sets is the hard part.

Toward that end, the following is an overview of what was on display at NAB2001.

Ikegami came to Las Vegas loaded with several new offerings. Notable among them was the HDK-790E, a switchable HDTV studio camera (the 79E is its portable companion). Outputs are provided for HDTV and SDTV in digital and analog. Selectable native-interlace and progressive readout modes are available by 2.2-million pixel, 2/3-inch CCDs, allowing the camera to be switched to provide 1080i, 720p and 480p. NTSC signals can be independently switched to 16:9, 4:3 side-cut or 4:3 letterbox aspect ratios.

Also of note from Ikegami, the HL-45AW portable digital camera, an update of its HL-45 model. The AW utilizes three IT CCDs to provide 750 lines of resolution, and features a dynamic range of 600 percent and a sensitivity of f11 at 2000 lux. A memory card feature allows operating status to be stored so that camera setup, color matching and DTL settings can be duplicated for several cameras.

Thomson showed representatives from its newly acquired Philips line. The LDK-7000HD (see Pick Hits, p. 82) utilizes Thomson's HD Dynamic Pixel Management (HD-DPM) CCD sensors to make available 4320 vertical pixels to enable 1080i/720p switching internal to the camera sensors, without need of any other adaptation. The series uses Thomson's TriaxHD transmission system, allowing HD video to be transmitted over 1000 meters using industry-standard triax cable without any loss in signal quality. The system is lightweight and offers ergonomic features like a zoom control fitted to the top of the uppermost handle for easier shooting at ground level and a rotary Triax cable connector that prevents the cable from restricting camera placement.

Philips also premiered its LDK-23HS MKII, a new version of its 23HS high-speed camera. The 23HS MKII uses triple-speed image acquisition, scanning three times the normal 50- or 60Hz frame rate (150- and 180Hz), allowing the camera to sharply capture details.

The big news at the Panasonic booth was the launch of its AH-HDC27V, a variable frame rate HD cinema camera. The 27V's variable frame selectivity allows users to choose from a wide rage of rates – including 4- to 33fps (in one-frame increments), 36-, 40- and 60fps, allowing fast- or slow-motion effects as well. It offers 46 minutes of standard 720/60p format on DVCPRO large cassettes and provides the equivalent ASA speed rating of 1000 – f12 at 2000 lux.

Panasonic also launched the AH-HDC27A, a 2/3-inch IT three-CCD DVCPRO HD camcorder. The 27A offers sensitivity of f11 at 2000 lux and 46 minutes of recording with two channels of 16-bit/48kHz digital audio, and a power consumption of 30W. Its HD-SDI output enables full color live and tape playbacks. A memory card stores camera setups.

The AG-DVC200 camcorder, which was also launched at the show, is equipped with three broadcast-quality, 1/2-inch, 410,000-pixel IT CCDs to deliver 800 lines of horizontal resolution, S/N of 62dB at the camera output, low smear, sensitivity of f11 at 2000lux and low-light shooting to 0.5 lux. 276 minutes of recording time without a changeout are available via a standard DV cassette. A Firewire interface allows uploading and downloading images and audio to a Mac- or Windows-based PC for nonlinear editing.

In a nod toward added convenience, Panasonic unveiled three new feature cards for its remote-controlled,

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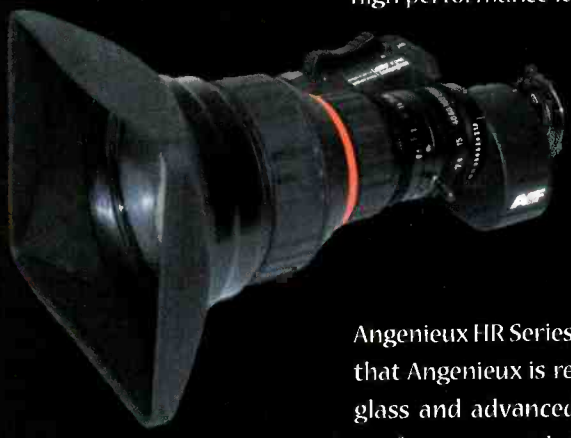

Angenieux's 40 X I.E. Extreme Tele Zoom is the EFP lens the industry has longed for. Its lightweight design is packed with Angenieux performance. Plus a big 40X focal range. And the 26 X 7.8 HR Series Tele Lens brings every shot into range with all the features you want – less the weight.

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convertible cameras, including a studio/SDI card with SDI output combined with use of a 5-inch viewfinder, intercom jack and RCU capability; a scan converter card for direct conversion of S-VGA graphics into a computer; and a Web card, which facilitates pan/tilt system control from anywhere via the Internet.

Sony's big push for the show was its "Anycast" systems, which stress interoperability across whole platforms – acquisition, ingest, storage, networking and distribution. The "acquisition" part of that equation is partly represented by its HDW-750 HDCAM camcorder. The HDW-750 camcorder is compact – basically the size of the Betacam SX series — while still feature rich, offering HAD Sensor technology (the same CCD as Sony's film-quality HDW-F900), f10 at 2000 lux, 54dB signal-to-noise ratio, -135dB smear, 600 percent dynamic range, and built-in HD-SDI output. Additionally, the 750 can output downconverted signals (with the help of an additional kit), as well as HD-SDI signals without an external adaptor for added flexibility. Plans were also announced to introduce the HDW-730, designed specifically for 1080i/60 HD acquisition, later this year.

Hitachi demonstrated new cameras aimed at the Webcasting market. Its PT-1, an integrated, switchable, digital pan/tilt camera unit, was shown with a color touchscreen controller (the PT-TSC). The company also showed its wind- and water-resistant PTE-300 head, which is compatible with several of the company's cameras, for use in remote observation applications.

Hitachi also showed its SK-3100P, a multi-standard HD camera featuring a 2.2 million pixel IT-CCD that provides simultaneous 1080i HDTV and NTSC output. It is a portable EFP camera that can also be used in a studio configuration. NTSC (480i) outputs are provided in digital and analog and it features independent control of all detail settings.

JVC introduced the GY-DV700WCL fully digital DV CineLine Camcorder. The GY-DV700WCL features three 2/3-inch, 16:9 IT CCDs and a B4 lens mount compatible with a wide array of lenses. The camera's features include black stretch/compression, zebra-level indication, and built-in genlock and timecode needed for shoots or syncing to other digital tools. FireWire I/O gives direct output to computer or NLE. A useful feature, "Super SceneFinder," automatically logs individual scenes as you shoot, then stores the SSF data on the head of a standard mini-DV tape so editing or batch digitizing is much easier.

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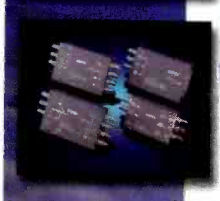

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D10C SDI to Component Analog Converter, 10-bit *	$ 800
D10A Component Analog to SDI Converter, 10-bit*	$1,200
D4E Serial Encoder, SDI to NTSC/PAL or Y/C*	$ 250
D5CE Serial Encoder, SDI to NTSC/PAL /w Component*	$ 375
D5D Decoder, 3-line Comb Filter, NTSC/PAL to SDI*	$ 595
DWP Power Supply, 110 Volt (*requires power supply)	$ 40

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Continuing its thrust into digital cinematography, JVC also showed the DY-90WCL, a 2/3-inch, 16:9, 50Mb/s 4:2:2 camcorder.

Lenses and camera support were another hot product segment in Las Vegas.

Lensmaker Fujinon showed its XA87x family of lenses for sport shooting and other applications where extreme close-ups and high image quality are critical. The lenses feature focal lengths of up to 2300mm and are available with an integrated image stabilizer – the OS-TECH Optical Stabilized Technology Adaptor. Fujinon also introduced its HA17x7.8E HD ENG/EFP lens, which offers operators precise control of zoom and iris functions via its Digi Power Servo unit.

Canon bolstered its HDxs family of lenses, offering three new members including the HJ21x7.8B, the HJ21x7.5B and the HJ11x4.7B wide-angle HD lens. The company also showed its DIGI SUPER 86 TELEx family, which is capable of zooming from 13.5mm to 1161mm (or 2322mm with a 2X extender). Canon extended its line of portable HD lenses with the HJ40X10B IASD-V and the HJ40X14B IASD-V TELE, which features a focal length of up to 1120 with a 2x extender.

Angenieux displayed its 40x HD and HR series zoom lenses. The lenses offer 440mm focal length with low ramping (1 degree) for EFP or ENG applications.

Radamec offered two new robotic control panels, the SC Mk11, which has a touchscreen display to provide the operator with full shot and transition information at a glance, and a camera robotics touchscreen control system that expands operator control to 16 cameras from one location.

Camera-support players showed their wares as well. Vinten showed its Vision 3 pan/tilt head for DV cameras and its Pozi-loc tripod, and Bogen showed its 503/505 video heads.

OConnor Engineering made a strong showing with two new entries: the 50-200 digital fluid head and the 55D tripod. The 50-200 is capable of counterbalancing a 200lb camera throuout its =/-90 degree tilt range. The 55D is a heavy-duty tripod for the Ultimate series 1030 and 1030S fluid dampened camera heads.

Finding your way through the various feature sets can be a daunting task, but those who take the time to understand their choices when selecting the first element in "glass to glass" will be rewarded by good results at the other end. ■

Compression systems

Dan Stark

Time was that "compression" was a dirty word around broadcast video. Now bring in DTV, where a 1.4Gb HDTV signal is compressed down to 19.4Mb or lower. Compression is in everyone's vocabulary like it or not.

Now compression is opening some new doors to the broadcast engineer, doors that will make the distribution of video content inside or outside the facility potentially more convenient, easier and faster to accomplish. Compressed video is now being distributed across new pipes in broadcast facilities. These pipes include various Ethernet infrastructures, fiber and even telephone lines deployed inside a building or across a campus.

These compressed images can be broadcast in 30fps MPEG-1 or -2, with video qualities from approval to uncompressed serial digital component video. Images can be live, such as delivering satellite news feeds to the desktop. Images can even be cached or received for browsing by client software from various network drives, including SANs.

Applications for compressed video delivery across these new pipes used to be thought of as only the low-frame rate, low-resolution, little boxes of video on computer screens. Now, new technologies allow for full-screen, 30fps images with variable resolutions from HDTV to approval quality.

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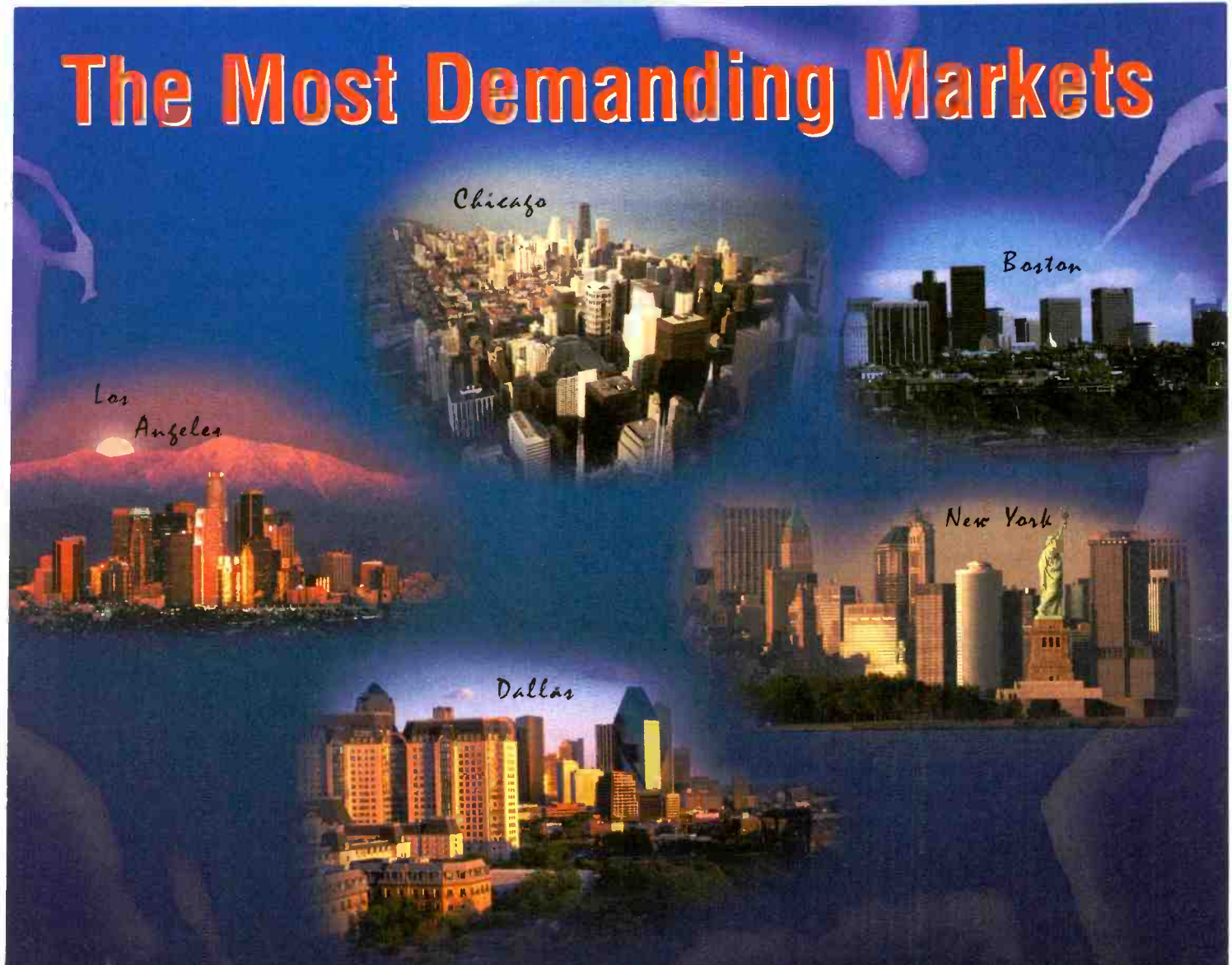

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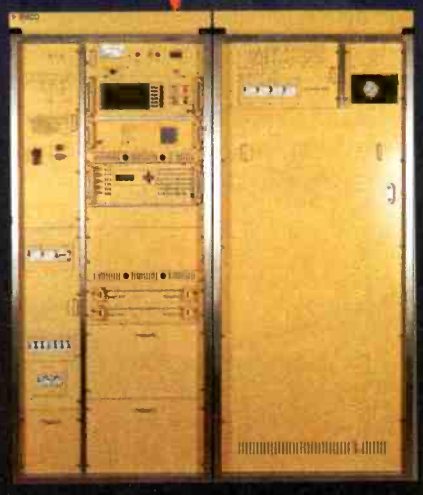

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Product Jackpot

Wheatstone showed the Bridge 2001, a bi-directional digital audio router providing all digital AES switching, with fiber optic or CAT-5 interlocation.
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Leitch introduced the NEWSFlash-II integrated newsroom solution Integrator 32x32 to 512x512 router systems and the Opus master control switcher.
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Mindport offered a preview of its Sentriq digital rights management system. The system provide secure content distribution over an IP broadband infrastructure.
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Tandberg presented its Data Reflex system for the 5000 multiplexer, and the E6100, a digital ENG providing COFDM modulation and MPEG compression.
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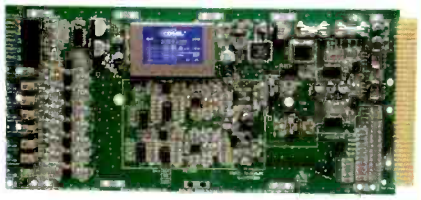

Benchmark Media Systems introduced its DAC-104, a four-channel DAC providing 24-bit, 96kHz D/A conversion.
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Miranda introduced its Aquila Altair HDTV upconverter and the NTW-HD1616 serial digital router.
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MYAT showcased its DT Star, a UHF Gysel power combiner featuring a compact footprint and greater fault tolerance.
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Compressed images are currently viewed on computers, and set-top boxes in homes, offices and broadcast facilities around the world.

Video is different than traditional data. If it is interrupted, the video's frame rate can be changed, causing the familiar stuttered frame rates. This is sometimes solved with buffering, but buffering and the inherent delays it causes are not acceptable in broadcast. The solution to this traffic congestion problem using IP is to guarantee quality of service (QoS).

Path1 showed a technology platform that enables stable video and audio in an IP environment, TrueCircuit. It provides QoS technology platforms that allow real-time broadcast applications to occur with IP. They license this technology to carrier-class providers, system integration companies and manufacturers.

TrueCircuit technology conditions the real-time traffic before it is sent, setting up and tearing down virtual channels inside the network. These virtual channels can be thought of as temporary dedicated paths on which the video traffic can travel. The path is conditioned for real time-transmission of content, then when the content has been transmitted the virtual channel is torn down, creating additional bandwidth for other real- or non-real-time data traffic.

Leitch uses TrueCircuit in its PG1 Gigabit Ethernet Gateway. The PG1 interfaces with 1000Base-SX fiber optic circuits or to 1000Base-T Cat-5 Ethernet ports. The PG1 enables the shift from traditional wire based infrastructures to Gigabit and fiber optic network LANs and WANs.

VNCI showed technology that can utilize existing Cat 3 or Cat 5 wiring systems. VNCI uses frequency modulation technologies allowing two-way audio and video communications, operating simultaneously with telephone or data traffic without having any impact on its speed or quality.

2NetFX displayed full-motion, full-color, full screen images at resolutions from VHS, DVD and HDTV over networks from 10/100, Gigabit to ATM. The system, which uses ThunderCastIP Server software allows users to multicast or unicast video to computer desktops or set top boxes. The company also showed its Streamrider, media player software that resides in a Windows of Linux computer or set top box. It allows scheduling of programs to playback on your computer live, or record them to the local hard drive for playback at your convenience.

Motorola showed its Digicipher II, an ATSC-compliant encoding system that is format flexible, and fully supports 5.1 audio.

Telestream offered its FlipFactory, a software application that eliminates streaming's traditional process of encoding and delivery by automatically flipping source files into user specified formats and then forwarding these files to appropriate servers.

Terayon showed its CherryPicker 7000 media delivery platform. The 7000 optimizes bandwith with its statistical re-multiplexing technology, which allows operators to unbundled and combine compressed streams from a variety of input sources in order to create an output multiplex for delivery.

Astro Systems offered several new products, including the CX-565 MPEG-2 TS PCI multiplex card for contents packetizing for data broadcasting.

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This year, numerous vendors at NAB either showed demonstrations of working systems or concepts that would transmit and receive compressed audio and video over various network links, from 10/100 Ethernet to fiber. As these technologies mature, we may find our traditional routing switchers, patchbays, and even our wire change to data models like our computer networks. For some applications, we can make use of our existing data and telephone wire and infrastructure, with no penalty to the uses we currently have for them now.

Compression used to be a dirty word. Now it is going to change the entire business of broadcasting, from the consumer, to our facility operations and infra-structures. It is going to offer new, revenue-generating possibilities, new creative possibilities and certainly new challenges to our infrastructure models. ■

Dan Stark is president of Stark Consulting.

Video editing systems

EDWARD E. WILLIAMS, CSTE

There were two main trends that were most evident in editing systems this year — and neither of them an editing technology. Shared storage and workgroups are the new dominant themes. We saw the introduction of a large array of workgroup applications, the general improvement of SAN and MAN architectures, and the quick adoption of common interfaces based on Java and HTML, interfaces written for Linux, and so on. The story of video editing is now as much about sharing material between users, platforms, locations and bandwidths as it is about the editing interface and how many effects come with the box.

Most vendors have settled on the "timeline" editing interface introduced by Avid. No matter where you look, there is some version of stacked audio and video "tracks" along with effects icons and mini-monitor windows staring back from a VGA screen. It's only a couple of the higher-end vendors that continue to offer a GUI that works differently. Perhaps most notable among these is Quantel, which prefers to stick to the interface that Quantel editors know best, the filmstrip. A couple of other film-market products also have non-timeline edit interfaces as well. Only one that we could find, Matrix from Chrome Imaging, gives you a choice between a number of different GUIs from timelines to filmstrip style. It's the workflow and sharing that everyone's chasing.

Sony showed its XPRI editing system (See Pick Hits, pg 82) based on the MPEG IMX (a.k.a. MPEG I-frame) format introduced last year. Running under Windows 2000 on a pair of Intel Pentium III Xeon processors, the system offers high performance with HDCAM and MPEG IMX video files, but will handle standard MPEG material as well. Sony uses a set of

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Product Jackpot

Pinnacle Systems showed StreamFactory X2 version of the StreamFactory Web Media Encoder. The X2 offers dual 1GHz CPUs in a rackmount.
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Pixelmetrix offered its DV Station with IP over MPEG traffic monitoring functionality.
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Quantel introduced an all-in-one production center, the Clipbox Studio. The system provides live DVE, mix/effects and keying.
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Accom showed the Abekas 6000, a server offering MPEG-2 and DVCPRO compression, and the Dveous/HD effects system.
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Tektronix showed products including the WFM700 multiformat modular waveform monitor with multiple display options and the ECO422D electronic changeover unit.
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edit-specific hardware control panels connected by USB that move the user away from the keyboard and mouse interface while keeping the relatively standard, timeline-style, on-screen editing presentation. The XPRI also works into Sony's workgroup media sharing systems with an optional SDTI interface card and support for MXF file transfers.

Discreet launched Heatwave this year. Not a video editing system in itself, Heatwave is rather a workgroup environment application that allows users to tie all of Discreet's editing, graphics and effect systems to a group of third-party applications. The goal of Heatwave is to provide largely platform-independent workflow and asset management between systems. Discreet also showed recently released new features for *edit* 6 including SlipStream, a new module that improves support for multi-camera editing as well as encoding and authoring tools.

At Quantel, the floor seemed awash with new editing gadgets. Introduced last summer at IBC, Quantel's iQ showed increased resolution for higher-end film work. Clipbox Studio made its debut, hooking up with AP's MOS integration initiative for newsroom environments. Editbox and Editbox FX get new software releases this spring and a product partnership with Panasonic brings out newsBYTE/Quickcutter, which is designed to move Quantel farther into the "open systems" arena for shared media across platforms. Quantel also continued to demonstrate its desire to pursue third-party software arrangements by showcasing almost 20 new plug-ins, helper apps and communications applications available for the various systems.

Also teaming up with Panasonic was Matrox for a new addition to the DNA/newsBYTE line, the newsBYTE 50. The system uses Matrox DigiSuite DTV and runs on an 800MHz Pentium III under Windows NT 4.0. The system offers the ability to edit DVCPRO and DVCPRO50 on one unit. This appears to be Panasonic's strategy this year – partnering up for editing and content creation systems while launching a wide array of new non-editing product.

Avid, in addition to announcing NewsCutter XP 2.0 and NewsCutter Mobile, and that Xpress DV 2.0 is shipping, also announced multiple additions to its existing product lines in the area of shared media management. Media Station XL, for instance, is designed as a dedicated digitizing and output workstation to allow users to enhance and separate some of the functions that have been done previously on, for example, a single NewsCutter or Media Composer workstation. Specifically for the newsroom side, Avid also announced a major upgrade to their AirSPACE workgroup product that adds many enhancements designed to bring further efficiencies to shared-storage news operations.

Other editing solutions on display were the dpsVelocity v8.0 NLE and dpsReality HD editing systems from DPS, along with the Newsflash II newsroom system from parent Leitch, an NLE that fully integrates with its VR technology servers.

Grass Valley Group's Vibrint Digital News Production Workgroup showed its stable of newsroom editing products based on the Profile Digital Media Platform: FeedClip, NewsEdit, and NewsQ, a manual playback application that supports simple two-channel

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Product Jackpot

Inscriber presented the LIVE!Clips video playout system and LIVE!RTX, a live titling solution that allows for the creation of custom information channels.

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OConnor Engineering showed its 50-200 digitalfluid head. the 50-200 is capable of counterbalancing a 200lb. camera thoughout its +/- 90-degree tilt range and can deliver live motion camera position data to a computer.

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Sony unveiled several products, including the PFM-42B1 flat panel plasma monitor and the HKC-T950 HDC telescopic optical head adapter.

Circle (395) on Free Info Card

Encoda introduced its DAL Channel Manager M-Series. The operator interface provides up-to-date control and edit functions using Win2000 architecture.

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AgileVision presented the CentralCaster, compressed program distribution technology allowing networks and station groups to leverage economies of scale in digital centralcasting.

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A/B-roll playlist management.

Actually introduced at IBC last summer, Matrix from Chrome Imaging gathered large crowds in the Sands E-Topia exhibit. Matrix is one of a group of products out from an ever-growing number of vendors that blurs the lines between editing, compositing, paint, 3D effects, modeling and color correction. Designed for the moderate to high-end film and broadcast post markets, and with one or two GUI options a Quantel expert could love, Matrix offers compatibility with nearly any file format in use today and runs on Windows NT 4.0 and a "normal" Pentium processor.

Fast introduced Ivory, an uncompressed editing system running under Windows 2000 on a dedicated, stand-alone hardware platform. Fast also announced FASTwire. Largely a technology demonstration at this point, FASTwire is a first step into shared media management. It currently allows any Fast Multimedia application to communicate with SGI, Omneon and A.N.N servers, as well as Keyvia MediaWorks.

SGI announced the introduction of a set of new products in its Media Commerce group including StudioCentral Library 3.0 for shared asset management. Nearly all of SGI's new content management tools are designed to work with any editing system that uses SGI machines, including Alias!Wavefront, Discreet, 5D, etc.

JVC kept its presence in the newsroom market, offering the SR-VS20U, a dual-format editing VTR that records and plays both MiniDV and S-VHS cassettes in a single unit.

Other companies with a presence in editing were: ETC (Editing Technologies Corp), which showcased its NLE Series; Inscriber, which, in addition to showing its E-Clips playback system, announced bundling of its TitleMotion software with Sony's XPRI and Discreet's edit 6.0; and Pinnacle Systems, which showed its DVEXcel, a frame-based DVE offering a choice of one to four channels, each with video and key and three separate DVE engines.

Omneon Video Networks, while not producing an editing interface of its own, partnered up with a number of other vendors to showcase an array of cross-platform applications that could all share Omneon storage. Many of these applications were tied together using simple Java or JavaScript-based applications.

Cyborg S and Cyborg Si are the latest applications from 5D, incorporating a standard timeline editing interface with some fairly advanced rotoscoping, motion tracking and color-correction features. The Cyborg products also incorporate an array of tools designed specifically for cross-platform media management. The Si version handles SD and HD as well as EDL batch handlers.

Accom showed enhanced workgroup sharing capabilities for its AFFINITY editing system, demonstrating a high level of integration between the editor and the Abekas 6000 Multi-Flex server. Accom also demonstrated the AFFINITY/san, being developed to provide a more solid integration between Accom products.

Adobe showed off After Effects 5.0 and Premiere 6.0, the latter offering tools for export of edited material to the Web in either (or both) Windows Media or RealMedia formats.

Incite Multimedia Corporation offered Incite 2.8 designed to run under

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Product Jackpot

Canon offered the DIGI SUPER 86 telephoto zoom lens, capable of zooming from 13.5mm to 1161mm, and the HJ40X10B IASD-V telephoto EFP lens.
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Thomcast introduced the Topaz TV Streamer for streaming MPEG-2 data over IP networks, the Odyssey and DCX Millennium transmitters, and the Generation II end-to-end bitcasting solution.
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Euphonix presented its multiformat mixer, the System 5-B, to mix, monitor and control for stereo, LCR, LCRS, 5.1 and 7.1 audio.
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JVC presented multiple offerings, including the DT-V1700CU 17-inch HD and multi-application DTV monitor, the BC-D2300U image upconverter, and a high-resolution D-9 camcorder, the DY-90WCL CineLine.
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Pathfire's (formerly Video Networks Inc) Digital Media Gateway enables broadcasters to access, control and interact with digital content from their desktops.
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Zandar demonstrated its HiResolution MultiViewer, a display system that controls up to 13 dual inputs and supports S-Video, YUV, SDI and VGA.
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Pinnacle displayed its PDS9000, a production switcher with 36 primary inputs, two independent M/E systems and full-function program/preset band with dual DSKs.
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Windows 2000 and with the Matrox DigiSuite LX card. Incite 2.8 introduces Multi-Layer Compiling (Incite MLC). MLC files can be shared over a network with other Incite workstations.

Media 100 showed multiple additions to its product line, most with enhancements to tasks such as creating streaming content, optimizing content for wireless IP devices and new applications for Macintosh. Among these was the new Media 100i version 7.5, which claims a new "lossless" video codec.

Several years ago, Broadcast Engineering editor Brad Dick wrote in the front pages of this magazine of a day when video editors would sit at a workstation and entrust their precious material to a magical "black box." They wouldn't care where the material was stored, how it was stored or what format it was in, as long as they could retrieve it on demand and end up with a product that was presentable for its intended purpose. Readers who remember that particular editorial may look back with a smile today as most of Brad's predictions are rapidly coming true. ■

Edward E. Williams, CSTE, is director of engineering at KPDX Engineering, Portland, OR.

Format conversion and synchronization

By Mike Betts

As the conversion to DTV speeds up, format conversion continues to be of increasing importance, while the array of choices available to perform this essential function continues to increase. A variety of equipment available today can route, distribute or display digital signals over a wide range of signal formats and frequencies without the need for external conversion equipment. There are, however, situations requiring conversion to a different signal format for production, storage or transmission. Choosing a format converter to suit your needs requires careful thought. For example, how do you decide between a linear converter and a unit that combines motion compensation to provide superior performance, or a programmable unit to adapt to future requirements as opposed to a converter with a fixed function?

A major requirement with HD-DTV is to upconvert existing or incoming SDI (or analog) material to HD-SDI. Any HDTV program that will include SD footage will require upconversion of this footage for inclusion within the new program. Similarly, downconversion of HD-SDI material into SD material will be required for some time to come to accommodate SD storage, transmission and various forms of SD processing. The need to convert between the progressive and interlaced formats is mainly a concern for those adopting the 720p. For those adopting the 1080i, the material will remain interlaced (for conversion from 480i to 1080i) and only occasionally will conversion to or from 720p be required. The choices available for these conversions range from selectable converters such as Xantus and Star-Up format and standards converters from TeraNex, to the Mach 1 converter from Snell and Wilcox (see Pick Hits, p. 82). These units provide conversion that can be changed to suit the needs of a particular session as required. Fixed converters are available from companies such as YEM with their 720p to 1080i converter, the HFC-2020, or 1080i to 720p with the HFC-4040. These units provide a dedicated solution and save the need for involved user interaction and the complexity of multipurpose units. Individual modular converters are also available to solve other requirements within the SD/HD environment. Monitoring HD signals can be accommodated by converting them to analog with the AJA HD10M or to SDI with the HD10MD. These units require the mode to be preset, typically with dip switches, prior to placing them into service.

If you have a need for conversion between composite analog NTSC, PAL or SECAM and component analog or SDI, you might want to check out the DTC1600 Quattro from Video International. This unit provides conversion between the selected I/O formats with a choice of processing, noise reduction and interpolation control. Modular units

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are also available to fill the need for preset conversion between composite or component analog and SD digital video. A variety of different solutions are available from companies including AJA, Cobalt, Leitch and Miranda.

A big concern with regard to conversion relates to archive and storage usage. Material needs to be tracked to determine the recorded format and then converted into the desired format. The use of individual conversion equipment is still the norm, as trying to maintain a mix of HD and SD formats in one facility is an expensive, if not impractical, proposition. It generally makes sense to keep everything in HD where needed for HD production or transmission and then downconvert to SD for SD production or for inclusion in SD transmission.

This brings up another concern with format conversion: aspect ratio control. While there are only two valid display aspects available for television, 4x3 and 16x9, care should be used when transferring an image originated in one format into the other. There are many manufacturers that provide the ability to adapt a 4x3 image into 16x9 space and vice versa within SD/HD converters. If this were the only concern it would create no more than a simple production decision. However, the problem is compounded by the transmission of DTV images and the inability to know if the resultant program is being viewed as 16x9 or 4x3. When the receiver in use fixes the image, the viewer has no choice in the matter. Or perhaps even more of a problem, they do have a choice, using the selectable display controls on DTV receivers. The result is that 16x9 images may be viewed with the sides missing on a 4x3 display or, even worse, a 4x3 image may be viewed with the top and bottom missing on a 16x9 display.

When it comes to flexibility in frame synchronization, quite a few manufacturers were showing modular equipment frames that accept SD (and some also HD) modules, including video and audio synchronizers and audio embedders and de-embedders. New frames that include SD frame synchronizer modules include the NEO series from Leitch, the Synapse series from Axon, the Avenue Series from Ensemble Designs, the IQ Modular system from Snell & Wilcox and the Symphonie series from Miranda. The new styles of frames provide the ability to perform remote monitoring and control. If you are looking for a modular frame with this in mind, consideration should be given to the current availability of modules, the planned modules for the product line, including HD, and the interconnectivity between different manufacturers' frames.

A major problem with video frame synchronizers has been with embedded audio. While the video requires a frame add or delete to synchronize to the local reference, the audio would experience a repeat or drop of audio data and subsequent interruption in the embedded audio frame sequence. This is no longer a problem with the SFS20 module in Axon's Synapse system, which provides audio processing to perform a smooth audio transition while video frames are dropped or inserted. This provides one solution to the problem facing users who have chosen to embed the audio wherever possible.

Less care is sometimes taken over audio signal conversion, but care in this area can save problems later. The common sampling rates in current use are 44.1- and 48kHz, with 96kHz becoming more popular. Rate conversion to a common sampling rate is often desirable when a variety of rates coexist and there is a need to synchronize asynchronous streams. ADC's DA4050 can convert asynchronous AES audio over a wide range into synchronous AES audio while maintaining the audio channel phasing.

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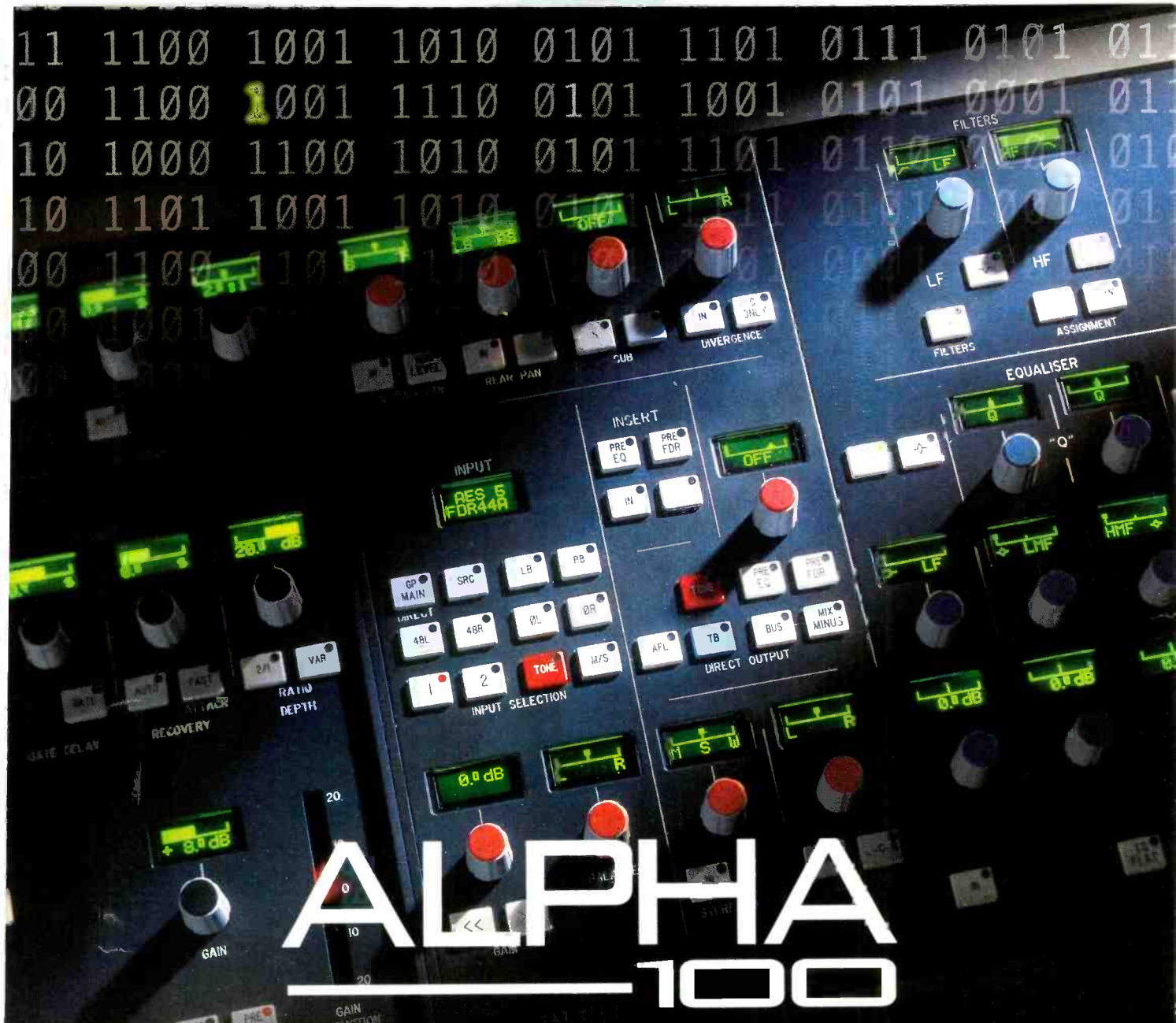

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Product Jackpot

DNF offered its new 2044CL clip management system and its new ST450 Shotbox controller, featuring 20 banks of 30 buttons to allow instant access to 600 video clips.
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Utah Scientific presented the HD-2020, a master control switcher that provides two independent video channels in any combination of HD or SD signals.
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Doremi Labs unveiled its V1-MP2, an MPEG-2 VDR providing simultaneous record and playback of MPEG-2 signals using 4:2:2 compression.
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Telecast Fiber unveiled Copperhead, a camera-mounted fiber optic multiplexer that delivers signals at 30X the distance of ordinary coax or triax on cable 1/10th the weight.
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Vela introduced its MediaMachine. The DVD-RAM library system combines an MPEG-2 video server and DVD-RAM archiving appliance for encoding, storage, archiving and playback.
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Litton presented Constant Efficiency Amplifier tubes for UHF television transmitters. The tubes efficiently provide twice the power of standard IOTs.
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Harmonic showed the MV50 encoder and the DiviTrackXE multiplexer.
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The smoke editing/finishing system from Discreet, a division of Autodesk, now offers real-time, HDTV I/O with multi-master editing capabilities.
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Computer video often comes into play in production when screen shots or Web pages need to be included in news programs or within training videos. Producing a high-quality, low-resolution image (525/60 or 625/50) in analog or digital from a high-quality XGA or SVGA source can be achieved with products such as the XTD 820R from Analog Way. This unit also allows zooming or panning of the image in real time to make the output more useful.

Whatever your conversion need is in today's mixed analog and digital, multiple-resolution world, there is probably a solution to your problem. ■

Mike Betts is the senior partner of Broadcast Training Partners.

Production systems

By Dave Higgins

The theme of NAB2001 was markedly different than its predecessor. Last year, the focus of the show was digital technology products with a strong emphasis on streaming and Internet-related infrastructure. While the ever-present digital evolution remained front and center at the show, and streaming technology was back, NAB2001 focused on maximizing functionality across multiple technology platforms. As most major broadcasters are evaluating some form of multicasting or multiple-signal strategy, equipment manufacturers are developing the next generation of technology to improve efficiencies and support these expanded operational requirements. In particular, in response to the growing need for SD and HD production, systems that support simultaneous capabilities were widely displayed at the show.

Among these was Grass Valley Group's updated Kalypso production switcher. The new version of the switcher supports resource sharing between multiple frames so that both SD and HD platforms can run off the same console simultaneously. In addition, an SD frame can be split across two geographically separate locations. The frame can be configured to support up to four levels of mix effects and utilizes the GVG Flexikey platform. As an example, the frame can be configured to run four distinct Program Out signals from each Mix Effect bus so that a single frame can produce four separate programs from the same core video asset in real time. The Flexikey approach allows the user to select any unused keyer on the board and allocate it for use with any ME bus output. The Kalypso can be configured for 80 inputs and up to 46 program outs.

The Phillips Seraph HD production switcher also supports multiple formats, with 90 HD or SDI inputs a new "Virtual Set" mode. The Seraph supports 720p, 1080i and now 24p. Another production switcher, the Phillips SD, has 62 SDI inputs and incorporates a 3D planar DVE, five distinct layers per ME and six downstream keyers. Phillips also showed its DD 35 compact production switcher with 32 SDI inputs, 3D planar DVE and 52 seconds of RAM storage onboard. The DD 35 supports simultaneous HD and SD production from a single panel.

Sony displayed its MVS 8000 production switcher and the MVE 8000 digital effects system. The switcher is capable of supporting HD and SD formats, can control up to 30 external devices, can be configured with up to four ME buses and utilizes the Sony S Bus to interface with its existing family of router products.

For the live production environment, Ross showed its Synergy series of production switchers, which incorporate 64 SDI inputs, a 2D DVE, an on-board matting device and the ability to simultaneously support 4:3 and 16:9 formats.

In addition to the Digital Glue, DigiBus and Genesis platforms, Leitch showcased its Integrator router systems. This highly configurable system supports both HD and SD and can be sized from 32x32 up to 512x512. The Command Control System offers both Windows- and browser-based applications and allows the user to utilize either serial or Ethernet ports.

DNF showed its remote VTR control systems that are TCP/IP compatible

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Product Jackpot

The UT-102 crystal-controlled, frequency-agile plug-on transmitter from Telex, used with the ENG-100 portable UHF receiver, adapts standard wired dynamic micro-phones for wireless operation.
Circle (414) on Free Info Card

Irdeto introduced the CypherCast conditional access and subscriber management solutions for digital IP.
Circle (415) on Free Info Card

AgileVision showed the AGV-1000 MPEG Master Control Switcher/Server featuring seamless insertion of HD or SD program content.
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EMC Corporation showed several representatives from its product line, including the CLARiiON and Symmetrix Enterprise Storage systems, and the Celerra file server and media servers.
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ADC introduced its ENVY control system software for the ENVOY router, which provides full tieline management support.
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Videotek offered several products, including the VTM-200 multiformat on-screen monitor, the VTM-330E test and measurement system, and the multiformat SQM signal quality manager.
Circle (419) on Free Info Card

DPS, a business unit of Leitch, unveiled the dpsWhiplash2 slow-motion instant replay system and version 7.6 of its dpsVelocity real-time nonlinear editing system.
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and allow sharing device control across the network.

Vinten launched its AutoCam robotics automation system. The ImageTracker pan-and-tilt system incorporating enhanced virtual set camera tracking technology (Intersense) was also on display.

Pixel Power displayed a range of cost-effective, yet powerful graphics and animation products. The Collage 2 platform supports traditional character generator, paintbox and 2D animations, as well as 3D, real-time graphics. The Clarity CG/paint and still store system supports simultaneous HD and SD production. The Pixel Power Graphite2 CG/graphics workstations' core is based upon a proprietary hardware and GUI, utilizing a pen-and-tablet approach similar in form and factor to competing products. The GUI is clean, unobstructed, and quick to navigate. The Graphite2 family is divided between two product lines: a Graphite2 CG variant (for character generation and still store applications); and a full-featured Graphite2 GX, with full 2D/3D paint and cell animation.

Tektronix unveiled the WFM-700, a Grade-1 HDTV/SDTV Waveform Monitor/Vectorscope. The WFM-700 utilizes a new color display and a menu system familiar to VM-700 operators. The WFM-700 was shown with both SD and HD input signals, and displayed screen resolution suitable for accurate camera shading, a shortcoming of the prior product. Additionally, the WFM-700 displayed a freeze capability, allowing overlay and comparative measurements within the waveform, vector and eye pattern displays.

Certainly of interest at this year's NAB was who allegedly did or didn't attend. It should be noted that for all the discourse, the NAB convention enables all facets of the broadcast industry to come together – one place, one time. This convergence enables both physically and technologically diverse disciplines to exchange ideas and advances. It is this exchange that shapes the future of the industry for attendees and exhibitors alike. ■

David Higgins is the director of project development for The Systems Group.

RF products

By Jeremy D. Ruck

While the annual convention is an enjoyable time to catch up with colleagues and gorge ourselves at fine restaurants, most of us make the annual pilgrimage to view the new products being offered by the wide range of manufacturers. On the RF side of things, there were a number of exciting new products on display at the show this year.

Improvements in combiner technology abounded. Each of the major combiner and RF system manufacturers had their improvements and models on display. Two of the more notable ones this year are the Trinity offered by Andrew-Passive Power and the new RFS 'N+1' combiner. Both of these models use different innovative solutions to reduce aural carrier distortions in N+1 applications.

The Trinity model is an all-aluminum, waveguide construction and has high thermal stability. Trinity will handle 75kW DTV plus up to 100kW NTSC. Trinity has a triple function in that it may be used as a very low loss N+1 combiner, a high-power DTV filter or an N-1 combiner.

The RFS N+1 combiner continues the RFS design that utilizes a substantially smaller footprint than some of their competitors. Their design incorporates a waveguide pre-corrector to minimize group delay. The elegant solution for static group delay correction is accomplished through the use of a tuned all-pass filter that flattens the group delay around the carrier, making it symmetric and minimizing the effect on the audio.

Harris announced its "Cool Fuel" approach to DTV transmission, which offers performance and efficiency benefits. Its use of proprietary signal equalization techniques and a patent-pending filtering configuration provides a dramatic cost savings potential and ensures full compliance with the Commission's interference requirements.

The Odyssey series, a new line by Thomcast, completes its solid-state product line. The Odyssey is a cost-effective

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Digi-View

The Endura Digi-View feature displays accurate battery capacity in the camera viewfinder of many new cameras.

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The Endura battery system is available with energy saving Syncron technology that automatically activates on-camera lights when recording is engaged.

MSRP $365.00

Endura-50

Every Endura battery contains **High Power, Lightweight, No Memory** Lithium Ion technology. IDX has been providing this powerful and safe battery technology to the professional video industry for over 6 years.

V-Mount

Endura batteries will fit directly on new cameras, which have the wedge style V-Mount already built-in, including Digital Betacam®, Betacam SX®, and DVCAM®. They are also adaptable to other mounting systems, or may be affixed directly to other cameras by adding the IDX P-V/P-VS Plate.

PowerLink

The Endura E-50 battery comes standard with the PowerLink system that allows two batteries to be stacked together for an extra boost of power. PowerLinked Endura E-50 batteries output up to 96 watts of power.

IDX acknowledges all manufacturers' trademarks as the property of their respective owners.

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Product Jackpot

Thales Electron Devices presented a range of products including the TH 15700 solid-state driver for IOT and the TH 4057 miniature traveling wave tube.
Circle (421) on Free Info Card

Fujinon spotlighted its three new prime lenses, the HAB16B-10, the 34B-10 and the 54B-10, in addition to its new zoom lens, the HA17x7.8B-10.
Circle (422) on Free Info Card

Harris showed the FlexiCoder MPEG-2 encoder management system.
Circle (423) on Free Info Card

Parkervision unveiled its WebSTATION for NEWS system for streaming live broadcast material and featured its 2001 line of scalable PVTV Studio NEWS systems.
Circle (424) on Free Info Card

Hitachi Denshi America showed its HV-D5W 2/3-inch three-CCD, 16:9/4:3 switchable digital camera as well as two new multistandard HD cameras: the SK-3100P and the SK3300P.
Circle (425) on Free Info Card

Terayon showcased the DTE-7585 Integrated Receiver, an off-air HDTV receiver.
Circle (426) on Free Info Card

Magni Systems introduced the MM-410 waveform/vector monitor, the AVM-510A automated video monitor, and the SDM-560M serial digital/composite monitor.
Circle (427) on Free Info Card

Mediostream offered previews of its CAMpeg Pro, a multiformat encoding solution.
Circle (428) on Free Info Card

solution for broadcasters looking for a state-of-the-art design. This particular model, says Thomcast, has the smallest footprint and highest level of internal redundancy available today.

Thomcast also introduced the DCX Millennium transmitter. The DCX Millennium is an enhanced version of the DCX. Improvements include Total Power Management, which allows a wide range of flexibility in the power control of the transmitter in fault protection, while maintaining it at the highest possible safe power level. The Millennium also features improvements to the filament/bias/ion supply and utilizes an intuitive GUI and networkable remote control software.

Andrew increased its antenna product line dramatically. It now provides inverted antennas for use on candelabra-style towers. In addition, Andrew has teamed up with Alan Dick, and is now offering VHF Superturnstile and Panel Antennas. The Trasar LT antenna also adds to the line by creating a lighter-weight and lower-wind load package that still has big antenna performance.

Dielectric showed its TUV Series Dualband. This antenna is particularly suited for those broadcasters who have both a high-band VHF and UHF channel during the DTV conversion, but no additional tower space. This particular model incorporates both the VHF and UHF signals into a single pylon antenna. With the use of Dielectric's Shared Line Tees and EHT transmission line, the TUV Dualband can not only minimize tower loading at the tower top, but can also eliminate the need for a second transmission line run.

Dielectric also offered its VSWR Vision program. Dielectric will install monitoring hardware and directional couplers on your transmission line, and then monitor your line VSWR and pressure for you. The system samples your VSWR every few seconds, and you are provided with a quarterly report detailing trends.

SpectraSite's services allow multiple broadcasters to use a common tower site in order to shorten project timelines and lower capital investment. The company obtains the site or identifies existing tower space that is available and suitable for broadcast needs, obtains zoning approval and will even manage the facility.

Richland Towers was on hand detailing its custom-designed tower lease programs and multi-tenant tower projects for broadcasters. Likewise, LeBlanc was offering its tower-erection services and showcasing its Larcan line of transmitters.

NuComm featured its Microwave V Stream STL, offering digital signal monitoring with SMPTE 310 and ASI digital interfaces.

Acrodyne, traditionally a big player in the RF arena, continued that trend with the launch of its Quantum IOT-based transmitter. The Quantum can serve both analog and digital applications with power levels up to 280kW analog and 120kW digital.

Another transmitter player, Itelco, offered its 50kW UHF model, featuring an exclusive exciter system and a patented Switch Mode Beam Power Supply.

Marconi showed its IIOTD3100W, an IOT capable of 110kW peak digital or 5.5kW combined analog amplification. Marconi also showed the Stellar TWT, which covers Ku-band for individual unit powers up to 180W and DBS bands as well as multiband applications.

Broadcast Microwave Services showed its StarLink series of STLs, as well as its microwave link systems for helicopters and ENG units. NEC also presented a solution for ENG, its Digital Microwave Link (DML).

Multidyne showed its line of video and fiber optic transport systems, including its DVM-2500, 2700 and 4000.

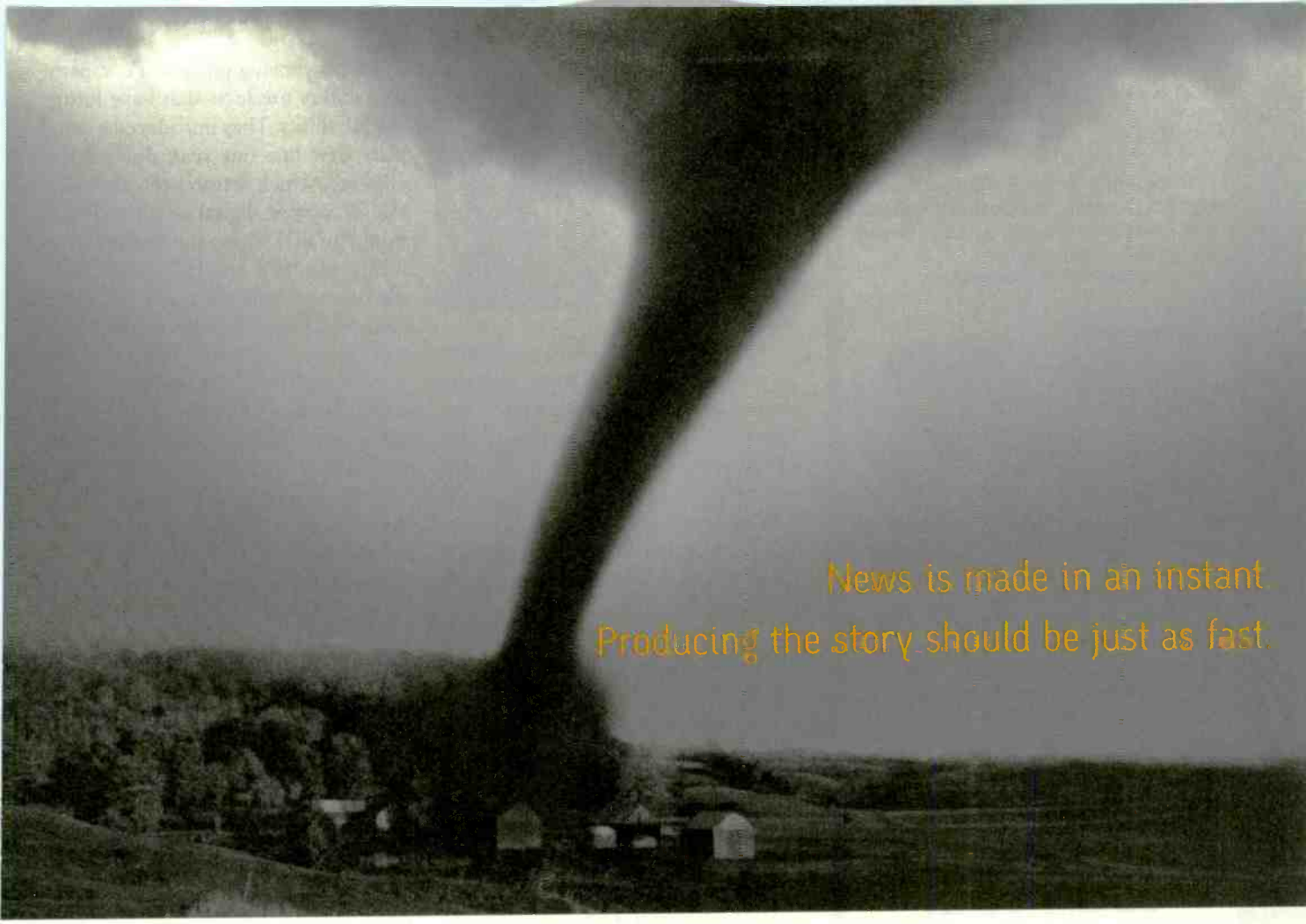
Ktech Telecommunications showcased its VSB-ENC-200 8VSB modulator. The ENC-200 modulates MPEG-2 transport streams into an 8VSB signal using linear and nonlinear pre-correction techniques.

Litton Electronic Devices featured its L-4299 constant efficiency amplifier. The next-generation, high-power UHF operates at peak power up to 120kW, offering high-efficiency in comparison to standard IOTs when digitally operated.

Another manufacturer, CPI-Eimac also offered a new digital IOT, the K2D130. The newest of the K2 family produces 130kW average for DTV.

While there was not necessarily a tremendous amount of new items, those that were on display continued to offer more efficient and reliable solutions to accommodate our ever-changing industry. ■

Jeremy D. Ruck is chief engineer with Markley and Associates.



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

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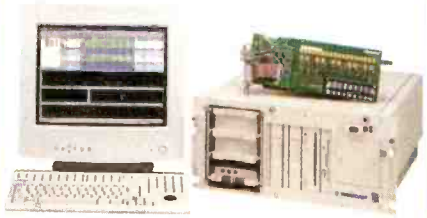
Product Jackpot

Odetics showed its AIRO Automation System, a facility management solution that controls all external devices needed for full station automation.
Circle (429) on Free Info Card

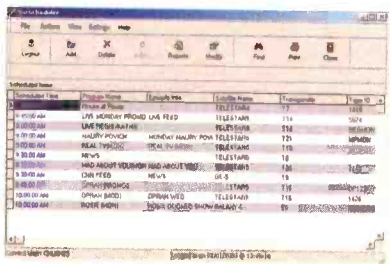


Thomcast unveiled its Optimux bandwidth optimization technology for the broadcast of live transport streams with the insertion of interactive data.
Circle (430) on Free Info Card

360 Systems offered its DigCart-3, a network production recorder that combines recording, playback and audio editing functions.
Circle (431) on Free Info Card

Radamec showed its new uniPED mobile robotic pedestal. UniPED provides off- and on-air height adjustment to pan and tilt for quasi-fixed stationary studio camera positions.
Circle (432) on Free Info Card

Panasonic introduced the AJ-D130DC, a dual-standard DVCPRO HD VTR. The AJ-HD130DC offers 46 minutes of 1920x1080 interlace scan or 1280x720 progressive scan high-definition recording at 100Mb/s.
Circle (433) on Free Info Card



Sundance Digital debuted its Intelli-Sat satellite recording package. Intelli-Sat manages the process of recording programming from satellites.
Circle (434) on Free Info Card

Routing systems

By Paul Black

As the concept of just what a "router" truly is continues to evolve, so does the hardware. Once, there was no doubt as to what the definition was; equipment that switched signals from different sources to different destinations. Now manufacturers are interpreting the idea of signal routing much more liberally, adding more complex options to the routing process.

Considering the complexity involved in the average X-Y crosspoint router, it seems wrong to call such a device a "simple" router, but really it is. Taking input X and making it appear at output Y is about all the systems could do a few years ago. Computer controls enhanced this process but didn't change the result very much.

Today manufacturers see the router as more than just a signal switcher. The larger units have multiformat capability — such as a mix and match of analog video, SDI, HD, etc.; automatic time-controlled functions; and hot-swappable circuit boards — but this isn't the latest news. Using the routing process to convert a signal from one format to another, or to add some form of processing or correction to the signal as it passes through, is a technique that is becoming more common. Another is to use the router to perform a function normally left to a discrete device such as a telephone coupler or a security camera "scanner."

Manufacturers are also taking into consideration that the industry is in a series of technical transitions. No one wants to sell a product today that will be obsolete when HDTV finally arrives in full. If you're shopping, it's worth determining how the product you are considering can be upgraded.

PESA Switching remains a company that makes products that have future upgradability. They introduced a complete new line this year, dubbed the Cheetah, which features the ability to take an analog digital signal and turn it into an SDI within the router frame itself. Also, SDI and HD can be handled in the same frame, with some card matching. The Cheetah can output signals either in a "copper" (that is, coax) or fiber format. So now, you can hook a single- or multi-mode fiber to the router output directly without an interface.

Within any company's product line, the control panels for one router will typically control any other router. The ability to also control the competitors' routers remains an important selling point, and more manufacturers are implementing this.

Grass Valley Group's "Net Captain" software is a good example. It has a level of flexibility that works with both their current and past products. It will also control other routers, notably the "Jupiter"-based system from Thomson/Philips or products from Utah.

GVG also has some new introductions, including Bravo, Concerto, Encore and Tempo. Encore is the control system for all of them and some others in the line. The main claim to fame is maximum flexibility in minimum size.

The latest from Leitch is a new 16x16 (expandable to 32x32) unit that passes high-rate digital without re-clocking. This is part of the Integrator series, which is designed as an overall solution for a facility that needs both small and large routers in different places. Their latest control software is the BLUECUBE, which will talk to all the Integrators (and, presumably, integrate them under

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Product Jackpot

Accuweather launched Galileo, a weather forecast production system offering 32-bit animated graphics, an intuitive user interface, and graphics in animated 2D or 3D formats.
Circle (435) on Free Info Card

Snell & Wilcox demonstrated its HD2524 production switcher and the Mach1 M.Sc standards converter for sports and ENG applications.
Circle (436) on Free Info Card

Oxtel, recently acquired by Miranda, showed its Imagestore Interactive mixing, branding and effects system for interactive and enhanced TV.
Circle (437) on Free Info Card

OmniBus Systems announced its Basic OmniBus Control System (BOCS), a transmission automation system.
Circle (438) on Free Info Card

vi[z]rt expanded its line with several new products, including the Simon Seez plug-in and the vi[z]rt video engine.
Circle (439) on Free Info Card

NEC showed a 61-inch XGA resolution plasma monitor, the PlasmaSync 61MP1.
Circle (440) on Free Info Card

Orad launched several new products, including the DVG-10, a PC-based video-graphics workstation, and CyberGraphics, a platform-agile 3D graphics system.
Circle (441) on Free Info Card

Pixel Power debuted its three-channel Clarity HD/SD GG.
Circle (442) on Free Info Card

BarcoNet launched its SNMP Profile manager, an open-interface software tool for its ROSA network management system.
Circle (443) on Free Info Card

SGI showed the DMediaPro family of enhanced systems, including the Zx10 VE visual workstation with DMediaPro DMI. The Kasenna MediaBase Network Edition of IRIX servers was also on display.
Circle (444) on Free Info Card

Scopus (formerly Tadiran Scopus) showcased its CODICO E-1700, an SDNG encoder designed to fit into tight spaces.
Circle (445) on Free Info Card

Sencore showed new products including the HDTV 8VSB player/recorder and the AT1506 8VSB RF signal analyzer.
Circle (446) on Free Info Card

one control system) and also functions within a distributed architecture.

Touching briefly on the audio-only side, Sierra Automated Systems has a new product called the 32KD. This goes beyond just an audio router; it's designed to replace both the traditional audio console and also some of the typical outboard peripheral devices that are normally separate boxes.

The unit can also replace a console, believe it or not. Any "controller" that can speak via a computer interface can be placed in (or on) a surface and hooked up to the 32KD. The controller can be from any one of several manufacturers. The cabling is then connected to the frame. This isn't especially new to the video world, given the layout of most switchers, but in audio it's just beginning.

Miranda showed the NTW-HD1616 (see Pick Hits, pg 82), a 1RU high, 16x16, remote-controlled audio-follow-video product that is only one inch thick. At first glance it looks more like a faceplate from a larger product, but it's a router, all by itself. If you have shallow racks, this is for you.

One of the more interesting marriages to take place earlier this year was Philips (formerly BTS) teaming up with Thomcast. The latter now has the router and overall broadcast equipment business under their name, with Philips keeping the set-top boxes and delivery systems in its own name. The supposition here is that Thomcast can do a better job of pushing the products into the marketplace. They'll also support all the older Philips products.

Meanwhile, Thomcast had a new routing product that was, well, not exactly introduced at the show. Shrouded in some secrecy, the new router will allow improvements in routing digital signals of various kinds, and some control options only available with this unit. It's dense (actual physical size classified as of this writing), keeping with the design philosophy of "density, serviceability, and reliability."

Thomcast also has a new version of the "Jupiter" software, which allows switches to take place only at the correct point within a digital "frame" so that there is no glitch artifact. This covers all the major digital video formats available.

Chyron Pro-Bel launched its Axis family of routers, as well as the HD, SD and AES versions of its large-scale Eclipse routing system.

Extron featured its SVS 100, a four-input, one-output video switcher offering seamless switching, effects, pic-

ture controls, audio switching and genlock capabilities.

Omneon Video Network's Content Server System was on display, along with FAST 's purple. The open-platform, standards-based infrastructure serves multiple applications and utilizes Firewire I/O with FAST's purple, with the I/O serving as an edge device and allowing direct transfers to a common file system.

ADC featured a new timecode card and controller software offering full tie-line management support for its Envoy 7256 router.

DNF Controls showcased its modular Ethernet machine control system.

So the router, the "heart of the plant" in many installations, is not just a signal passer any more. It now can manipulate the signals that it's feeding out, take the place of outside boxes, and even function as, and with, automation systems. The mutations are underway and they're happening fast. ■

Paul Black is Engineering Manager of the San Francisco International Gateway teleport for Loral Skynet.

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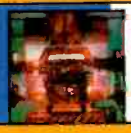
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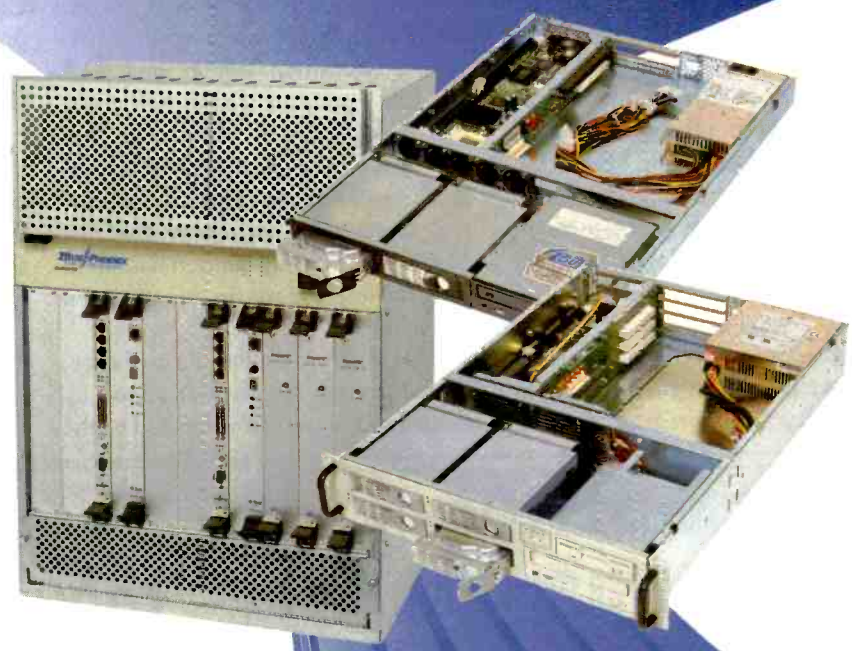

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Storage and automation

By Jim Boston

NAB2001 provided additional evidence that many technologies that were once separate, clearly delineated systems continue to fuse into contiguous solutions for the television broadcaster. Two technological areas that demonstrate this are storage and automation. Media companies are developing strategies for capitalizing on the dramatic growth of distribution channels and the corresponding demand for more program material. These companies need networking and shared storage solutions that facilitate migration from existing analog videotape to packet-switched, disc-based digital operations. Evolving program production environments need large-scale collaborative capability providing simultaneous access to program material within and between geographically separated facilities. Program distribution is migrating from broadcast only to simultaneous distribution of targeted programming via any transmission method including traditional broadcast, Internet and emerging broadband services.

What's new in servers

Avid has built a complete news system based around their servers. The system can accommodate in excess of 50 dual-stream clients, all with access to the same, or any media, simultaneously. The system uses a server-assisted architecture in conjunction with a virtualized storage system. A File Manager runs a custom file system (OMFS, Open Media File System), which assigns and maintains the block-level address of media on central storage. Clients query the File Manager for media location data first, then retrieve the media directly from the storage.

Grass Valley introduced a real-time, shared-storage system that allows simultaneous access to video and to the NT-based tools, such as Vibrint NewsEdit, required to manipulate that video. Its network runs up to 48 channels up to 50Mb/s with DVCPRO or MPEG 4:2:2, HD MPEG up to 80Mb/s as well as low-bit-rate browse video.

Odetics introduced three major initiatives in the storage area: support for a modular, scalable DLT Library system from Quantum?ATL to power its Data Library Manager archive management system; support of Grass Valley's In-Sync mirroring software; and an HD-version of its TCS Library Series.

Omneon added to its Networked Content Server System. The newest products within the system are a network switch and an Extended File System. The Extended File System allows multiple networked content servers to share a common file system. The switches are content-aware packet switches that transport both isochronous and asynchronous data, extending the network's reach via optical fiber.

Panasonic introduced a new multiformat DVCPRO video server, which comes standard with 20 hours of RAID 3 protected storage @ DVCPRO25,

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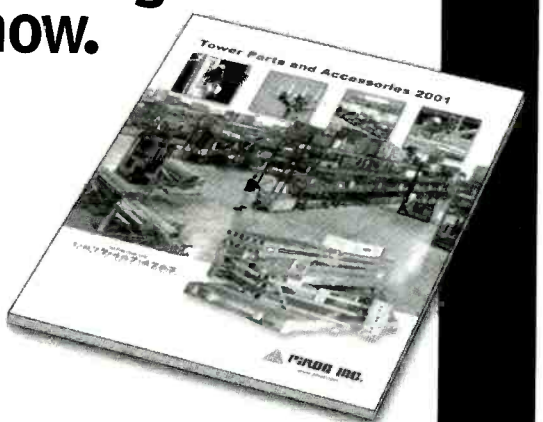

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Images courtesy of TSN

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- Paul McLean, producer, TSN

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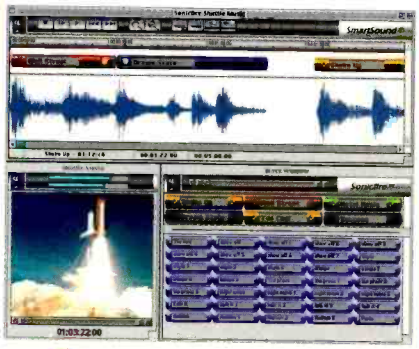
Product Jackpot



Sonic Desktop featured Sonicfire Pro, a soundtrack-editing program, featuring video and audio importing, editing, a professional NLE-based interface, and complete support for DV audio file formats.
Circle (447) on Free Info Card

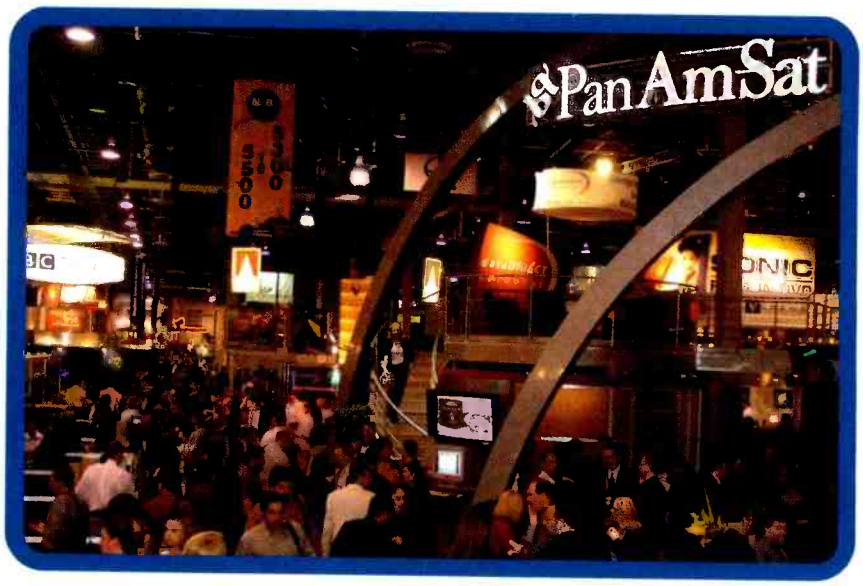
Scientific-Atlanta showed its QuickStage multichannel per carrier system, part of its PowerVu Plus product family.
Circle (448) on Free Info Card

Transoft Networks offered its FibreNet SAN bundle, which are available in four tiers: Bronze, with three FibreNet seats, Silver, with five seats, Gold with ten seats, and Platinum with 20 seats.
Circle (449) on Free Info Card

Media 100 introduced a lossless version of its Media100i family of digital media creation systems for Macintosh, version 7.5.
Circle (454) on Free Info Card

Artesia Technologies' TEAMS 4.1 helps organizations to capture, manage and re-express rich-media assets for targeted delivery.
Circle (455) on Free Info Card

Thomson/Philips showed several products, including the Trinix router and the LDK6000HD and LDK7000HD 2/3-inch portable high-definition camera systems.
Circle (456) on Free Info Card



utilizing 36GB HDDs. Each of these servers offers up to four bi-directional channels of SDI, SDTI or analog I/Os, and each channel has its own discrete RS-422A port. This new server also has the ability to do 25-, 50- or 100Mb/s at the same time on the same server.

Pinnacle introduced a new full-featured four-channel server and image store. It has 120GB of true-mirrored internal storage (25 Hrs @ 10Mb/s). It sports a 3D DVE for over-the-shoulder shots per channel. Pinnacle also introduced a beefed-up version of the same server that has the features of the LT with the added features of shared SAN external storage for up to 12 channels of I/O and 340 Hrs of common storage.

SeaChange offered three families of media servers, including a high-end system with a sixteen-drive chassis that is available in three- to seven-node cluster configurations. The company also introduced a mid-range machine supporting twelve drives per chassis and an entry-level product supporting eight drives per chassis.

The SGI Media Server for broadcast is now available with SGI Fibre Channel Storage System and a clustered version of SGI XFS file system software, which enables the simultaneous and concurrent file access essential to a Storage Area Network (SAN).

Sony introduced new options for its MAV servers, internal HD encoders and decoders. New DVB/ASI boards were introduced that allow integration to their multipurpose bridge for encoding, decoding and transcoding real-time streams and network distribution. Sony also was demonstrating full integration between server and data tape products that are used as near line and archive devices in newsroom and transmissiom applications.

Vela introduced a combined project with ASACA that marries its disc libraries with a Vela's video server in the same appliance. The entire system is contained in one of the ASACA DVD-RAM libraries. This includes an MPEG-2 encoder, decoders, 10 or 20 hours of online storage at 8Mb/s, and the RapidAccess suite of control software in a single appliance.

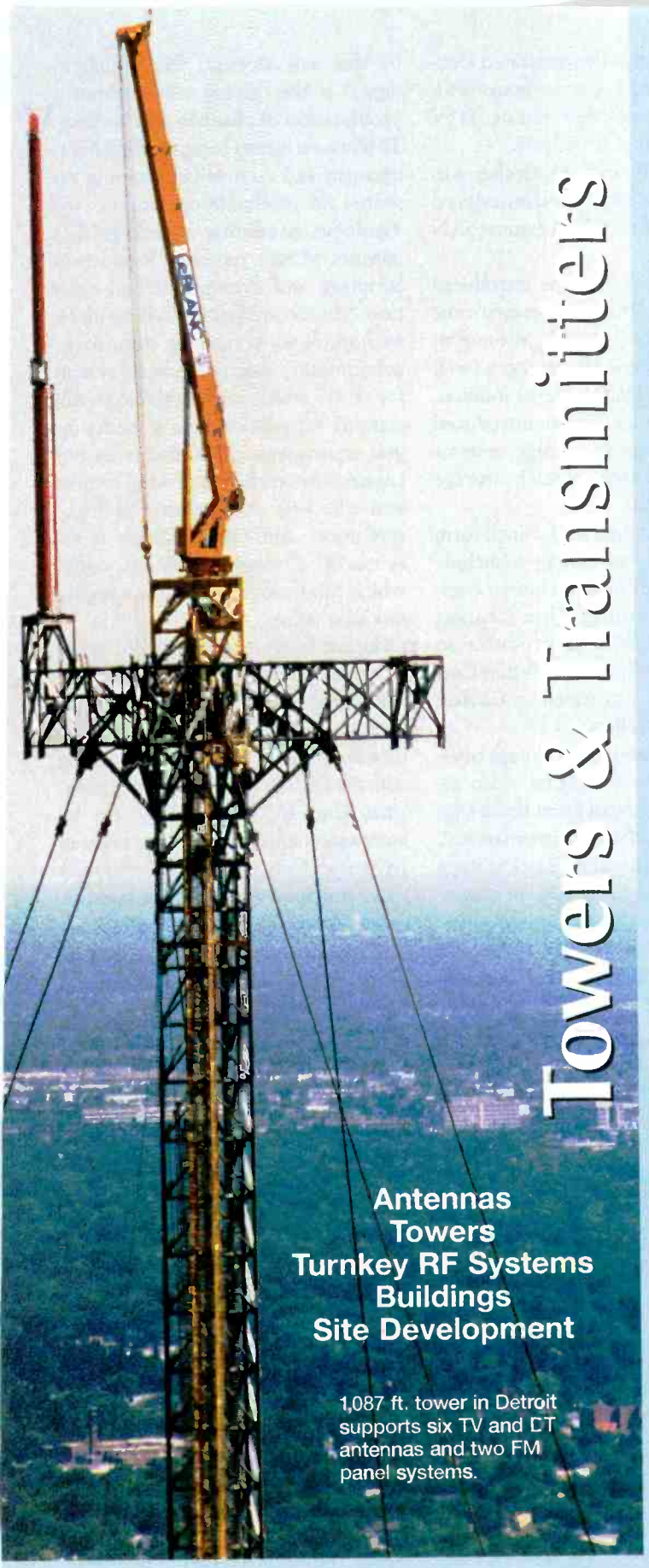
Storage suppliers

As the industry becomes more dependent on servers, servers are becoming more dependent on the storage vendors. Each year the show has more of these vendors displaying their wares.

Ciprico demonstrated its 2GB Fibre Channel technology. Ciprico is found in OEM server vendor products from Leitch, Panasonic, Philips, and Pinnacle.

Digi-Data Corporation introduced RAID systems featuring 2GB interface for SANs and a new Ethernet adapter option that allows users to connect the system directly to the Ethernet for NAS support. Systems can be configured ranging from 36GB to more than 4TB.

EMC has formed partnerships with Anystream, Artesia Technologies, Convera, e-Media LLC Keyvia, Sony Broadcast, Thomson Multimedia, Video Network Communications, and



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Product Jackpot

Vela introduced the Argus Spectrum to extend the capabilities of the Argus encoder by enabling operators to create real-time streams in MPEG-2, MPEG-1, Real G2 and Windows Media formats simultaneously.
Circle (457) on Free Info Card

AMS Neve unveiled its new networkable Logic 3SC 5.1 audio post system for high-speed editing and simultaneous multiversion mixes.
Circle (458) on Free Info Card

BUF Technology showed its Spot server management system for control of up to 10 server channels.
Circle (459) on Free Info Card

TASCAM showcased the DM-24 digital mixing console offering 24-channel/eight-bus configuration, plus eight additional channels for returns.
Circle (460) on Free Info Card

Intelligent Paradigm offered its Primatte Explorer system, which performs production and post-production matting in real time.
Circle (461) on Free Info Card

Video Design Software offered its AirPlot system, a suite of applications allowing broadcasters to generate live line graphs from an external data source using the Chyron iNFiNiT!-family and Duet.
Circle (462) on Free Info Card

Virage. EMC also demonstrated technology for media asset management, IP streaming, nonlinear editing, DTV and multichannel broadcast.

Gadzoox Networks, which claims to have coined the term SAN, introduced a 2Gb open-fabric Fibre Channel SAN switch.

Grande Vitesse Systems introduced network servers that support up to nine 10/100 Ethernet (network) with up to 350GBs of online RAID storage as well as a single tape DLT Archival solution.

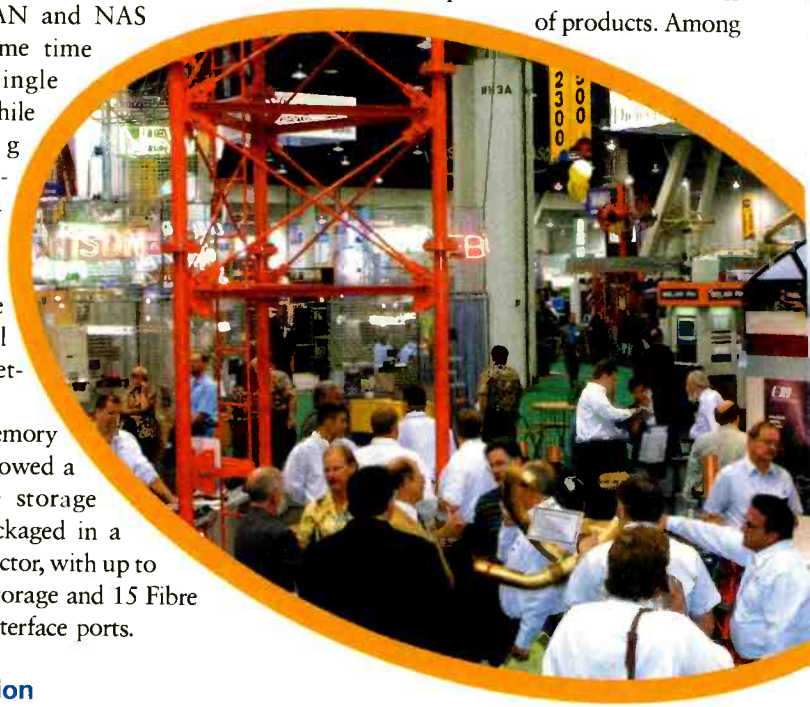
LSI Logic Storage Systems introduced full-fiber, enterprise storage systems (SAN), and network-attach storage solutions (NAS).

Nstor is expanding its 3.5-inch form factor enclosure technology to include a complete SCSI product line to complement the existing Fibre Channel line. Nstor OEMs its products to Omneon Video and First Virtual Corporation. They also resell to Chyron video server resellers.

StorageTek introduced a storage offering and solution for digital video archives, partnering with Front Porch Digital and ManagedStorage International.

Truesan introduced network storage systems and storage management software. Truesan storage systems deliver SAN and NAS at the same time from a single system, while making storage capacity accessible over both Fibre Channel and IP networks.

Texas Memory systems showed a solid-state storage system packaged in a 2U form factor, with up to 64GB of storage and 15 Fibre Channel interface ports.



Automation

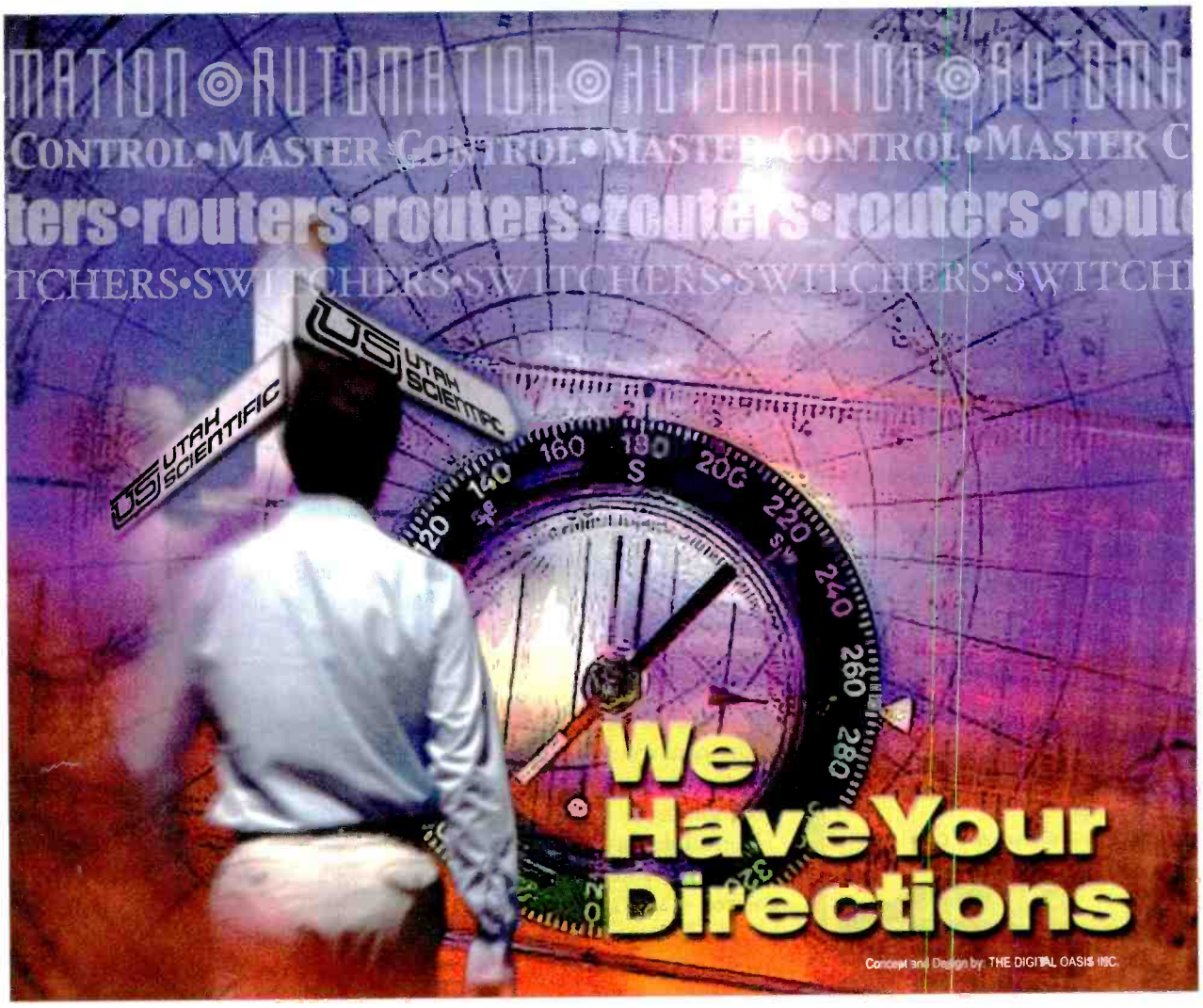
As servers become the anchor that facilitates televisions physical and operational metamorphosis into a different entity, automation is increasing needed to manage the flexibility enabled by this new storage. The switch to digital is the driving force behind a proliferation of channels and content. This in turn means computerized management and control is becoming essential for profitable operation.

Autocue is offering a package that consists of four modules: Production Scripting and Prompting, Full-function Newsroom System (wires, diary, assignments, scripting, rundown, prompting), a machine-control system for news, which is expandable to full channel automation, and a media ingest, management, and archiving, including low-resolution desktop browse and edit with conformance at high-resolution. Autocue's package is essentially a single body of code, which can be implemented in a highly modular form.

Blueline Technology introduced its latest version of station automation. Blueline allows the customer to select their own preference of databases such as Oracle, MYSQL, SQL, Access etc. along with the OS, i.e. Windows 2000, Linux, Unix, Unix IAX, MAC OS10 etc. Its automation applications are written in JAVA with Cobra communication links that allow for control over the Internet.

Crispin demonstrated a number of products. Among Crispin's products are applications which move or copy clips from one video server to another. The servers do not have the same format.

Quantel showed its Clipbox Studio



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Product Jackpot

Panasonic showed the AJ-D455 DVCPRO studio editing VTR for record and playback of both standard and mini-DV cassettes and playback of DVCAM recordings.
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Chinook unveiled spectrum enhancement technology that allows broadcasters to embed up to 6Mb/s of additional data in existing analog/digital signals without diminishing original signal quality.
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Teranex introduced its Star-up upconverter and pre-compression processor.
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Vixel introduced the 7200 Fibre Channel switch to provide high-bandwidth image transfer in SANs.
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Nucomm launched its Newscaster VT series of analog/digital ENG/OBVan transmitters.
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Panasonic showed its AJ-D410, a DVCPRO camcorder that combines high-sensitivity ½-inch 410,000 pixel IT 3CCDs with DVCPRO's digital component recording quality.
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Dolby debuted its DP579 Dolby E Tri-level Sync Interface, which generates 23.98fps or 24fps Dolby E streams.
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5D showed its star*dust film mastering and restoration system, developed as a resolution-independent module of the 5D Cyborg integrated effects editing environment.
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live production server, which offers access to video clips and stills for studio programming and provides re-sizing and re-aspecting capabilities for each output through internal 2D DVEs.

Encoda Systems introduced two next-generation products this year: Both automation solutions seamlessly integrate with Encoda Business Systems. Their high end system is a full-facility automation product based on a engine-client-server architecture, it is designed to address a broadcast facility's changing environment — including centralization and distributed control. Encoda also has a entry-level product for automating video servers.

EMC Corporation demonstrated a range of technologies for media management, IP streaming, non-linear editing, digital television and multi-channel broadcasting.

Wegener's COMPEL network control system administers receivers both as individual sites and as groups, and issues commands that are accurately synchronized with video and audio programming.

Florical displayed examples of CentralCasting and Multiple Time Zone control. They also showed products specifically for newsroom operations.

Louth introduced several new products, including one that provides control of the automation system over a TCP/IP network. To support control of equipment over WAN they showed control of an EMC video server using their new Network Device Control Protocol (NDCP). The NDCP protocol uses XML over TCP/IP.

Odetics Broadcast showcased products which offers CentralCasting, real-time streaming Web delivery of re-purposed broadcast content using Pinnacle's Stream Factory. They also introduced a low-cost automation system using an HD version of Odetics Video Tape Library. Odetics also announced a partnership with Wink Communications to offer interactive television enhancements — with customers to include The Discovery Channel and TLC.

New this year was the OmniBus Process Unification System , which takes a core asset and media management system that ties together all of the media and physical assets and provides a tight link with business administration systems, planning and scheduling systems, desktop working and the control and management of a broadcast facility. OmniBus also debuted a multichannel, multidelivery automation and control system that has been designed to bridge the gap between video, audio, Internet and data-streaming applications.

Qubit-Automation displayed a system that uses what they call a 'device frame' to control each device, essentially a frame with each card in the rack and a PC that is dedicated to a single device. Each device is available to the whole system, i.e. any channel.

SeaChange is introducing a small backup automation package. The package can support four playlists in the event the primary automation has failed. This software is an option that runs on the software control system that ships with every SeaChange server.

Sundance Digital launched the next generation of its automation system. It now supports Microsoft's Windows 2000 operating system and SQL Server 2000. Also shown was a tape-to-server caching option for Sundance Digital, Inc.'s automation. This system is designed for use with Sundance's FastBreak Automation.

News automation

An important group within the automation area is the newsroom automation vendors. The applications and hardware that comprise these systems often resemble an on-air automation package. The major differences being that the functions, and thus the names for the various components are different. As with video servers SANs and NASs are rapidly shaping the direction that newsroom architecture is taking. The industry is moving towards direct server editing with editing files on a SAN located between a video server and a NLE.

A number of vendors offer products aimed exactly at this area, Avid, Grass Valley, Panasonic, and Sony are a few. These are server vendors who have built a newsroom software layer above their hardware. A few "on air" automation vendors are expanding into this area, while at least one, Autocue, started in the newsroom and now is expanding out in the "traditional" automation venue. ■

Jim Boston is director of emerging technology for the Evers Group.

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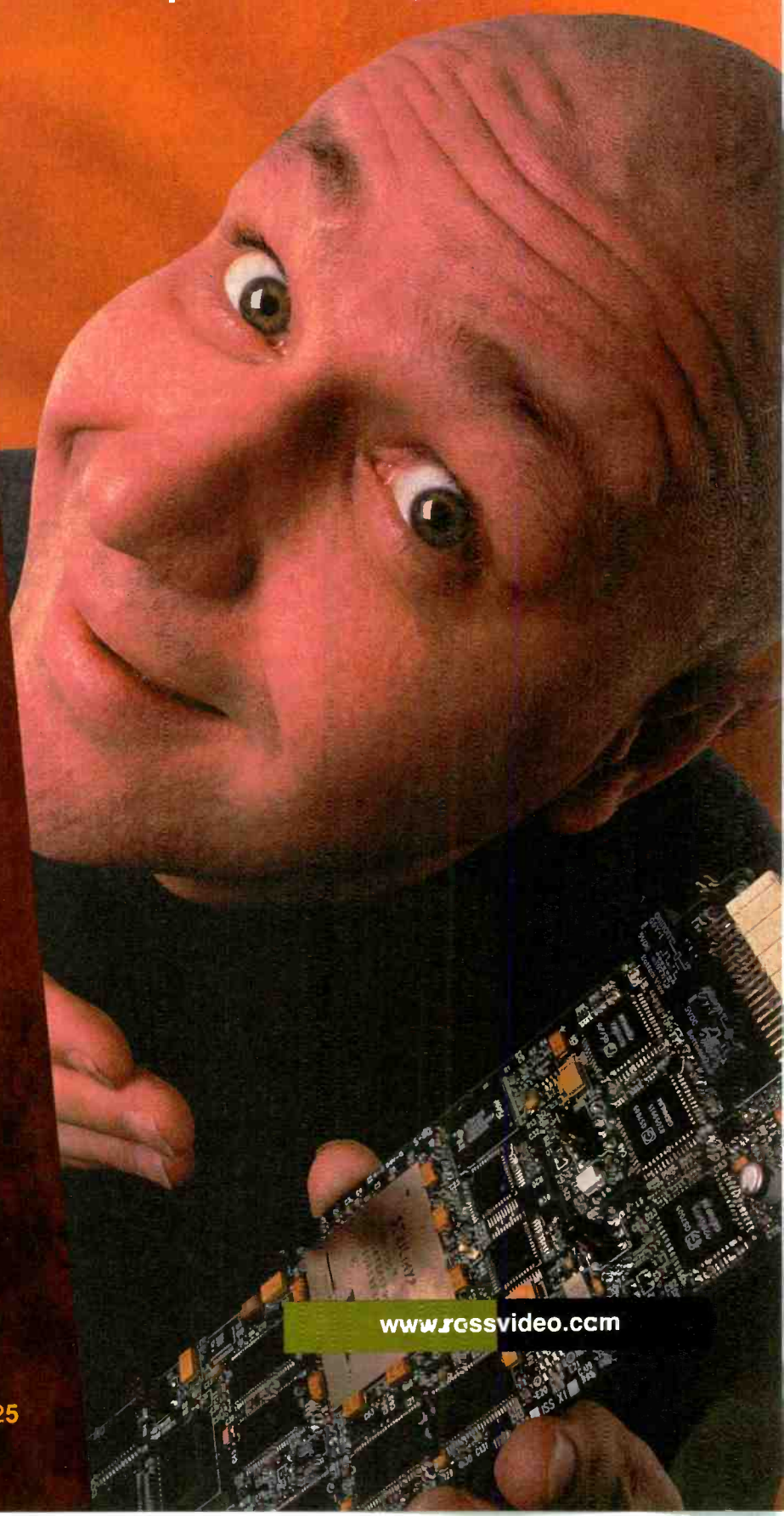

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Product Jackpot

Rohde & Schwarz announced its EFA real-time test receiver now offers optional support for U.S. broadcasting standards. The DVQ digital video quality analyzer was also on display.
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Neutrik offered its new Ethercon series of connectors, which have been ruggedized for use in rough environments.
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Aphex introduced the Model 2020 Mk II broadcast audio processor for louder and cleaner output in FM broadcasting and Webcasting.
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Editware announced its new Fastrack VS nonlinear/hybrid NLE system.
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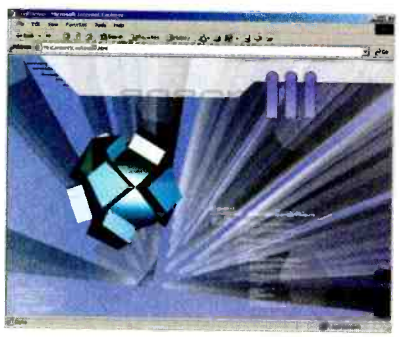

Anark launched the beta version of Anark Studio, which allows users to incorporate layered graphics, video, audio and data in television-quality interactive presentations for streaming.
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Streaming

By Steven Blumenfeld

This year's NAB was fascinating in many ways. The rust of the Dot-com technology growth was showing itself on the floor. While many of those young start-ups had already failed by the time NAB rolled around, the larger companies that tried to emulate their fantastic growth sunk loads of dollars into R & D. Now that the air has cleared, we are left with a whole lot of new products, the most in years.

As usual the Sands was the place for the smallest companies with the biggest innovations. According to Cahners In-Stat Group, Internet streaming solutions represent the fastest growing segment of the market. Over the long term, In-Stat expects that streaming will migrate upwards to become true video.

Zapex showed its Pegasus II system. It is the first Linux-based system able to stream live video over an IP network from real-time video or content stored on the server. It comes packaged as a rackmount video server with the encoder based on Zapex's own ZL-330. The system provides streaming solutions in either unicast or multicast operation by using the "Thundercast" server software from 2NetFX.

StarBak's Torrent 100 is a dedicated streaming media appliance that handles as many as 1300 streams at once. The StarBak-developed software has been optimized for streaming large volumes of audio and video data, and has been incorporated into the Torrent hardware with a custom operating system. This focus simplifies management as files can to be loaded, managed, and deleted via a simple graphic user interface (GUI), which anyone in the organization can be taught to operate.

Digital Fountain's technology uses advanced mathematical techniques to partition data into equal lengths. Then through combinational mathematics, it creates uniquely identifiable representative equations (Luby transform coding). These equations are then sent out over the network and as soon as enough of them are received, the data is reconstructed. Receiving order or loss has no effect on the data as long as the receiver can acquire enough equations to recreate the original. This eliminates the one-to-one conversations required of traditional TCP\IP servers. The approach allows a Webcast to mimic many of the dynamics — and business models — of a television or radio event. In effect, Digital Fountain's approach enables the Internet to serve as a broadcast medium.

Anystream's Agility Enterprise encoding platform is an enterprise-class solution for streaming media production and distribution that also streamlines and automates the process of converting (in real time) traditional broadcast footage into a variety of streaming media formats. The functionality that really sets Anystream apart is the ability to automatically encode programs into a multitude of streaming formats simultaneously including multiple resolutions and versions of Windows Media Player, Real and QuickTime. The whole system integrates fully with professional broadcast environments to ensure automatic capture of content and prescheduled delivery of the final streaming media programming to content delivery networks and asset management systems.

Telestream's FlipFactory Pro streaming automation software automatically transcodes and delivers media in virtually any format from broadcast servers to streaming servers or between different manufacturers' broadcast servers and digital devices. Additionally, Telestream expanded the suite of FlipFactory models including automated publishing and "on-demand" storage and retrieval for archives, media libraries and cache networks. Telestream also showed ClipRemote a portable media delivery for news and film crews wanting to transmit broadcast-quality footage from the field via the Internet to receiving stations located anywhere in the world. For those that have already invested in Telestream's technology there were major enhancements to both ClipMail Pro and ClipExpress.

Storage Concepts showed off FibreBlock, a full-featured RAID device measuring the size of a shoebox. The FibreBlock packs 300GB, a transfer

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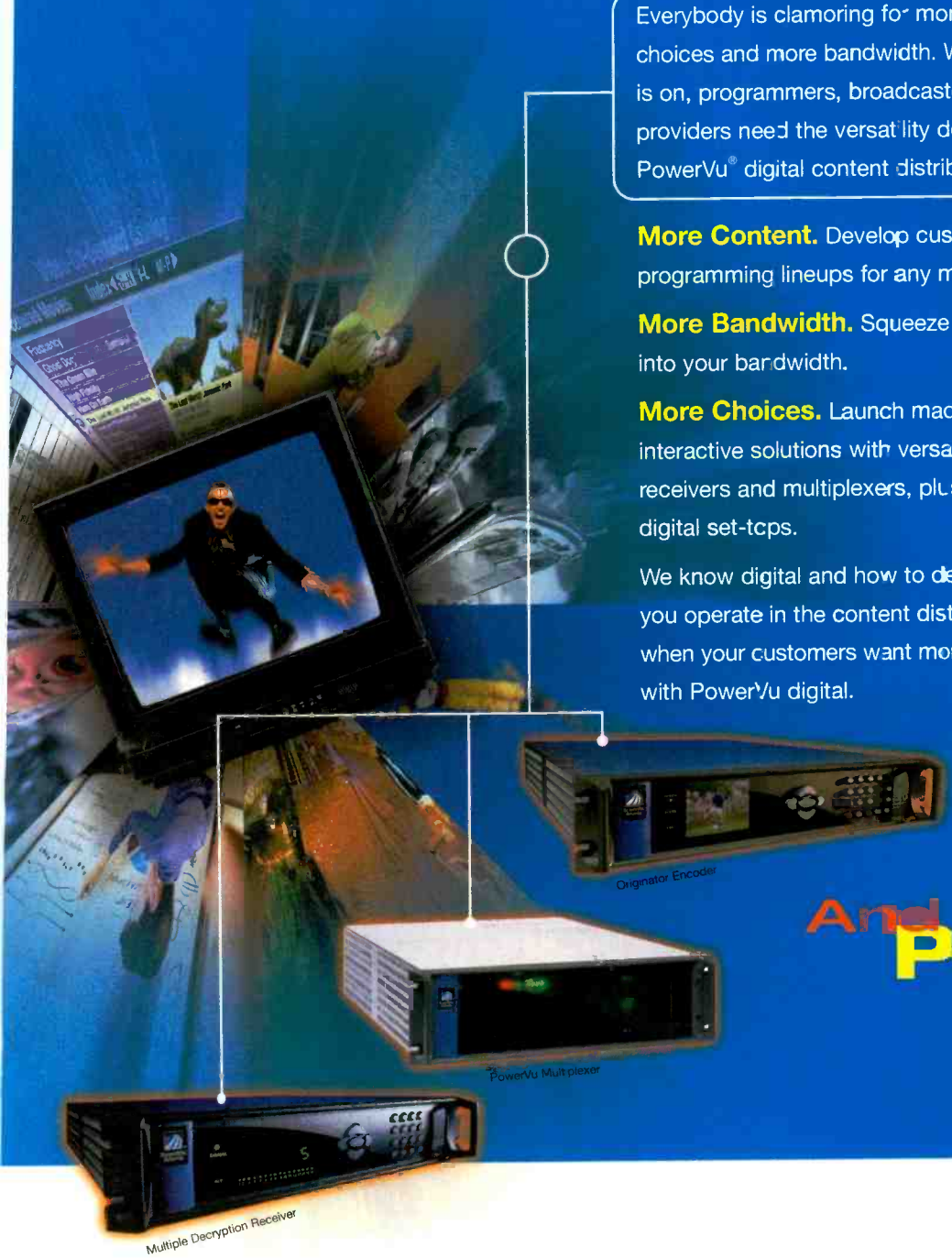

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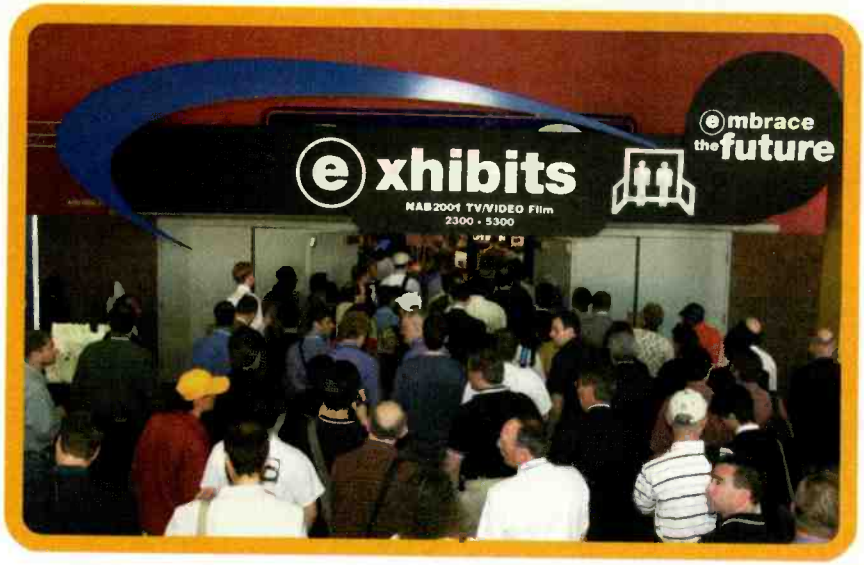

rate of 90MB/s and features full redundancy. The Block is capable of handling multiple streams of data running simultaneously through a single port at a combined transfer rate of 80MB/s to 85MB/s. It is compatible with all Host Bus Adapters (HBAs) and can be configured to run on multiple software platforms.

NCUBE demonstrated the integration of nCUBE's n4 streaming media appliance with RealAudio 8 and RealVideo 8. The n4, a fourth-generation streaming appliance, will enable broadband providers to simultaneously deliver high-quality streaming media to thousands of consumers over digital cable and IP networks. The n4 allows broadband providers to leverage the scalability and high performance of nCUBE to cost effectively deliver RealNetworks' RealAudio 8 and RealVideo 8.

ViewCast demonstrated the Niagara Streaming System. Niagara is a turnkey, plug-and-play streaming solution available in desk-side, portable and rack-mountable configurations. The Niagara series of encoders are a powerful way for businesses to stream "live" on the Web or create archived video-on-demand content. Fully integrated Niagara 1-, 2- and 4RU systems as well as portable configurations provide turnkey solutions for streaming applications and make it easy to convert your content to RealNetworks or Windows Media support formats.

While not necessarily streaming media, Dixon Sports, eSystems, ASACA and the Los Angeles Dodgers showed an implementation of a new digital video and Internet technology solution that will record all at-bat activity for every Dodgers' game. Combined with ASACA's 3.9TB DVD-RAM library to store and organize the videos, eSystem's ASaP integrated data mining portal solution will deliver accurate searches of the entire information bank. Authorized users will be able to browse and access files online, making the Dodgers' new Video Coaching System (VCS) an invaluable tool.

Spruce Technologies' SpruceUp's personal digital video authoring software is a creative tool that allows users to shape

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captured content and author their own rich productions. Users can quickly add Web interactivity to the DVD productions, and can publish to a CD or DVD. SpruceUp is one of the most intuitive authoring tools I have used. Full featured enough for professionals and easy enough for beginners.

Eveo showed off its EveoPublisher, a robust and scalable XML-based video publishing application that allows organizations to deploy video on their Web sites. This turnkey Web video solution is designed for businesses that want to enrich their sites with compelling streaming video.

Fraunhofer Institute one of the primary inventors of the MP3 format, showed the new MPEG-4 system Low Delay Advanced Audio Coding (AAC-LD). This new codec offers sound quality at a data rate of 64kb/s that is comparable to MP3, but with 80 percent lower transmission delay.

Virage's demonstrated a platform that allows content owners to prepare, manage and distribute video for Web and broadcast programming. The platform's open architecture integrates into any workflow and allows video to be used across a variety of applications. It also demonstrated wireless delivery of an on-demand streaming video to handheld PDA devices. Virage used a 3G-compliant wireless network set up at several locations to stream video highlights of the Stanley Cup Playoffs. Virage's new on-demand wireless streaming capability opens additional distribution channels for delivery of video content.

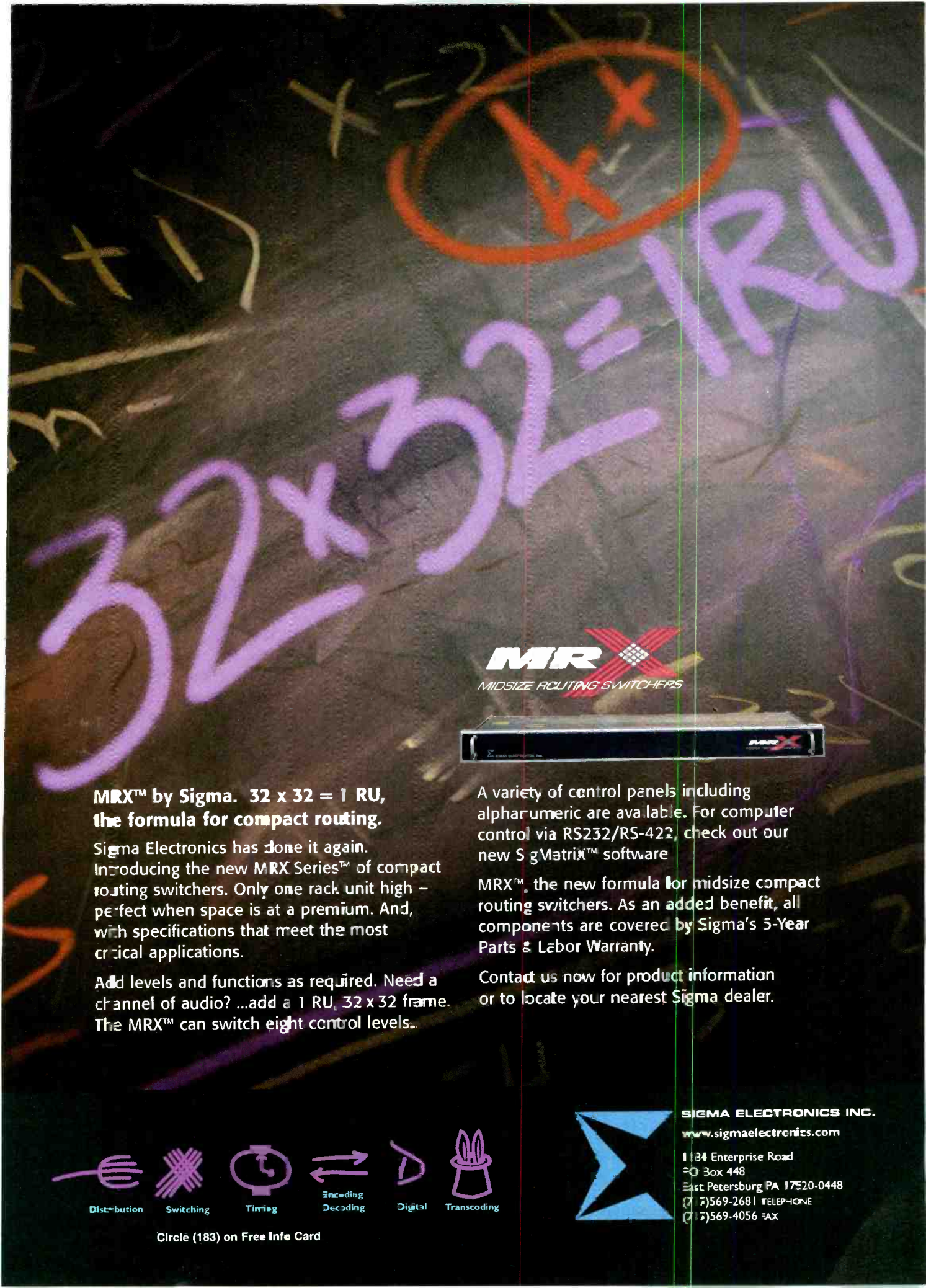
Convera unveiled its new In Progress Highlights technology, which enables users to access video highlights while the live event is still occurring and create customized video reels. Convera's capabilities and services allow analyzing, indexing, managing and publishing video content for online applications.

Mindport Sentriq and PacketVideo announced a strategic alliance to enable Digital Rights Management (DRM) solutions for wireless distribution of content. In addition to providing a compelling multimedia experience for wireless users, the partnership will enable companies at all points within the content delivery chain to protect rich media. This partnership will offer content owners and wireless operators the means to monetize multimedia that has been optimized for MPEG-4 standards-compliant wireless delivery using integrated Sentriq, a Mindport product, and PacketVideo technology.

The Bulldog Group announced the release of Bulldog Two.Seven, its enterprise digital asset management solution. Two.Seven offers integration capabilities with vendors such as Virage, Convera, and Telestream. It provides video logging, video transcoding, intelligent text searching and Quark document management. Bulldog's new API, makes video handling easier to manage with integration to the Virage VideoLogger.

iKNOWLEDGE has developed a new technology called Content Lifecycle Automation (CLA), allowing companies to automate and manage their Web content-intensive business processes regardless of format, volume, or business rule — quickly, easily, and cost-effectively.

Loral CyberStar introduced its ClearStream Suite of Streaming Media Solutions. ClearStream is an IP-based suite of products that enable high-quality, full-screen



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Product Jackpot

Horita showcased its PTR portable timecode reader, which reads SMPTE/EBU timecode at multiple frame rates and displays the time and/or user bit data on a two-line LCD display.
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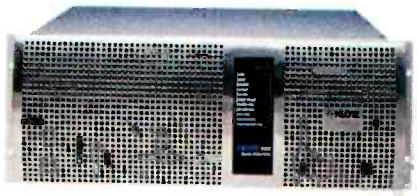

Klotz Digital exhibited its new VADIS 880 digital audio/media platform for routing and distribution of audio and program-associated data.
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Lightwave Communications introduced the DVI-Fiberlynx, a display extension system allowing a keyboard and display to be located up to 1000 feet from the CPU.
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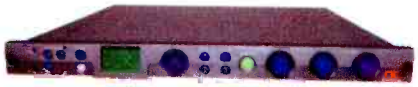

FortelDTV showed its new FS-412, a video synchronizer with independent 12-bit composite and 12-bit component processing paths.
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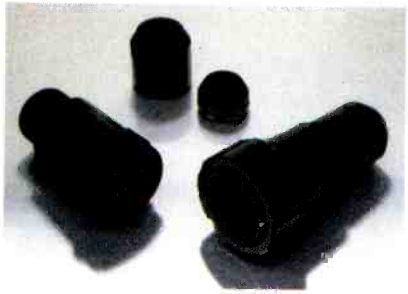


Gepco introduced its new V37 series of DT12 connectors, with low-profile, all-metal, universal termination design.
Circle (480) on Free Info Card

Grass Valley unveiled its new Digital Media Distribution solution with real-time shared storage and the Encore facility control solution.
Circle (481) on Free Info Card

Panasonic introduced the AJ-HDC27V, an HD cinema camera capable of operation at a range of frame rates, including 24fps.
Circle (482) on Free Info Card

distribution and delivery of broadband applications to desktop PCs. Using CyberStar's satellite-based network you can bypass the Internet, avoid wide area network (WAN) congestion and deliver broadband applications to multiple, geographically dispersed sites.

NET-36, a PanAmSat company provides a satellite-based Internet broadcast network that leverages the world's largest network of geostationary-orbiting satellites. The network is tailored to deliver content at a minimum sustained rate of 300k, and an average sustained rate of 500k. Net-36 owns and operates both the satellites and the edge servers to enable Internet broadcast of high-fidelity video, audio and data.

ChainCast Networks is a managed streaming platform service. The chain-casting technology allows customers to stream content by creating dynamic distribution links or "chains" between users. The peer-to-peer technology enables consumers with sufficient bandwidth to act as splitters - transparently sending streams to additional users. ■

Steven Blumenfeld is currently the GM/CTO of AOL-Nullsoft, the creators of Winamp and SHOUTcast.

Test equipment

By Paul Black

Last year's NAB showed a sudden upsurge in the number of monitoring companies producing products designed to monitor digital videostreams, 8VSB modulation, detected HDTV signals and other new signal types that are recent developments in the broadcast industry. Most of these are now becoming standard items in the broadcast engineer's test gear arsenal.

The computerization of test gear is a trend on the increase. However, manufacturers are still producing stand-alone products and probably always will.

Unlike last year, there were not a large number of new "stream testers" introduced. The effort this year on the part of most companies centered on solidifying themselves as the experts in a particular area, and making the equipment they already have more user-friendly and feature-rich.

Sencore, one of the companies who pioneered digital video test equipment, had some advancements. Its field strength-measuring device, the AT1506 (See Pick Hits, pg. 82), is an upgrade of last year's AT986. Significant improvements include an increased recording capability of the signal you're measuring, and, more importantly, global positioning system receiver built into the meter. Now you don't have to try to remember the color of the buildings or some other landmark where you took those field strength readings.

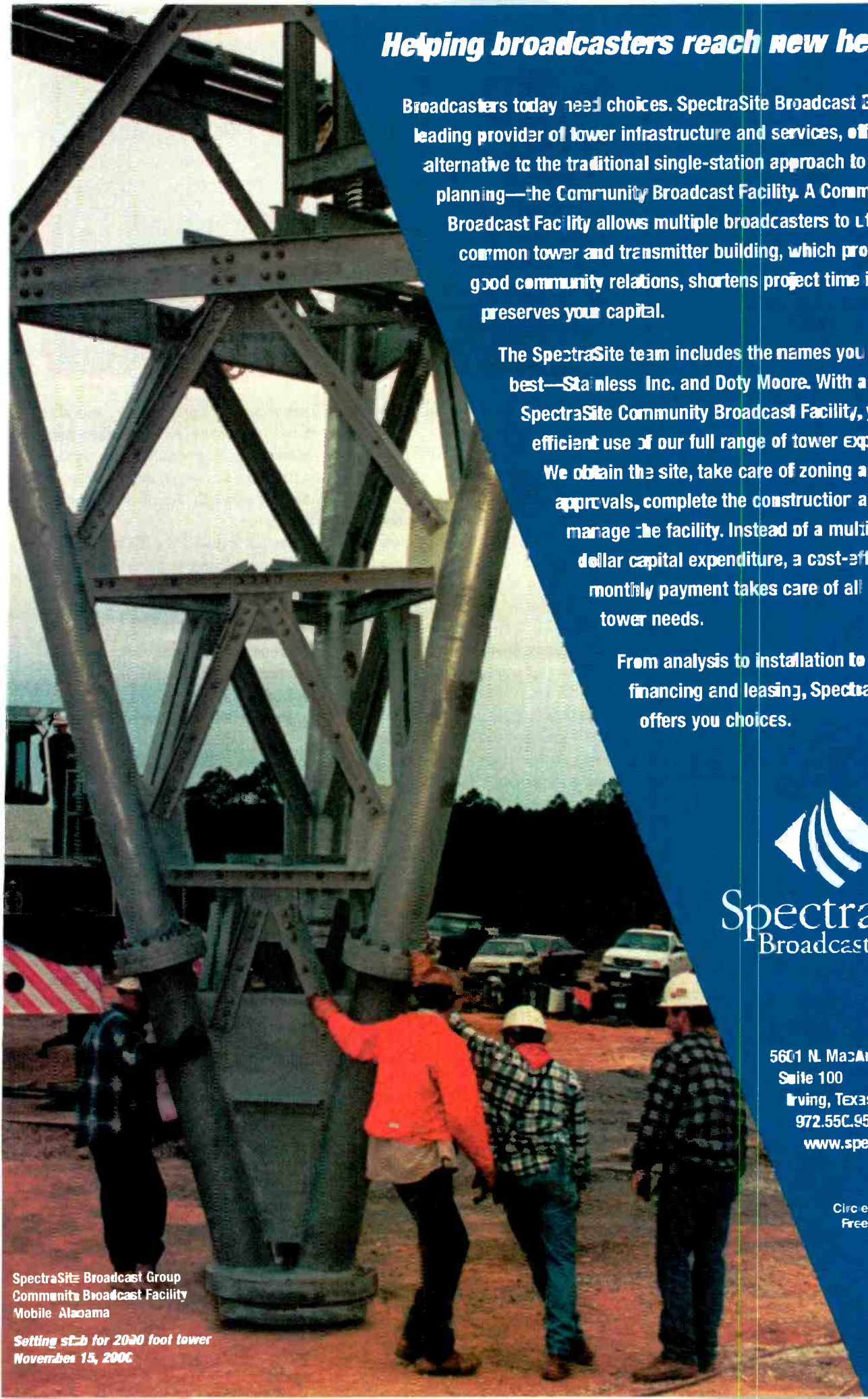
Sencore also had another new DTV test item, an ATSC-compliant baseband signal source. At first glance, it seems like only a transmitter manufacturer would be interested in such a thing. But on second thought, what about testing that digital STL or doing a "proof of performance" on your DTV transmitter?

Again, Rohde & Schwarz advanced its DTV test line by showing the DVQ-M real-time tester (See Pick Hits, p. 82). Unlike many test items that only provide you with parameters, the DVQ-M is a quality tester, designed to tell you what the quality of the signal is, in reference to set standards. If you're dropping I-frames or the motion vectors aren't working, this will let you know. By comparing the signal under test to the standards, deeper levels of measurement capability are possible.

Audemat showed the DTVA01. Lest we forget, DTV's sound is shaping up to be at least as important as the picture. There seem to be few few-channel sound testers available, so this box is somewhat unique in the industry.

Acterna showed its DTS-100, which offers extensive, real-time analysis and capture in an easily portable package. The DTS-100 is capable of in-field analysis of MPEG-2 DVB/ATSC transport streams, running from a laptop plug-in box via the PCMCIA interface.

Audio Precision showed its line of PC-controlled audio measurement systems



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Product Jackpot

Winsted offered the VersaDesk Model E4242, an ergonomically designed wraparound workstation.
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Telestream presented the ClipRemote portable media delivery system.
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AJA Video showed its HD10A, a 10-bit A/D converter that adds an HD-SDI output to HD cameras and computers, VTRs or other analog-only HD equipment.
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Panasonic and Snell & Wilcox announced a joint development that enables DVCPRO and MPEG to be seamlessly integrated by preserving the MPEG "MOLE" data when transcoding to DVCPRO50.
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Broadcast Microwave Services unveiled the Carry-Coder, a portable module that provides wireless digital transmission of camera audio and video signals.
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Evertz offered previews of its F9-2410MD downconverter. The system uses output from the Sony HDW-F900 HDCAM camera to provide composite analog outputs for local and remote monitoring.
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Ross Video demonstrated its CDK-111, a digital master control switcher featuring full frame-synchronization capability and infinite timing adjustment on four channels.
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WireWorks introduced its WireLux line of wire and cable, including the InstaLUX, StudiLUX, UltraLUX and Musilux cables.
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consisting of its System One, System Two and System Two Cascade, as well as a new version of its APWIN monitoring software for those systems.

One area that has received less attention that some others is the measurement of the actual output power of a DTV transmitter using 8VSB modulation. Digital modulation, in general, does not lend itself to the standard methods of "caloric" power measurement; that is, heating up some form of element and interpolating the power from the heat. Whether it's your digital cellular or PCS phone, or your HDTV transmitter, obtaining the true power in the digital domain can be quite a challenge.

To assist the industry with this effort, two major manufacturers have teamed up; Bird Electronics and Harris Corp.

Bird has a new series of meters that are designed to measure the true RMS power of the DTV signal. The "BPM" series (for Broadcast Power Monitors) uses a transmission line section installed at the transmitter output that connects to a 1 RU-high, digital monitoring unit. This system looks at forward and reverse power and also does efficiency calculation, power ratios, etc. It can be connected to a PC, so you can do some system analysis.

In dummy loads, Bird introduced a new series of high-power loads called the Digital Air Series, which claims to handle a 10dB peak over their average power without failure. Again this is designed to allow for the effects of digital modulation.

Tektronix has spruced up the WFM700 monitor to make it a multi-format measurement device, and also allow increased capability when connected to a computer. The front-panel controls area is much more attractive and considerably more user-friendly than before.

Videotek showed the VTM 330E, a rack-mount frame with up to 15 cards in it. Each card has the ability to monitor a videostream in real time by looping the stream through the card. Different cards measure different types of streams and the frames can be stacked. Each frame, or a series of stacked frames, connects to a computer, which can monitor the quality of the stream, and do detailed analysis, again in real time. The computer also can log any intermittent problems, time-stamp them, and tell you what they were in great detail. The connection to the computer is TCP/IP, so you can use the Internet if you want to tie the frames and the computer together.

For certain, today's test gear has something for everyone, or perhaps one should say, a way to test, monitor, analyze, troubleshoot, define or generally discover whatever you want to know about any signal that your plant can generate. ■

Paul Black is Engineering Manager of the San Francisco International Gateway teleport for Loral Skynet.

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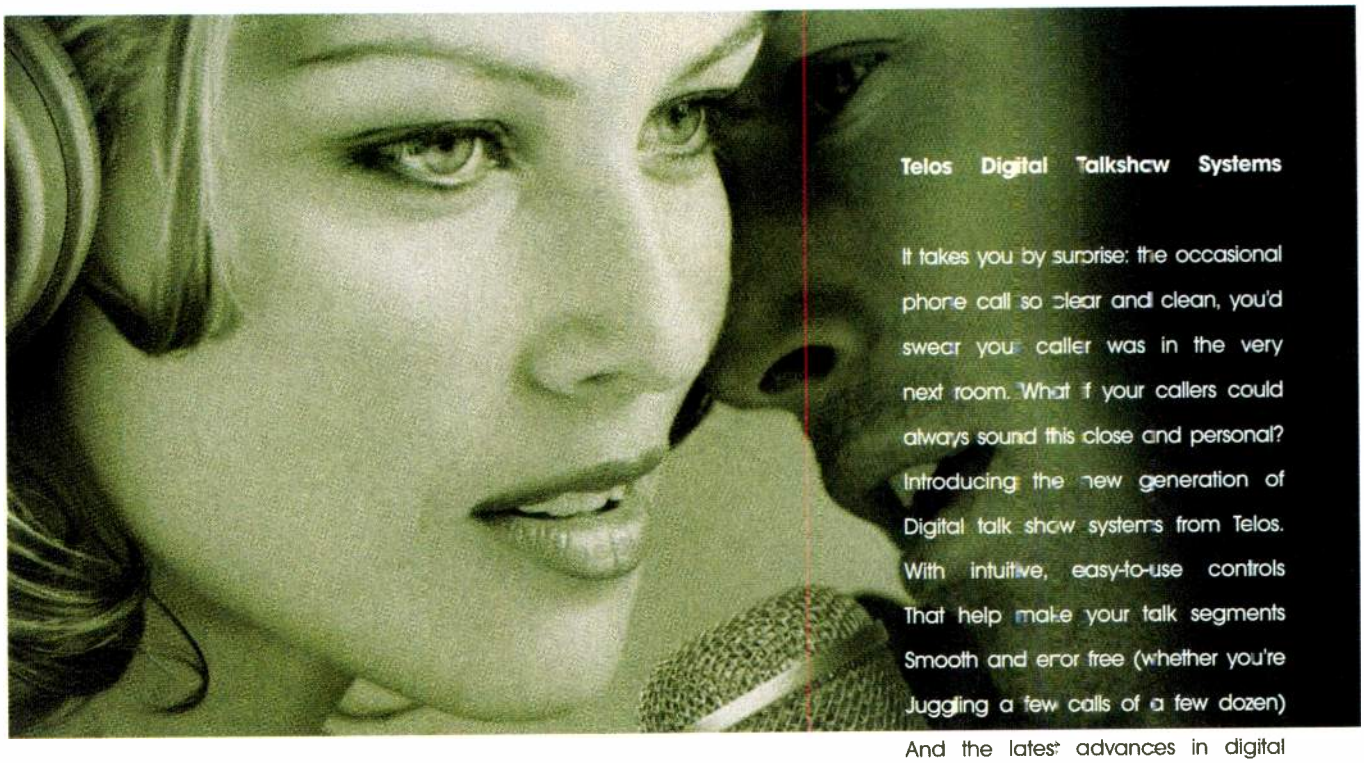

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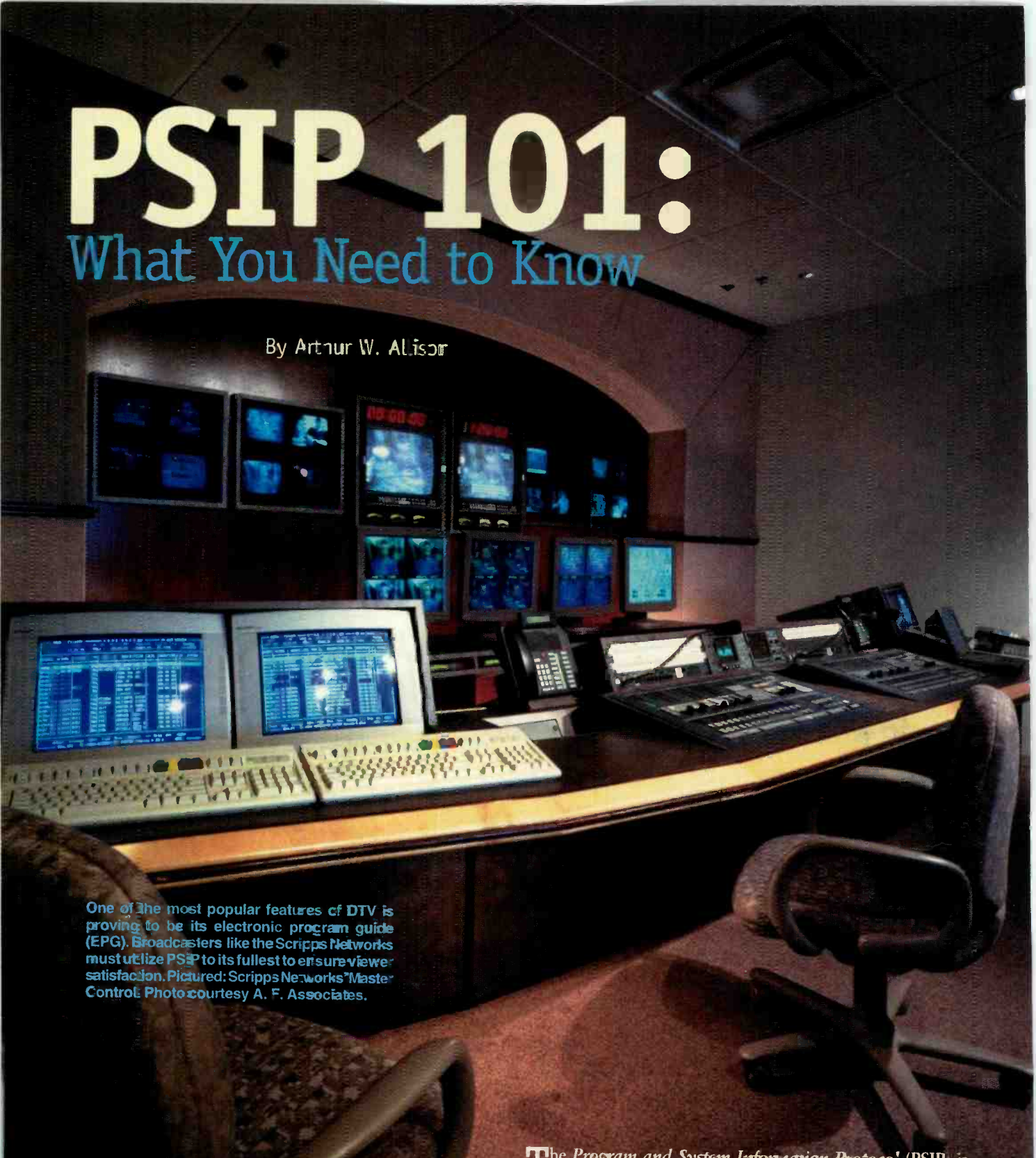
PSIP 101:
What You Need to Know

By Arthur W. Allison



One of the most popular features of DTV is proving to be its electronic program guide (EPG). Broadcasters like the Scripps Networks must utilize PSIP to its fullest to ensure viewer satisfaction. Pictured: Scripps Networks' Master Control. Photo courtesy A. F. Associates.

The *Program and System Information Protocol* (PSIP) is a collection of tables designed to operate within every transport stream for terrestrial broadcast of digital television. The purpose of the protocol, described in ATSC document A/65, is to facilitate the tuning of programs by specifying the information at the system and event levels for all virtual channels carried in a particular transport stream. Additionally, information for analog channels — as well as digital channels from other transport streams — may be incorporated.

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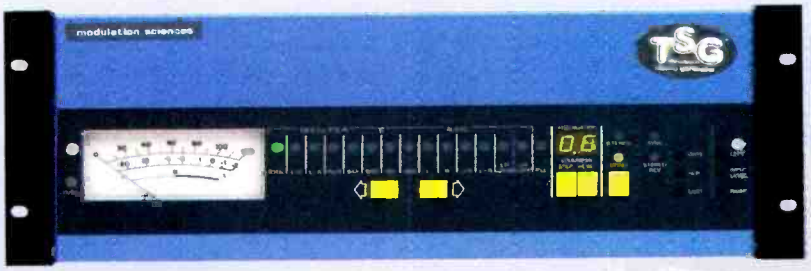

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In DTV, the pieces of the program are sent to the receiver, along with an instruction manual for the receiver to select the right prices and to assemble them properly. PSIP is the instruction manual and it is the broadcasters' responsibility to send the right information to enable proper reassembly. It is the receivers' responsibility to follow the instruction sent.

PSIP information is generated through a process illustrated in Figure 1 for the general case. Figure 2 places the PSIP generator in perspective relative to the ATSC transmission system, and Figure 3 (on p. 144) describes the reception and decoding process.

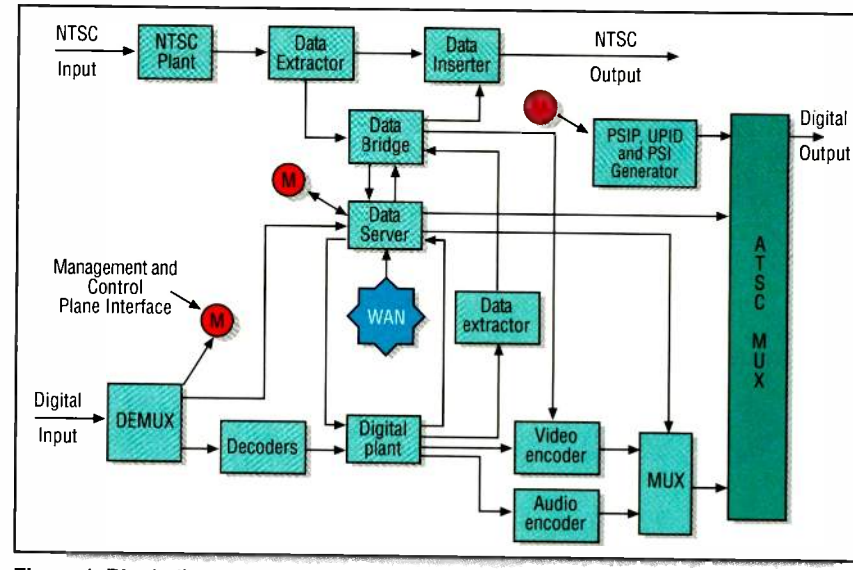

Figure 1. Block diagram of the PSIP generation and insertion process.

PSIP tables

PSIP, in its most basic form, is a collection of tables, specifically:

- *System time table*, STT, which provides the time reference;
- *Master guide table*, MGT, which contains the pointers to the identification number of the packets that contain all other tables (except the STT);
- *Virtual channel table*, VCT, which provides attributes for all virtual channels in the *transport stream* (TS);
- *Rating region table*, RRT, which provides rating information for each geographic region;
- *Event information table*, EIT, which provides program titles and technical data about the planned events on the virtual channels;
- *Extended text table*, ETT, which provides detailed descriptions of virtual channels and events;
- *Directed Channel Change Table*, DCCT;
- *Directed Channel Change Selection Code Table*, DCCST.

Not all of these tables are required for terrestrial and cable applications, as detailed in Table 1.

Table	Required for Broadcast?	Required for Cable?
STT	Yes	Yes
MGT	Yes	Yes
VCT	Yes (TVCT)	Yes (CVCT)
RRT	Yes	Yes
EIT	Yes (EIT-0, -1, -2, -3) All others optional	Optional
ETT	Optional	Optional

Table 1. PSIP tables required for transmission in the broadcast and cable modes.

The STT is a short table that is sent in packets with the base PID. It contains the current time, sent once every second, and is expected to be very accurate, even though the PSIP standard has a relatively wide implementation tolerance of ±4 seconds to allow compliant operation before the integrated digital automation systems are standard equipment.

The MGT lists key information about all other PSIP tables (except the STT), including version numbers, table sizes and PIDs. The MGT allows simpler decoder designs for receivers because any change in PSIP status is flagged in this table. Only the base PID (0x1FFB) needs to be monitored by a receiver to detect changes in PSIP status.

The VCT contains a list of channels in the TS. It may also include the broadcaster's analog channel and digital channels in other streams. For terrestrial broadcasting, the terrestrial VCT is used (TVCT) and for cable, the TVCT or the cable VCT (CVCT) may be used. Key information contained in the VCT includes the major and minor channel numbers, and *transport stream identification* (TSID), pointers to the component streams that make up a program, and descriptive information.

The *major channel number* is used to group all services associated with a broadcaster's NTSC brand, for example Channel 4. The *minor channel number* specifies a particular channel within that group. Zero (0) is reserved for the NTSC channel; all other values (1–999) are allowed for digital services. One

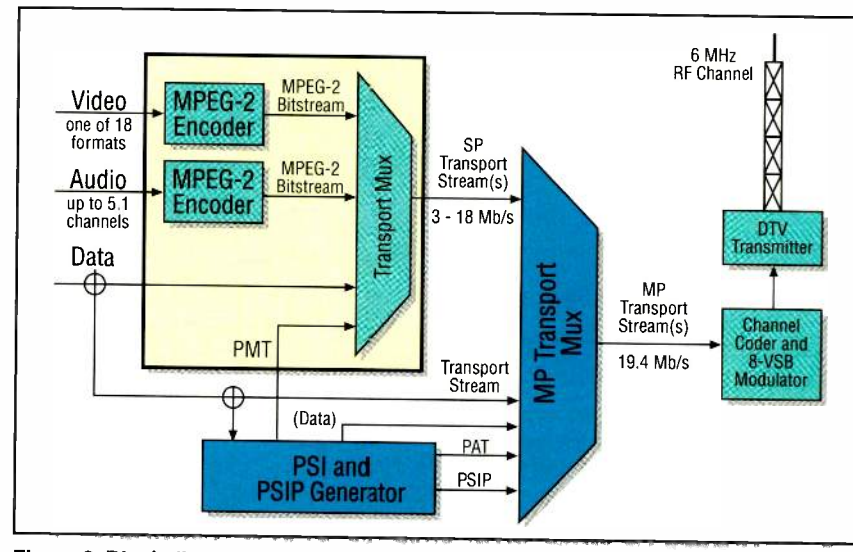

Figure 2. Block diagram of the ATSC transmission system, including PSIP generation and insertion.

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common approach is to start with 1 and to continue numerically for different programs. Data services must use 100 or greater. For example, the NTSC channel would be 4-0, the first digital channel signal would be 4-1, the second 4-2, and the first data service 4-100. ATSC document A/65 assigns major channel numbers for existing NTSC broadcasters to be the same as the current NTSC RF channel number (2–69). Rules for other usage are also covered, with the essential requirement that there be no duplication in a market.

The next major table structure is the EIT. Each EIT covers a period of three hours. The starting time for each EIT is constrained to be one of the following UTC (*Coordinated Universal Time*, the current local time at Greenwich, England) times: 00:00 (midnight), 3:00, 6:00, 9:00, 12:00 (noon), 15:00, 18:00, 21:00.

EIT-0 represents the "current" three hours of programming. For terrestrial PSIP, the first four EITs (EIT-0, EIT-1, EIT-2, and EIT-3) representing nine to 12 hours of programming, are required. The maximum number of EITs is 128, permitting up to 16 days worth of program information to be delivered to receivers. Figure 4 shows what a typical electronic program guide (EPG) might look like.

The ETT is an optional component. It is used to provide detailed descriptions of virtual channels or events. These descriptions are called *extended text messages* (ETMs). The format of the 32-bit ETM identification element tells the receiver whether the ETM describes a channel or an event within the EIT. This format allows the receiver to search for a single description quickly without having to parse the payload of a large table.

The RRT defines the rating standard for a particular geographic region and/or country. The content advisory descriptor, which may appear in the EIT and PMT, indicates — for a given event — the ratings for any or all of the rating dimensions defined in the RRT.

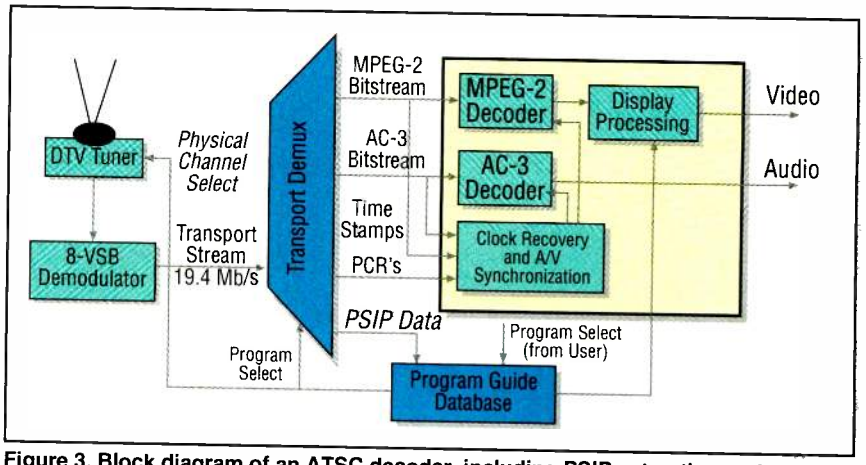

Figure 3. Block diagram of an ATSC decoder, including PSIP extraction and program guide generation.

The intent of PSIP is well known, the details required to make PSIP work are not.

The DCC functionality is an interesting feature that has just completed the formal ATSC approval process. DCC allows broadcasters to tailor programming or advertising based upon viewer demographics. For example, viewers who enter location information such as their zip code into a DCC-equipped receiver could receive commercials that provide specific information about retail stores in their neighborhood. Segments of newscasts, such as weather alerts that are relevant to certain areas, could also be targeted based upon this location information.

A channel change may also be based upon the subject matter of the content of the program. Nearly 140 categories of subject matter have been tabulated that can be assigned to describe the content of a program. A broadcaster can use this category of DCC request switching to direct a viewer to a program based upon the viewer's desire to receive content of that subject matter.

Channel	Name	6:00 pm	6:30 pm	7:00 pm	7:30 pm	8:00 pm	8:30 pm
6-0	XYZ	City Scene		Travel Log		Movie: *Speed II*	
6-1	XYZ	City Scene		Travel Log		Movie: *Speed II (HD)*	
6-2	XYZ	Movie: Star Trek—The Voyage Home				Tune 6-1 for Movie: *Speed II (HD)*	
6-3	NC	Local News		Airport Info		HD Program on 6-1	

Figure 4. Example of what an electronic program guide might look like. Future extensions can enable thematic browsing and sorting.

For further information

In this space available, we have just scratched the surface of PSIP implementation. Interested readers are encouraged to consult the following relevant PSIP documents:

- ATSC PSIP Standard A/65, available from the ATSC website, www.atsc.org.
- PSIP Amendment 1 to A/65A (Directed Channel Change)has been approved and will soon be available.
- Conditional Access System for Terrestrial Broadcast (ATSC document A/70), which defines the ATSC conditional access descriptor for the VCT and EIT.
- U.S. Region Rating Table and Content Advisory Descriptor for Transport of Content Advisory Information Using ATSC A/65 Program and System Information Protocol, September 1998 (EIA-766).
- In addition, the book *Understanding PSIP: Channel Branding and Navigation for DTV* is recommended. This publication is available for purchase from the National Association of Broadcasters at www.nab.org. There is also a PSIP web page at www.nab.org/scitech/PSIP/default.asp. ■

Arthur Allison is director, advanced engineering, at the National Association of Broadcasters and is chairman of the ATSC Implementation Subcommittee.

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Applied Technology

Tektronix's WFM700 waveform monitor

BY GARY MCFARLANE

The implementation of digital technology has created a myriad of production formats that professionals have to measure and quantify. A combination of horizontal scanning lines, vertical pixels and frame rates has made measuring various standard-definition and high-definition digital signals a chore rather than a simple operating procedure. As the world moves from analog to digital transmission with both SD and HD programming, the need to monitor and measure both types of signals in a true multichannel environment is increasing. With the space requirements of separate SD and HD monitoring equipment, a facility can quickly run out of space to perform monitoring and compliance measurements of their digital video signals.

At NAB2001, Tektronix introduced the WFM700 family of waveform monitors to address the need to monitor multiple formats, including 525/59.94 and 1080i or 720p at frame rates of 60, 59.94, 30, 29.97, 24 or 23.96, all from a single digital platform. In their simplest form, the monitors provide simultaneous display of different views of the same signal, whether SD at 270Mb/s or HD at 1.485Gb/s, through the same input.

The waveform monitors accomplish these measurements in a single, 3RU, half-rack-width rack frame. The monitor auto-detects the type of signal it is being fed and can be configured to accept and switch between SD and HD using the same input. Full digital processing from input to display provides accuracy and repeatability of measurements, as well as a flexible user interface.

The need to monitor both types of signals in a true multichannel environment is increasing.

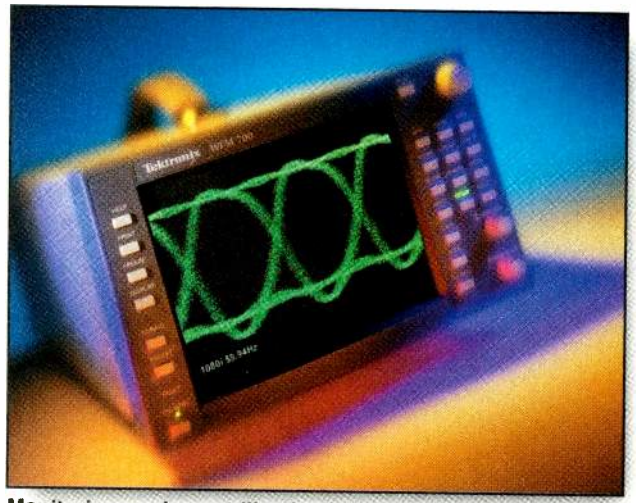
The family of monitors is designed to accommodate changes created by the development of new video formats and new monitoring requirements through the installation of additional modules or software downloads. All models share a common platform and are differentiated by four application-specific, plug-in modules. One slot is used for an external reference module and provides picture monitor outputs. Up to two video cards, which can be configured as measurement or monitoring modules depending on the application, can be fitted into the unit. An additional slot is available for future expansion. The monitoring system accepts a total of four inputs on the main frame.

For measurement modules, a jitter output is available for detailed analysis. The external reference module provides a loop-through analog reference input and analog picture monitor output for a traditional monitor or VGA display. An additional VGA output provides a waveform display to drive a VGA monitor.

An integrated color touchscreen display that is 50 percent larger than traditional CRTs provides ease in viewing when determining video quality. It also has a color LCD so the waveform can be displayed in all with the touch of a button. The LCD color display allows display of a picture monitor of the currently selected signal either in 4:3 for SD or in 16:9 for HD. On the color display, the waveform can be displayed in the traditional green phosphor or the white phosphor, and clear indication of gamut errors present in the picture is provided.

The unit allows alarm conditions to be displayed in a different color for easy visibility of an error. Tektronix has refined the rasterizing engine with proprietary technology that gives the look and feel of a more traditional CRT waveform so that familiar operations of level adjustments in YPbPr or RGB can be performed.

The family of monitors consists of an HD-only monitoring unit; a multistandard, multiformat monitor used in SD, HD and hybrid serial digital operations; and an SD/HD measurement instrument with eye pattern and jitter measurements.



Monitoring equipment like the Tektronix WFM700 waveform monitor (shown above) saves space in broadcast facilities by combining monitoring functions for high-definition and standard-definition signals.

The first two are operational monitors used in verifying a single path, setting levels and checking validity of serial digital signals. The last model provides for the evaluation of the digital transport layer and digital analysis capabilities important to the design, installation and maintenance of 270MB and 1.485GB component digital systems. Eye pattern and jitter displays are provided for both SD and HD systems.

These features and performance also can be enhanced through software. Ethernet connectivity enhances serviceability by providing a simple path for software upgrades, such as those for new digital formats. The platform has 10/100Base-T Ethernet connectivity that simplifies the process of downloading software.

Advanced measurements

Jitter, noise, amplitude changes and other distortions to the serial digital signal can occur as it is processed by distribution amplifiers, routing switchers and other equipment that operate on the signal exclusively in its serial form. The waveform monitors provide users with an array of available measurements to verify the quality of their SD and HD signals. Prior to the monitors' development, the only way for those needing to get the same jitter measurement performance for HD signals was to purchase a $40,000 digital oscilloscope. The WFM700M performs eye pattern (overall signal quality) and jitter measurements while displaying the effects of systemic and random distortion.

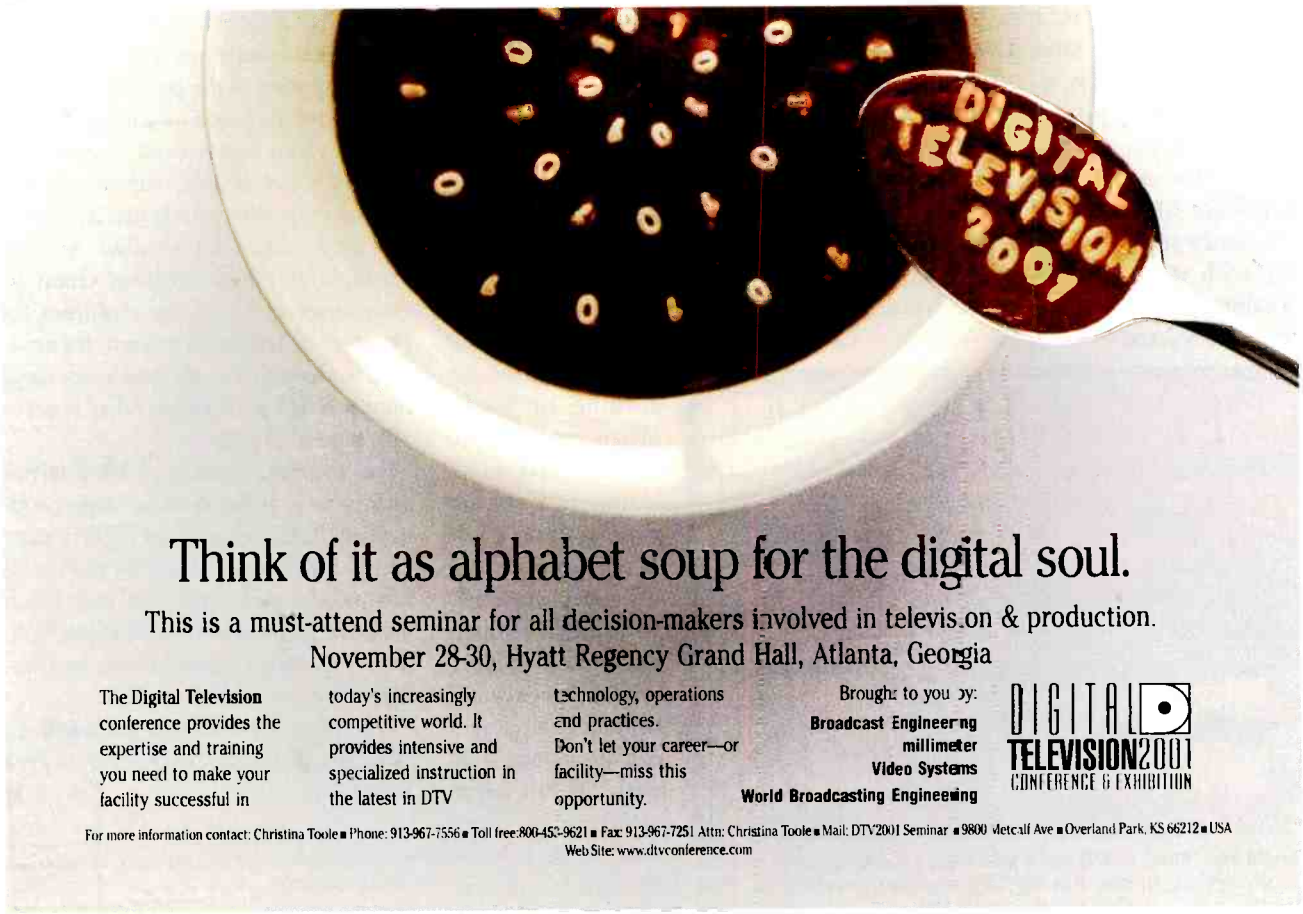
Facilities can quickly run out of space for monitoring and compliance measurements.

The systems monitor gamut in a variety of ways to verify that content can be transcoded into other formats regardless of the format it was created in, and that alarms are logged when the signals are out of specification. Using the Tektronix Diamond Display to show how a component signal fits into legal RGB color space, trigger alarms can be set to alert the operator when illegal colors are produced. Operators can check gamut with the Tektronix Arrowhead Display to show whether a component digital signal would be valid when converted to composite analog for transmission. Alarms can again be set to warn the operator of invalid signals. Gamut errors are highlighted on-screen with Picture Mode for easy recognition in videotape quality control situations.

Traditional video measurements also are supported, including measurements for traditional 75 percent and 100 percent color bars and selectable electronically-generated I/Q axis. The vector display is selectable based on the user's environment. Tektronix Lightning Display allows simple adjustment of luma and chroma signals within a single display. ■

For more information on the Tektronix's WFM700, circle (451) on Free Info Card.

Gary McFarlane is business director of content and broadcast for Tektronix.



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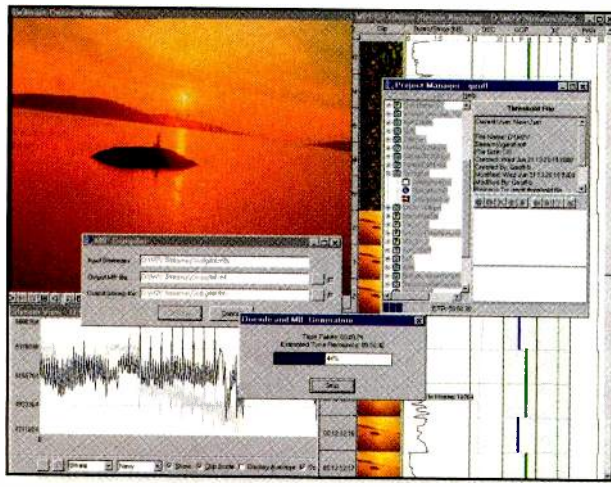
Circle (189) on Free Info Card

Snell & Wilcox's Mosalina MPEG stream analyzer

BY FRANÇOIS ABBE

The first television compression schemes came into use over 40 years ago. NTSC and PAL were devised to squeeze the three full-bandwidth channels, R, G and B from the camera pick-up tubes into the single channel bandwidth then occupied by monochrome. Now compression has moved up nearly an order of magnitude in power with the advent of MPEG-2. Now five or six digital programs are transmitted in the space of one analog channel. In addition, MPEG-2, although initially intended for transmission, is in some cases being applied to studio work. Clearly, with so much depending on MPEG-2, it is vital to be able to easily check and assess its quality.

The sheer quantity of digital television channels means resources are spread thinly, leaving little opportunity for widespread, accurate, in-depth quality assessment. Operational monitoring must be easy to use and low cost — a step up from the complexity of laboratory tools. So the third-generation systems have progressed from hardware to hybrid software/modular hardware-based solutions: starting with the MPEG Offline Stream Analyzer (Mosalina) software from Snell & Wilcox.



Tools like Snell & Wilcox's Mosalina (shown above) enable broadcasters to monitor MPEG-2 signals for errors so that quality is not sacrificed in compression.

Analysis and monitoring

If the picture looks poor, is this because the MPEG-2 coding is not good, or is the original material at fault? Picture Appraisal Rating (PAR) may be used to determine this in video monitoring. PAR is included in both Mosalina software and IQMPAR modular hardware to provide real-time quality monitoring of only the MPEG-2 video artifacts introduced by the last coder. The result is a number on a 0- to 48dB scale that is easy to record and assess. Signals falling outside PAR limits are flagged for further attention.

If the picture looks poor, is the fault in the MPEG-2 coding or the original material?

PAR differs from most techniques in that, for accuracy and simplicity, it measures the coded MPEG-2 signal directly. It does not decode. In addition, it is single-ended and has no need of the coder input signal for reference. PAR is based in high-level math, but closely matches both human and other technical assessments.

For frontline monitoring of MPEG-2 video, PAR is available on modular cards, each providing three PAR facilities — stacked according to needs. When connected to a networked monitoring and control system these allow remote monitoring of many channels with minimal operational intervention.

If PAR goes out of limits, the causes can be investigated with the in-depth monitoring and analysis tools in the Mosalina and corrective action taken before completing the program. Such moves help to keep the MPEG signal within defined quality targets and avoid publishing potential MPEG problems.

From the MPEG-2 bitstream, Mosalina's Project Manager generates metadata files of fundamental parameters such as PAR, bit rate, timecode and GOP structure, as well as picture thumbnails stored in the MPEG stream as MIF and THM files. It also helps to track project assets and provides useful timesaving features.

For broadcasters using MPEG within studios, for streaming servers as well as for digital transmission multiplexes, end-to-end analysis is required. This may start at the point of ingest of new material. Just as with tapes, new MPEG video assets need checking to ensure they will play without a hitch and meet quality standards. Monitoring and checking is also needed throughout the production chain to transmission. Here, de-multiplexing Program or Transport streams for analysis of their programs and associated data provide a check on what is actually sent to viewers.

For content creators, PAR analysis and report generation ensures their product is MPEG coded to the highest standards. This is made easier by the use of further analysis, templates and batch processing from Mosalina's Project Planner — creating operation akin to automated picture quality control.

For more information on Snell & Wilcox's Mosalina, circle (450) on Free Info Card. ■

François Abbe is MPEG product manager for Snell & Wilcox.

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Field Report

Toybox transfers HD to offline with Evertz

BY BILL VARLEY

Our episode clients were early adopters of the new high-definition television standard. They quickly realized the future popularity of HDTV, and though there is presently limited HDTV original broadcasting in North America, they wanted to ensure future compatibility in their current productions. Feature films also have an audience in Europe, and HDTV at 24fps can easily service this market. However, they did not want to make significant changes to their method of operations. They had every right to assume the telecine transfer and post-production facility would make the necessary preparations to provide them with U-Matic and VHS offline editing cassettes, even though the frame rates (and timecode) of the HDTV film transfers may not be the same as the offline cassettes.

This presented Toybox with a challenge. How could we simultaneously color correct and transfer their materials in any one of the HDTV formats and provide them with the usual complement of vertical interval editing codes on a standard-definition offline videocassette? Additionally there had to be a solid lock between the EDL our clients returned to us and the codes on the Master HDTV, to provide for the possibility of searching for scenes on the original film should re-transfers be required. There might also be a requirement to cut the negative and create a new finished film using laser recorder technology.

Searching for a solution led me to Evertz Microsystems. The Evertz HD9025TR, HD9150 and KeyLog Tracker conversion package promised to maintain all the traditional codes within an HDTV pipeline.

Toybox also wanted to have the film numbers recorded in the correction list of our color corrector to enable us to search the film via the edgecode using the transport controls of our color corrector in case there was a need to re-transfer scenes from the original film. To this end, Evertz produced code that would pass the relevant information through an auxiliary communication port on the tracking computer for input to our Pandora color corrector.

So how is this information gathered, transmitted, stored and displayed? The HD9025TR can be thought of as a code formatter rather than simply as a timecode generator for multiple frame rates. All configuring on the HD9025TR encoder must be done via the companion Keylog Tracker software system.

Feature films also have an audience in Europe, and HDTV @ 24fps can easily service this market.

Upgrading an SDTV suite that already has a 5500 Film Decoder requires an upgrade to a 5550. The film decoder converts the number information from the edge of the film into a serial datastream and transmits this to the encoder via RS-232, where it is combined with audio source timecode (30fps) if sync sound is desired. From the telecine the encoder receives biphase clock pulses and frame ID pulses that inform it of the position and cadence of the film during the transfer to tape. This information, and the generated master timecode, is then encoded into a bitstream and inserted into the Vertical Ancillary Data Area (VANC) of the HDTV bitstream. The resulting HDTV SDI bitstream is then recorded onto the original transfer tape. Simultaneously, the transfer materials, codes and comments are logged on the tracking computer and then saved on removable media for export to other systems.

Another piece of equipment in an HDTV setup is the HD9150, an HDTV-to-SDTV converter with character keying capabilities as well as a VANC data reader. (It is worth noting the SDTV output of the HD9150 was not designed nor intended for broadcast. Its primary function is monitoring and the making of offline cassettes.) The converter has two SDTV output formats, analog and 601. Because the converter can read the metadata generated by the HD9025TR, all codes recorded in the VANC of the master HDTV deck are maintained in the downconversion. This is no mean task when converting between 24psf HD masters and 30i SDTV offline cassette. Consider what must be done. Obviously the SDTV will require the insertion of a 3:2 cadence because we are going from 24fps to 30fps. The cadence must be predictable and replicable. The timecode on the original transfer tape is also turning over at 24fps, so the downconverter must generate 30fps timecode.

The system has provided us with a solution for our episode clients, although we had to work out a few bugs as our units were early release versions. One was in the communications modules of the tracker computer, which intermittently and erroneously displayed communications errors during the configuration procedure of the HD9025TR. Another caused an internal buffer in the encoder to overflow, resulting in an interruption of the VANC metadata. Both were quickly isolated and resolved. Also, the HD9150 had a color-space conversion problem that resulted in standard-definition conversions of a green hue. Evertz has solved this problem as well. ■

For more information on the Evertz HD9025TR, HD9150 and KeyLog Tracker, circle (452) on Free Info Card.

Bill Varley is chief engineer at the Toronto Toybox division of The Command Post & Transfer Corp.

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Circle (191) on Free Info Card

Anvil Post Production expands with Solid State Logic

BY ROGER BECK

Anvil Post Production, a division of Vidfilm International Digital, is one of the UK's leading audio post houses and offers end-to-end audio solutions to producers of both feature films and high-end television dramas.

Located in Denham, just west of central London, Anvil's facilities include fully equipped digital sound editing rooms; optical sound transfers to Dolby SVA, Dolby SR-D, DTS and SDDS, ADR and Foley rooms; and two feature dubbing stages, each equipped with a Solid State Logic Avant digital mixing console.

Both theaters were refitted by Solid State Logic in 1998 and since that time have seen action on feature films such as "Her Majesty Mrs. Brown," "House" and "Waking Ned Divine" and television dramas including "Inspector Morse," "Randall & Hopkirk Deceased," "Hope and Glory," and "Close and True."

Anvil has also recorded music for titles including "Silence of the Lambs," "Naked Lunch" and "Supergirl." Theatrical foreign versions are also made here – "Gladiator," "Independence Day" and "GoldenEye" amongst them – and the very first Dolby SR soundtrack, "The Wolves of Willoughby Chase," was mixed at Anvil.

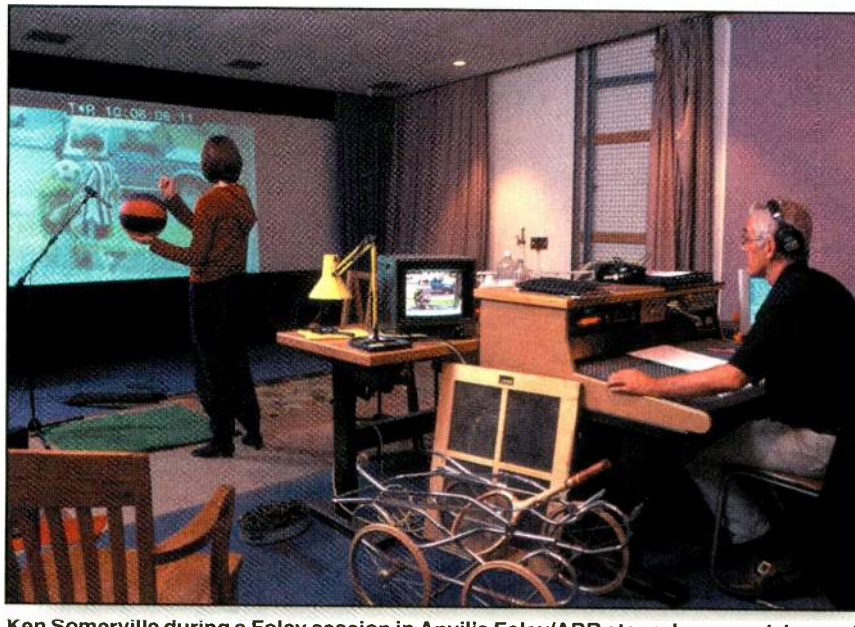
Demand for the services Anvil provides to the television and film industry has increased with the advent of formats like SR-D, DTS, SDDS, surround sound TV mixes and lateral 5.1 for DVD. Before the SSL refit, Anvil serviced these requirements in just one THX dubbing studio, equipped with a Soundcraft 3200, MagTrax 5.1 monitoring, with no automation and only 56 inputs. The Soundcraft desk was a brilliant workhorse, but time and technology move on.

Anvil didn't want a board that re-invented the wheel just because it had gone down the digital route.

Looking at the direction in which the post-production industry was headed, Anvil realized that to retain existing TV and theatrical clients while still attracting new ones, a second studio and expansion of the central machine room were required. After careful consideration, Anvil decided to acquire two Avant consoles. Although this decision came later than that of other studios in the same league, Anvil believed that it would be prudent to wait a little longer while the technology advanced.

For the upgrade, the goals were simple. Anvil wanted a streamlined, two-studio configuration that could handle a variety of mixing work. Because technically speaking, the two rooms would be almost clones, projects would be able to be passed between the room with no compatibility problems. With this state-of-the-art setup, Anvil could take on twice the workload and still stay completely within the digital domain. As a result of the upgrade. Anvil is now able to mix large numbers of tracks quickly, while still satisfying today's complicated delivery requirements. Moreover, the studio can recall any of the mix configurations by entering the name of the project.

When Anvil decided to upgrade, the studio knew it wanted total automation, with at least 180 inputs and a comprehensive monitor matrix. However, it didn't want a board that reinvented the wheel just because it had gone down the digital route. With a two-desk setup, the studio would need to be able to network occasionally, and simultaneously be truly digitally connected to the outside world, without the need for add-ons. The current networking structure is two digital



Ken Somerville during a Foley session in Anvil's Foley/ADR stage. Increased demand for Anvil's post-production services due to the advent of surround sound and 5.1 formats was a driving force behind its expansion of its facilities.

A range of music has been recorded at Anvil, including U.S. titles such as "Silence of the Lambs" and the first Dolby SR soundtrack. The main Dolby Mix room, Studio One, is shown above.

consoles linked to a central brain. All record, replay and outboard devices are connected to this, which makes it possible for either mix room to access the gear it needs. Setups and automation can flow between the mix rooms by utilizing either SSL's proprietary software or magneto-optical disk.

The process of choosing the right desk took about a year. As he was searching, dubbing mixer Alan Snelling had the good fortune to work with a Dutch mixer, Wim Wonk, who had his own four studio outfit in Amsterdam with four SSL Axiom desks. With his recommendation of the consoles and SSL's implementation of nine-pin control, which made the desk a complete center for all operations, it seemed that the search for the right desk was almost over. Many trips to SSL followed, and although the Axiom was clearly a step in the right direction, there were still some outstanding issues to address in terms of multiformat monitoring.

Snelling was the first person outside of SSL to view the prototype of SSL's new Avant dubbing console. It became apparent it was a truly digital desk, with look and feel of a traditional analog control surface. The last piece of the puzzle had fallen into place and within a week Anvil had placed an order for two consoles with SSL. By July 1998 Anvil had two 192-channel digital consoles up and running in newly refurbished rooms.

The new boards have more than lived up to Anvil's expectations, in every respect. At the time of installation, the two SSL boards were, in fact, the first two Avants to be supplied to a commercial studio operation.

Anvil seeks to constantly push the envelope of audio convention and sometimes surprises itself with what can be achieved. The digital technology contained within the Avants has radically changed the way projects are completed at Anvil. More multitrack pre-mixing allows more choice at the final mix stage, virtual mixing is carried out with ease and total recall is perfect, waving goodbye to patchleads. The way projects are handled now presents dubbing mixers with new challenges, but the Avant offers precision, speed and flexibility and has given staff a boost in confidence and creativity.

Recently, Anvil was acquired by Vidfilm, a well-known audio, video and film post production house. Being part of the Vidfilm International Digital facilities group adds a whole new dimension to Anvil. As a result of the acquisition, Anvil is able to offer clients a range of related post-production services like digital video mastering, QC, high-end conversions and DVD authoring and encoding as part of sound post packages. Vidfilm is currently installing a broadband link to its new mix theater in Los Angeles so it will be able to exchange audio and mix files easily and run real-time ADR and playback sessions using talent in London for directors in Los Angeles and vice versa.

As for the future of the facility, its primary mission hasn't really changed. Anvil will continue to work hard to maintain the highest standards, both technically and creatively, for its clients. This will involve not only keeping up to speed with the latest developments, but also knowing how to use the new technology in an artistic and sympathetic way. ■

For more information on Solid State Logic's Avant, circle (453) on Free Info Card.

Roger Beck is managing director of Vidfilm Europe.

Circle (192) on Free Info Card

HD conversion products: The big picture on small pixels

BY JOHN LUFF

For many years consultants, equipment designers, production professionals and system planners have mused about how to effectively manage the transition from our low-resolution 525/625 television systems. In conversion matters, the image format issues seem to garner the most interest. People would rather discuss conversion of line rates and pixel counts than more esoteric issues like colorimetry. My guess is that much of the arcane but critical information one must consider in conversion is not well understood by most professionals in the industry.

There a number of technical parameters that are routinely modified in conversions between standard-definition and high-definition video formats. They include issues of technical format (analog or digital), captured image format (frame rate, interlace or progressive scanning, active picture sampling, aspect ratio), and ancillary information like embedded audio. Any geometric conversions also must take into account the effect in the special and temporal domain on the artistic intent of the original image maker.

Conversion between pixel sampling maps has become rather routine. For clarity, those include conversions from SD to HD, the inverse of that conversion, and conversions between the various HD formats. The sampling and filtering science involved first showed up in professional products over two decades ago, with standards conversion for 525 and 625 applications and digital video effects. In the HD domain the conversion might be between 1080p and 720p pictures. That would entail a filter and re-sampling operation on a picture that originally was 1920x1080 samples to create one that is 1280x720 samples. If static, the conversion is not particularly difficult. However, if one considers frame rate, the murk increases.

The picture is not improved by upconverting a 525 signal to HDTV for DTV transmission.

Most professionals recognize the issues. The most familiar case is 525-to-625 conversion. The dropped frames create a judder not unlike that seen when using film and video together. But consider the judder when 1080i is used in an NTSC world. That requires a frame rate of 30/1.001, or 29.97fps (59.94 fields per second). If we were to operate with cameras at 60Hz, we would have to drop a little less than two frames per minute, or about one field every 15 seconds. The other way to deal with it is to continuously interpolate the display frame, with the consequence that considerable memory and complexity is added to the process. Conversion done with motion interpolation has the effect of dramatically softening the picture, which might be better than missing frames in some cases, such as live sports.

In general it is true that special interpolations, i.e. changing one sampling grid to another, are more successful when converting higher pixel counts into lower ones. It seems intuitive that decimating a 1920x1080 picture to one that is 720x480 will produce a much better result than the inverse conversion. This speaks directly to the practice of many broadcasters today of upconverting their 525 signal to HDTV for DTV transmission. The simplest way to say it is that the picture is not improved by doing the conversion. The line structure will disappear and not all of the detail will be preserved. If a high-end converter is used the net effect may be quite pleasing, but use extreme caution with such conversions. You may find that the picture displayed in the home is worse due to the necessity of applying bits to create an HD signal, when the same number of bits would produce outstanding native 525.

Transmitting interlace allows fewer lines total to be transmitted, while preserving the impression that the resolution of the signal has not reduced. The "integration" the human visual system adds makes this trick possible. When the current standard was designed, interlace allowed a significant increase in picture quality, given the state of the technical art. But few would argue that, if technology allows, a progressive signal will produce a superior result. Given sufficient vertical resolution the difference is hard to spot. Compare for instance 1080i

Conversion tools enable broadcasters to adjust technical parameters such as aspect ratio to deliver a quality signal at any resolution. Photo courtesy Teranex.

and 1080p at the same frame rate. For a more interesting comparison look at the same scene with 720p and 1080i. It is hard for many observers to see any difference in vertical resolution, and indeed mathematically there may be little difference. The most obvious comparison is 480i (525 NTSC) and 480p, where the progressive signal is always picked by professional and non-professional observers as superior. It contains twice the vertical information, and thus is truly superior.

The thing most obvious to many people about HDTV is the aspect ratio or the display. It is hard to find a happy medium when converting back and forth between 4:3 (like NTSC and PAL), and all widescreen 16:9 formats. 16:9 (or 1.778:1) provides 33 percent more width than 4:3 (or 1.33:1). It is arguably a better match to the human binocular visual system, and certainly closer to the aspect ratio of motion pictures. The most complicated and intractable issue in conversion is aspect ratio. Though it can be measured with numbers, the decisions are artistic rather than technical. A properly designed upconverter can leave side panels beside the 4:3 frame or truncate content top and bottom to fill the frame. Downconversion can leave "letterbox" bars top and bottom, or truncate the sides of the HD image. Variations include nonlinear methods of stretching the picture to fill the horizontal frame in the 16:9 window or panning the HD image across the 4:3 frame. All of those choices are "non-technical."

The form of the pixel sampling format is essentially fixed. All studio devices, SD and HD, use 4:2:2 sampling for interconnection (SMPTE 259M and SMPTE 292M), but outside of the studio formats a plethora of sampling and coding formats exist in both the DV and MPEG domains. Systems using 4:2:2, 4:2:0 and 4:1:1 all work well, but be aware that concatenating pictures compressed using varying schemes will leave complicated footprints in the picture which may well not be compatible with other image transformations. For instance, a DVE expansion of an image that has been through multiple processes may well show filter artifacts that resemble aliasing.

Colorimetry is not often considered outside the design lab. With HDTV the standards organizations had an opportunity to pick color primaries and coding that optimizes colorimetry. However, when converting an image from NTSC to HDTV it is important to apply the most appropriate colorimetry transformation so that the color of the original image as chosen by the artist is properly replicated in the new colorimetry of HDTV.

Conversion from analog to digital (or the inverse) requires careful consideration as well. Pick a converter that has good filtering so that the signal will conform to the standards. Not paying careful attention to a manufacturer's spec sheets could lead to lower performance. It they do not offer a statement that they conform to an accepted and published standard ask them for full data. Inexpensive converters usually produce a visually pleasing picture, but may well leave unwanted energy in the signal that will cause other problems, or filter too heavily to prevent aliasing, leading to reduced performance.

Finally consider other data embedded in the signal you are converting. What happens to closed caption data, VITS and embedded audio may well be as important as the active picture in some applications. Data tends to be stripped off and at best reinserted after processing, and at worst not reinserted at all. For instance, upconverters in general do not pass closed captioning to the output, either embedded or discretely. ■

John Luff is vice president of business development for AZCAR.

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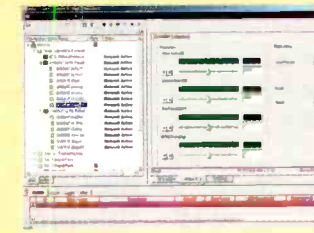
Intelligent Paradigm Primatte Explorer

Intelligent Paradigm's Primatte Explorer system performs production and post-production matting in real-time in both high-definition and standard-definition models. It takes elements, such as translucent materials, in a foreground shot and composites them in the background footage.



Leitch Pilot

The Leitch Pilot command control system provides open, scalable access via standard protocols to entire networked systems. Windows-based software allows easy configuration, control, monitoring and secure access to Leitch and third-party networked equipment.

Business highlights from broadcast and production

BY NANCY INWOOD, ASSISTANT EDITOR

Miranda Technologies has acquired Oxtel to help further the mission of the two companies to provide solutions for centralized broadcasting and multichannel delivery.

NBC has agreed to a three-year technology agreement estimated at up to $25 million to deploy Grass Valley Group solutions in support of the Network's companywide centralcasting, new production, media asset management and HD playback.

Baranti Group has become a recommended design center by Genesis Microchip. The addition of Baranti will allow Genesis to connect its customers with a design resource. It is the first design center of this kind in Canada.

Turner Studios has purchased the Accom Abekas 6000 MultiFlex DTV Server for use in its main control room for live, play-to-air applications.

Boston's WB affiliate and Tribune Broadcasting station WLVI (WB56) has completed installation of an AMS Neve BTC analog console in its audio suite.

Fox Digital, Los Angeles, CA, has purchased AJ-HDC27V variable-frame HD cinema cameras from Panasonic.

Canadian Broadcasting Corp. (CBC) has selected Pinnacle Systems' new MediaStream Networked Storage system for its Toronto-based network control center.

Sweetwater Digital Productions has become the first to purchase and use Fujinon's new XA87x9.2ESM HD zoom lens. It purchased four lenses for its new mobile production truck.

WLS-TV, the ABC-owned and operated station in Chicago, has completed a two-year, $5 million rebuild of its technical facility in order to support HD digital television. WLS-TV has equipped its studio with a Thomson/Philips Venus serial digital router with a Jupiter control system with machine control to supplement its Venus 160x128 analog video router and Venus 160x128 stereo audio router.

JVC Professional Products Company has shipped an initial order of D9-HD 100MB/s recorders to Fox Digital for use in episodic television production.

JVC also announced that Yahoo! Broadcast Services is using JVC DV-500 camcorders for the daily acquisition of remote and studio footage used for delivering video webcasts.

Panasonic and Snell & Wilcox have joined together with NBC to integrate DVCPRO for newsgathering and editing, and MPEG for contribution feeds, transmission and storage.

Diversified Communications has purchased nearly $2 million of analog and DTV transmitter systems from ADC.

CBS affiliate station KENS-TV, San Antonio, TX, has received its second shipment of Harrison TV5.1 surround consoles.

People

Warren Allgyer

Warren Allgyer has been named vice president of worldwide sales for Kasenna and will lead the company's efforts in the Americas, Europe, Africa and the Middle East.

Vela appointed Bill Robertson president of the company's Broadcast/Systems Division. Rob Shevlot was also appointed the division's vice president of sales and marketing.

Jerry D. Chase

Thomcast Communications' president, Jerry D. Chase, was named head of Thomcast Group Global Operations. Chase succeeds Patrick Desproges who was promoted to a senior executive position in Thales Group Information Technology & Services Business Area. ■

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SONY

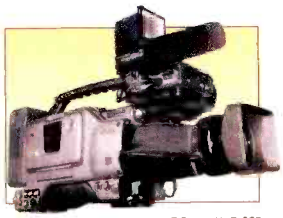
DSR-250 3-CCD DV & DVCAM

Introducing everything you need in an event camera and more. The new completely digital DSR-250 from Sony is a high image quality reduced size camcorder which has been optimized for shooting events and parties. Every feature you could want is included in this revolutionary acquisition tool.

- **1/3 inch x three 380K pixel** (effective 340,000 pixels) **CCD's** allow two scanning modes: 480 progressive (still) or interlaced (for video) • One touch auto focusing in manual focus mode.
- **530 lines of horizontal resolution.**
- **Switchable aspect ratio** 4:3 (TV mode) or 16:9 (Movie mode)
- **DXF-801 high resolution 1.5" black & white viewfinder** (same as on DSR500/1 & DXC-D35) enables easier focusing. Automatically switches from 4:3 aspect to 16:9.
- **58mm lens** with **12x optical zoom.**
- **Records in DVCAM or DV,** standard tapes or mini. Up to 270 minute recordeding in DV mode onto a 184 min. DVCAM tape.
- Manual or automatic functioning: Focus, Iris, Shutter-speed, Zoom, Gain (3 positions and memory).
- **Flip out 2.5" 200,000 dot LCD monitor,** finally available on a professional camera • Time date stamp.• Soft shoulder pad.
- **Advanced optical stabilization** allowing for a high quality digital zoom out to 24x, with a maximum digital zoom out to 48x
- **Assignable time code** (Rec Run, Free-run, User-bit)
- 16 bit 2 channel audio recording, or 12 bit 4 channel
- **Digital in/out** (IEEE1394) and **analog in/out.**
- **Still image capture onto memory stick** – Upload graphics from memory stick or USB adapter, software included
- Phantom 48V power • Built in speaker • Directional microphone in pro mic holder, 2 XLR audio inputs
- **Wireless remote.**
- **Built in edit controller.** Equipped with an i.LINK interface, allowing camcorder to serve as edit player or recorder
- External 12V supply/Connection for light. The DSR-250 is equipped with light output (DC 12 V, maximum 30 watts)

DSR-300A

3-CCD Digital (DVCAM) Camcorder

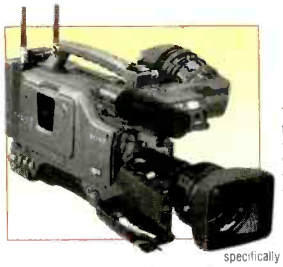


The affordable DSR-300A actually extends operational convenience with a range of new features and peripheral products. Remarkably compact and lightweight, the improved DSR-300A provides high mobility without compromising picture quality and can be held comfortably on your shoulder through the longest shoots and gives videographers the ability to acquire their footage quickly and easily.

- The DSR-300A has three 1/2" IT Power HAD CCDs to deliver 800 lines of horizontal resolution, 62dB S/N ratio and high sensitivity of F/11 at 2000 lux.
- With built-in 26-pin VCR interface, they can feed composite or S-Video output signals to an external recorder for parallel or back-up recordings. VCR recording modes including Parallel, Internal (only) and External (only) are selected via the trigger switch positioned on the operational panel.
- LSI Digital Signal Processor (the very same one used by the DXC-D30 cameras) for a high signal-to-noise ratio of 62 dB.
- Both mini cassettes (PDV-M series) and standard cassettes (PDV series) can be used with the DSR-300A. With PDV-184ME (standard), a maximum recording time of 184 minutes can be achieved. They can also play back tapes recorded in the consumer DV format.
- For operational convenience while shooting, the Time Code is superimposed on the viewfinder screen or MONITOR OUT screen, even during playback.
- DXF-801 viewfinder featuring variable peaking, 3 level tally light and a white LED light with 2 levels of intensity to illuminate the lens setting. • IEEE1394 i.Link (out only)

DSR-500WSL

2/3" 19:9 CCD (DVCAM) Camcorder



The DSR-500WS camcorder gives the video journalists the ability to acquire footage quickly and easily because the required functionality and performance was packed into this camcorder. In the meantime, the next generation widescreen TV's have been introduced and the demand for video material in widescreen (16:9) has greatly increased not only in broadcasting, but also in the event production and corporate communications market. To meet this demand , Sony offers this Widescreen Digital Camcorder. The DSR-500WS offers outstanding picture quality by adopting full Digital Signal Processing and three 2/3-inch (520k) Power HAD WS (Wide Screen) CCDs which are specifically designed for a 16:9 aspect ratio, switchable to 4:3 full screen. The camcorder extends the mobility, operational convenience and system flexibility with a range of peripheral products. Built-in digital output of the i.LINK interface for backup and simple field editing is just one example. Technological advances in Sony DSP and CCD Technologies, many powerful options and a convenient low price-point make the DSR500WS a formidable tool for a wide range of applications.

DXC-D35/D35WS

Dockable (DVCAM) Camcorder

The DXC-D35/ D35WS cameras are designed to the highest specifications, providing unprecedented video quality in this price range. The DXC-D35 is at home in the studio or field, docking directly to a host of backs including Betacam SP and DVCAM, as well as studio backs and viewfinders. The highly adjustable picture means that these cameras are ideal for capturing detail in low or changing light, as well as compensating for peoples skin flaws while keeping the rest of the image sharp. DXC-D35WS is switchable 4:3 to wide screen 16:9 ratio.

The DXC-D35WS camera is the latest Sony digital camera designed to the highest technological standards. With the proven Sony DSP technology combined with Sony high performance 16:9 CCD's. This high standard was previously held by the DXC-D30 series now being replaced by the NEW DXC-D35 series. DXC-D35 series feature a new Prism Assembly, new Pre Amplifiers, new DSP Software and a new Digital Encoder resulting in astounding performance. The DXC-D35WS camera fully interfaces with Sony's CCU-TX7 Wideband Component Triax System. It provides 8 set-up files (3 user) as a stand alone. 16 additional scene files (all user settable)are available when combined with the RCP-TX7 remote control panel. The DXC-D35WS is equiped with three 2/3" IT Power HAD CCD's switchable between 16:9 and 4:3 aspect ratio's. The camera docks to DSR-1 DVCAM and DNV-5 Betacam SX recorders for digital video recording, or PVV3 and BVV-5 Betacam SP recorders for analog recording.

- 880 TV lines of resolution for DXC-D35
- 850/800 TV lines for D-35WS • Two REC tally lamps
- DXF-601W New Viewfinder Switchable 16:9 to 4:3
- VF lens light with on/off switch • 3 level Tally light
- Display characters on/off switch • Take Tally
- Horizontal and Vertical peaking • Die cast aluminum
- Better flare compenstation • DynaFit shoulder pad
- Lower minimum illumination (0.25 lux with HyperGain)
- Better color reproduction at high gain
- Improved dark detail and contrast • New preamplifier, prism and encoder • Better performance at overloads
- Reduced noise at Gain Up • Variable color temperature adjust
- Adjustable 4:3 safety zone when at 16:9
- New HyperGain mode of +42dB gain
- Aspect ratio select from Main Menu

JVC

GY-DV500U

1/2-inch 3-CCD Professional DV Camcorder

QUICK DIAL 74

The GY-DV500 combines the convenience and cost-effectiveness of Mini DV with the performance and features you need. Incorporate three 1/2-inch 380,000 pixel IT CCDs for superior picture performance (equivalent to 750 lines of resolution); superb sensitivity of F11 at 2000 lux and minimum illumination of 0.75 lux (LoLux mode). Rugged construction with a rigid diecast magnesium housing. Extremely portable, compact and light weight (less than 11 lbs. fully loaded). Additional features like the menu dial and Super Scene Finder assure ease-of-use and shooting flexibility, while the IEEE1394 and RS-232 interface allow integration into various non-linear and post-production systems. A professional camcorder in every sense, the compact, lightweight GY-DV500 redefines acquisition for corporate, educational, cable and broadcast production, as well as wedding videography and multimedia applications.

Professional Specifications

- Applies JVC's DSP with advanced 14-bit video processing to bring out more natural details, eliminate spot noise, accurately reproduce and restore color in dark areas.
- CCD Defect Correction function evaluates white defects with the lens closed and then stores their addresses in memory. When the camera is turned on, the data is sent to the DSP for storage and real-time correction.
- Black Stretch/Compress function ensures accurate reproduction of black areas on the screen.
- Multi-stream parallel digital pipeline processing at 40 MHz creates an ultra-smooth gamma curve, calculated using a true log scale algorithm.

Professional Performance

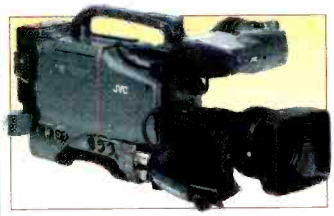
- Multi-zone iris weighting system gives priority to objects at the central and lower portions of the picture for accurate auto exposure under any condition, even if a bright subject moves into the picture.
- Adjustable gamma for adjusting the "feel" of the picture according to taste. Adjustable detail frequency for setting picture sharpness for a bolder or finer look.
- Viewfinder status display uses characters and menus to display selected information, including audio indicator, tape and battery remaining time, VCR operation and warning indicators. Camera settings and setup parameters can also be checked at a glance.
- Highlight Chroma Processing maintains color saturation in highlights. The result is natural color reproduction, even in bright highlight portions of the picture.
- Smooth Transition mode ensures no jump in color when manually changing gain or white balance settings.

Professional Audio

- To complement its superior video performance, the GY-DV500 offers outstanding digital PCM sound. You can choose between two 16-bit 48-kHz channels or two 12-bit 32-kHz channels with a dynamic range of 85 dB.
- In addition to camera mounted mic, has two XLR-balanced audio inputs with 48v phantom power and manual audio control. Phantom power can be switched off when not in use.
- Side-mounted speaker lets you monitor audio in playback and recording modes without headphones.

GY-DV550U

1/2" 3-CCD DV Camcorder



Introducing the Versatile GY-DV550 from JVC. Designed by professionals, for professionals, the GY-DV550 is the world's first DV camcorder to offer studio camera capability. Thanks to the built-in 26-pin interface, you can connect the GY-DV550 to a CCU for remote-controlled studio operation or backup recorder in the field. But that's not all. It also comes with pool feed input/output, so you can transfer image data back and forth to another camera or cameras, making it ideal for special shooting situations such as press conferences, exclusive interviews, and sporting events. Record isolated camera views (ISO-Cam) during a live multi-camera shoot, making it idea, for parallel shooting at live concerts and other events. Naturally, we've made sure the GY-DV550 is equipped with all the other capabilities you need, including a standard 1/2-inch bayonet mount for use with a great diversity of professional lenses, bidirectional IEEE 1394 (NTSC), two 48 kHz 16-bit digital PCM audio channels, and a built-in SMPTE or EBU timecode reader/generator, as well as XLR microphone inputs, audio outputs, headphones output, and both composite and Y/C outputs. Maximum versatility, top-level performance, and superior cost-efficiency make the GY-DV550 the smart solution for producers who need a camcorder capable of doing double-duty in both the studio and the field.

Ready for EFP remote control (RM-LP57/LP55) The EFP remote connects directly to the GY-DV550 for precise control over the video parameters.

Return video output for Tele-Prompter Tele-Prompter capability assures full support for studio program production.

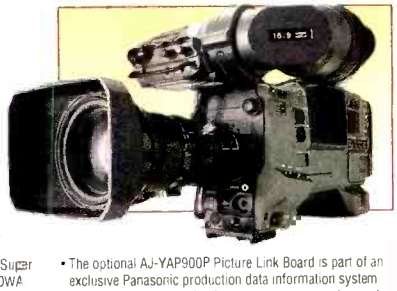
Genlocking function To meet the demand for systemization, the GY-DV550 is equipped with a genlocking function that includes SC lock to assure high-resolution pictures.

State-of-the-art 1/2" 3-CCD Image pickup Incorporates three 1/2" 380,000 (NTSC)/440,000 (PAL) pixel interline-transfer CCD's. Each CCD is equipped with highly advanced circuitry that eliminates vertical smear when shooting bright lights in a dark room. Lag and image burn are also reduced to indiscernible levels, while high sensitivity of F11 at 2000 lux assures creative flexibility and simplifies lighting requirements.

Panasonic

AJ-D610WA

2/3" 16:9 IT-3CCD DVCPRO Camcorder



The AJ-D610WA is an affordable DVCPRO camcorder which combines three high sensitivity 2/3" IT CCD's with digital component technology, to create a true broadcast recording. The AJ-D610WA is switchable between 16:9 and 4:3 aspect ratios. A built-in PCMCIA card slot makes it quick and easy to adapt the camera to different shooting conditions. Features Super Gain, Super Iris, and Digital Signal Processing (DSP). The AJ-D610WA can operate with a minimum illumination of 0.5 lux (F1.4, +36 dB Gain), and resolves 750 lines of resolution.

- The AJ-D610WA has three high density (520,000 pixels) 2/3" CCD's. The CCD's feature a large light collecting area that gives the camera a S/N ratio of 63 dB, plus a sensitivity of f 11.0 @ 2000 lux.
- The Digital Signal Processing (DSP) helps to deliver a very high quality picture. The user has the ability to adjust different parameters of the camera to accomodate any situation.
- A PCMCIA card slot is built into the operator side of the camera, allowing the set-up (DSP) data to be saved. The saved set-up data can be used to reset the camera parameters.
- The optional AJ-YAP900P Picture Link Board is part of an exclusive Panasonic production data information system which stores shot logging in camera memory and records it on tape during the eject cycle. The logging information can be read by Panasonic's newsBYTE DVCPRO native nonlinear news editing system.
- Exceptional resolution of 750 horizontal lines.
- A Super Gain feature is available to boost gain by a full +30 dB or +36 dB for high quality shooting in low light, making it possible to shoot as low as 0.5 lux (f1.4, +36 dB).
- An optional Digital Triax for studio or mobile use is available. • A six speed electronic shutter (1/100 to 1/2000 sec) features Synchro Scan to match the frequency of a computer monitor.

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SONY

DSR-1500
DVCAM Studio Editing Recorder

DVCAM becomes more and more flexible with the introduction of this brand new, half-rack width studio editing deck. The DSR-1500 boasts studio editing function capability in a compact size. The new DSR-1500 incorporates the same innovative, high standard technology featured in the DSR-2000.
The space-saving size makes the DSR-1500 ideal for installations in OB vehicles and desktop editing systems.

- SDI interface ensures a migration path to Digital Betacam™, Betacam SX™ and SDI-based systems.
- SDTI(QSDI) and i.LINK IEEE-1394 interfaces enable a high quality, virtually lossless transfer with DV compression based systems.
- Compatibility to consumer DV (SP mode only) and DVCPRO 25 format recordings in addition to DVCAM, automatically accommodate all cassette sizes without the need for an adapter.
- Analog input interface board which includes component, composite and S-Video is also available as an option.

DSR-1600/1800
DVCAM Studio Editing Player/ Player Recorder

The DSR-1600 is a **studio editing player**, and the DSR-1800 is a **studio editing recorder**.
Both incorporates innovative technology at an affordable price. Excellent playback of all DV based (25 Mbps) formats and cassette sizes is possible without the need of an adaptor. A jog/search dial is standard, including jog audio. A variety of option boards are available for SDI, SDTI, and i.Link outputs.
They both provide two selectable audio channel modes: Two channels of 16-bit (48 kHz) Four channels of 12-bit (32 kHz), PCM Digital Stereo recording is used in both modes to ensure superb audio performance with a wide dynamic range and excellent signal-to-noise ratio.
• Automatically adjust for playback of any DV based format, including DV (SP only), DVCAM or DVCPRO 25.

DSR-2000
DVCAM Editing Recorder

The OSR-2000 is a highly flexible DVCAM studio deck designed for demanding ENG editing. It can playback all DV (25 Mbps) based formats, including two consumer DV formats (Standard and Long Play), as well as all types of DVCPRO tape as an editing source, without any mechanical tape adapters. Equipped with audio/video pre-read editing and includes a Jog/Shuttle dial that allows two-machine editing. A SMPTE standard MPEG SDTI-CP interface option is available for the DSR-2000 to output an MPEG stream in addition to the optional i.LINK interface. This allows the DSR-2000 to seamlessly link to Betacam SX and other MPEG-based video equipment by means of SDI, i.LINK and MPEG SDTI-CP.

DSR-11
Compact DVCAM VTR

Compact desktop DVCAM recorder. This VTR provides a powerful and cost-effective option for NLE editing systems. Provides basic VTR features, along with an i.LINK (IEEE1394) interface and is compatible with both NTSC and PAL color systems. Designed to be used in either a horizontal or vertical position; A footprint of only 2 3/4" in the vertical position.

- The DVCAM format uses 8-bit component digital recording at 25 Mbps, with Intra-frame 5:1 compression, 500 lines of resolution and 4:1:1 color sampling. A 15 micron track pitch provides superior picture quality, superb multi-generation capability and production flexibility. Two 1/4" ME cassette sizes are available: Standard and Mini.
- Plays and records either a DVCAM format signal or a DV format signal.. • Both Mini and Standard size cassettes can be used with the DSR-11 without the need of an adaptor
- Play or record in either the NTSC or PAL color systems.
- Equipped with a 4-pin I-LINK (1EEE-1394) interface, for lossless transfer of digital video and audio information with other IEEE-1394 equipped devices. The single 4-pin i.LINK cable can be connected to MAC or PC based NLE systems or to another VTR for degradation-free editing.
- DV EE (electronics to electronics) Out: Analog input signals can be converted into digital signals, and can be simultaneously output from the i.LINK interface.

UVW-1200/UVW-1400A
Betacam SP Player • Player/Recorder

The UVW-1200 and UVW-1400A are non-editing VCRs which deliver Betacam SP quality and offer features for a wide range of playback and recording applications. RGB and RS-232 interface make them especially ideal for large screen, high quality video presentation, scientific research and digital video environments.

- Ideally suited for work in computer environments, because RGB signals can be converted into component signals and vice versa with minimum picture degradation.
- 25-pin serial interface allows external computer control of all VCR functions based on time code information. Baud rate can be selected from between 1200 to 38,400 bps.
- Built-in Time Base Stabilizer (TBS) locks sync and subcarrier to an external reference signal as well as providing stable pictures. High quality digital dropout compensator further ensures consistent picture performance.
- Equipped with two longitudinal audio channels.
- Auto repeat of entire or a specific portion of the tape.
- Built-in character generator can display VTR status, time code, self-diagnostic messages, set-up menu, etc.
- Both read LTC Time Code) and UB (User Bits). The UVW-1400A also generates LTC and UB (Free-Run/Rec-Run).
- Control of jog, shuttle, playback, record, pause, FF and REW with the optional SVRM-100A Remote Control Unit.
- Composite and S-Video as well as component via BNCs which are switchable to RGB output. The UVW-1400A has two switchable sync connectors and a Sync on Green.
- Built-in diagnostic function and hour meter.

UVW-1600/UVW-1800
Betacam SP Editing Player • Betacam SP Editing Recorder

The UVW-1600 and UVW-1800 are the other half of the UVW series. They offer the superiority of Betacam SP with sophisticated editing features. They feature an RS-422 9-pin interface, built-in TBCs and Time Code operation. Inputs/outputs include component, composite and S-Video. **All the features of the UVW-1200/1400A *PLUS*—**

- Optional BVR-50 allows remote TBC adjustment.
- Two types of component output: via three BNC connectors or a Betacam 12-pin dub connector.
- RS-422 interface for editing system expansion.
- Frame accurate editing is assured, thanks to sophisticated servo control and built-in time code operation.

PVM-14M2U/14M4U & 20M2U/20M4U
13-inch and 19-inch Production Monitors

Sony's best production monitors ever, the PVM-M Series provide stunning picture quality, ease of use and a range of optional functions. They are identical except that the "M4" models incorporate Sony's state-of-the-art **HR Trinitron** CRT display technology and have SMPTE C phosphours instead of P22.

- HR Trinitron CRT enables the PVM-14M4U and 20M4U to display an incredible 800 lines of horizontal resolution. The PVM-14M2U and 20M2U offer 600 lines of resolution. M4 models also use SMPTE C phosphours for the most critical evaluation of any color subject.
- Dark tint for a higher contrast ratio (black to white) and crisper, sharper looking edges.
- Each has two composite, S-Video and component input (R-Y/B-Y, analog RGB).For more accurate color reproduction, the component level can be adjusted according to the input system. Optional BKM-101C (video) and BKM-102 (audio) for SMPTE 259M serial digital input.
- Beam Current Feadback Circuit
- 4:3/16:9 switchable aspect ratio.
- True multi-system monitors they handle four color system signals: NTSC, NTSC 4.43, PAL & SECAM.
- External sync input and outputcan be set so that it will automatically switch according to the input selected.
- Switchable color temp: 6500K (broadcast), 9300K (pleasing picture), User preset, (3200K to 10000K)
- Blue gun, underscan and H/V delay capability

PFM-42B1
Flat Panel Plasma Display Monitor

Flat Panel AC plasma display monitors are used where space and aesthetics are a major consideration. They accept and automatically detect computer and video signals ranging from NTSC to HDTV and VGA to UXGA.

- 42-inch screen
- 1024 x 1024 pixel display, with a 160° viewing angle
- Aspect ratios from standard 4:3 to widescreen 16:9
- Accommodate DVD presentations and widescreen broadcasts
- Advanced scan converter reproduces digital video signals (including SDTV, and HDTV) & UXGA computer signals
- 3.25" thick & weighs 65.5 lbs.

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Professional Grade VHS

PG-30	2.29	PG-60	2.39	PG-120	2.59

Broadcast Grade VHS Box

BGR-30	3.49	BGR-60	3.99	BGR-120	4.69

H471S S-VHS Double Coated

ST-30	6.99	ST-60	7.49	ST-120	7.99

M221 Hi 8 Double Coated

Metal Particles			Metal Evaporated		
P630HMP	4.49		E630HME	7.69	
P660HMP	6.29		E660HME	10.49	
P6120HMP	8.49		E6120HME	13.99	

M321SP Metal Betacam (Box)

05S	10.99	10S	11.99	20S	12.99
30S	13.99	60L	20.99	90L	32.99

DP121 DVC PRO

12M (Med.)	7.49	23M	8.79	33M	10.99
63M	19.99	66L	22.50		
94L	30.99	126L	39.99		

maxell

Broadcast Quality Hi8 Metal Particle

P6-30 HM BQ	5.39	P6-60 HM BQ	6.09
P6-120 HM BQ			7.99

P/I PLUS VHS

T-30 Plus	1.69	T-60 Plus	1.99	T-90 Plus	2.09
T-120 Plus		2.19	T-160 Plus		2.69

HGX-PLUS VHS (Box)

HGXT-60 Plus	2.69	HGXT-120 Plus	2.99
HGXT-160 Plus			3.99

BQ Broadcast Quality VHS (Box)

T-30 BQ	3.89	T-60 BQ	3.99	T-120 BQ	5.99

BQ Professional S-VHS (In Box)

ST-31 BQ	6.79	ST-62 BQ	6.99
ST-126 BQ	7.45	ST-182 BQ	13.99

Betacam SP

B30MSP	13.49	B60MLSP	19.99	B90MLSP	27.95

Panasonic

Mini DV Tape

AY DVM-30	6.49	AY DVM-30 (10 Pack)	ea. 5.99
AY DVM-60	6.99	AY DVM-60 (10 Pack)	ea. 6.49
AY-DVM80	12.99	AY-DV123EB	20.95

DVCPRO

AJ-P12M (Medium)	7.99	AJ-P24M	9.99
AJ-P33M	11.49	AJ-P66M	19.49
AJ-P66L (Large)	20.99	AJ-P94L	29.99
AJ-P126L			38.95

SONY

Hi-8 Professional Metal Video Cassettes

P6-30 HMPX	4.79	E6-30 HMEAD	6.99
P6-60 HMPX	6.79	E6-60 HMEAD	9.99
P6-120HMPX	8.99	E6-120HMEAD	13.99

PR Series Professional Grade VHS

T-30PR	2.39	T-60PR	2.59	T-120PR	2.79

BA Series Premier Hi-Grade Broadcast VHS (In Box)

T-30BA	3.69	T-60BA	4.19	T-120BA	4.99

MQ Master Quality S-VHS (In Box)

MQST-30	7.49	MQST-60	7.69	MQST-120	7.99

BRS 3/4" U-matic Broadcast Standard (In Box)

KCS-10 BRS (mini)	8.99	KCS-20 BRS (mini)	9.99
KCA-10 BRS	8.99	KCA-20 BRS	9.49
KCA-30 BRS	10.69	KCA-60 BRS	14.99

XBR 3/4" U-matic Broadcast Master (In Box)

KCS-10 XBR (mini)	9.79	KCS-20 XBR (mini)	11.29
KCA-10 XBR	10.29	KCA-20 XBR	11.79
KCA-30 XBR	13.29	KCA-60 XBR	17.39

BCT Metal Betacam SP Broadcast Master (In Box)

	Single	10 Pak/Ea.	50 Pak/Ea.
BCT-5M (small)	10.99	9.99	9.19
BCT-10M (small)	11.49	10.29	9.79
BCT-20M (small)	12.99	11.49	10.99
BCT-30M (small)	13.49	12.49	11.99
BCT-30ML	13.49	11.89	--
BCT-60ML	20.99	19.99	18.99
BCT-90ML	30.99	28.99	27.99

PDV Mini Series Professional DVCAM Tape (w/memory chip)

	(1)	(10) Ea.		(1)	(10) Ea.
PDVM-12ME	14.49	13.49	PDVM-22ME	15.19	14.49
PDVM-32ME	15.49	14.99	PDVM-40ME	16.99	16.49

PDV Series (Standard) **Professional DVCAM Tape**

PDV-34ME	24.99	23.99	PDV-34N	20.99	19.49
PDV-64ME	27.99	26.99	PDV-64N	24.99	26.99
PDV-94ME	32.99	31.49	PDV-94N	29.99	28.49
PDV-124ME	38.49	37.49	PDV-124N	32.99	31.99
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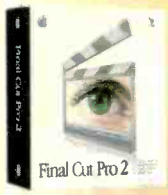

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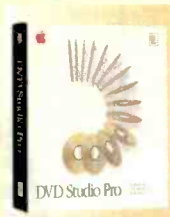

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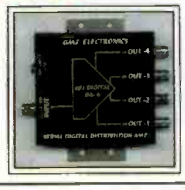

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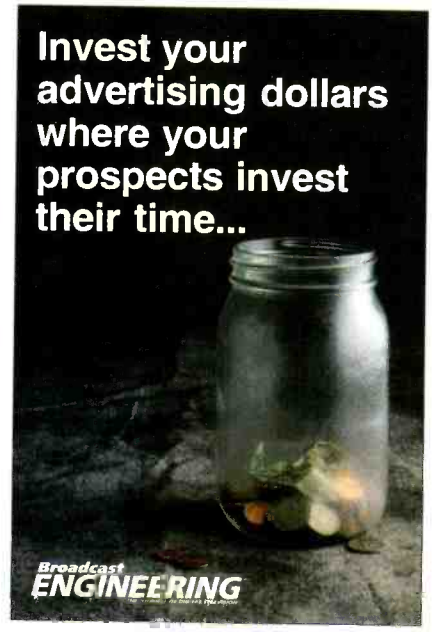

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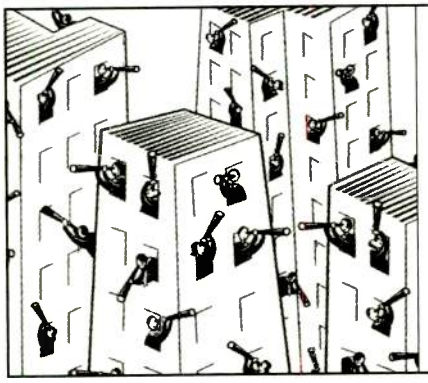

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EOM

Inexactitudes in satellite delivery

BY PAUL MCGOLDRICK

My education must have been fairly violent compared to those of many people. My secondary schooling was with teachers of the De La Salle order of religious (The Christian Brothers in the United States), and they were fond of using the long strap that tailed from their waists to the ground. Sure, it made you work, but it also spread hate, disgust and fear.

By comparison, college was a dream world, except for one lecturer who terrorized us. Sins committed with incorrect units were treated the most heavily and would often result in blood-red ink on an assignment: "See me!"

So this is why I react to inexactitudes in the world around me. Most of the time I bite my tongue, but I have seen the initials SHVA misused enough to make me grind my teeth.

A little history: The original Satellite Home Viewer Act (SHVA) became law in 1988. It was intended as a tool to protect local network affiliates (and the cable companies) from the satellite providers offering network feeds from more distant stations. With no teeth, SHVA was just about totally ignored by the satellite companies prompting new customers on their answers. "No, I can receive no network affiliates; no, I have not had cable TV service at this address for the last 90 days." The law was amended in 1994 with compliance time limits placed on the satellite providers, leading to massive numbers of customers losing their services and unable to obtain waivers.

Next came the lawsuits in Miami, in which FOX and CBS filed suit against PrimeTime 24. The DSS companies listened and were a lot more careful.

The so-called "local-into-local" arrangements signed into law Nov. 29, 1999, as the Satellite Home Viewer Improvement Act was the logical solution for all this (unless you were a cable operator). That's the S-H-V-I-A. But writers are not only getting the initials of the new act wrong, they also are unclear about some of the content.

SHVIA allows the DSS providers to supply local stations to DMA viewers and it continues to allow them to provide "distant" service to those subscribers who are still eligible ("unserved households"). Unserved households always include subscribers with dishes permanently attached to commercial trucks and RVs, as well as C-band users. The 90-day waiting period after ending cable service is eliminated. There also is a nice quirk that has mostly gone unnoticed: If a station disagrees with a viewer on whether Grade B reception is possible at a specific location there now is a solution: ARRL members can be nominated to go to the site to test off-air reception. If the station is correct, the DSS company pays the bill for the testing. If the DSS company is right, the station gets to pay. Of course, there are some stations that do not explain that in their literature. WEYI, for example, in Flint, MI, says, "*The satellite provider* has the authority to contract a specialist to investigate your situation. *Remember, there may be a substantial cost for this inspection so please discuss it with the satellite provider carefully.*" Neatly phrased as a deterrent don't you think?

The date for stations to agree to be carried by DSS has passed (May 2000), but a Report and Order on Nov. 2, 2000, implements new dates. The DSS service must provide all the local stations assigned to the DMA, that *ask* to be carried, (but limited to one version of any network) by Jan. 1, 2002. But when must they tell the DSS providers?

What is still up in the air, apart from the satellites? Whether a household is within the Grade B contour of a translator seems to be totally ignored by all involved, and the DSS providers seem to have few problems in getting waivers. The position of PBS coverage also is a little strange. Until Jan. 1, 2001, the DSS providers can give all subscribers the national X-feed of PBS (on East Coast timing). After that they *can* provide local-into-local and the wording is unclear as to whether it is their choice over the local PBS *asking* to be carried. In a place like the San Francisco Bay Area, how does that apply to the multiple PBS stations?

Lawmakers' ability to write bills with inexactitudes leaves wiggle room for everybody.

The DSS companies are already running out of bandwidth for these services, of course, and the provisioning of new markets seems to have come to a halt until new birds are flying and the companies know how many stations they are expected to carry in the 40 to 50 markets they have already committed to. Their position is going to be a slippery one and they will undoubtedly be looking for exceptions.

Once again the wonderful ability of lawmakers to write bills with inexactitudes leaves wiggle room for everybody. We need to write a few "See Me's" on their papers. ■

Paul McGoldrick is an industry consultant based on the West Coast.

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