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MARCH 2002

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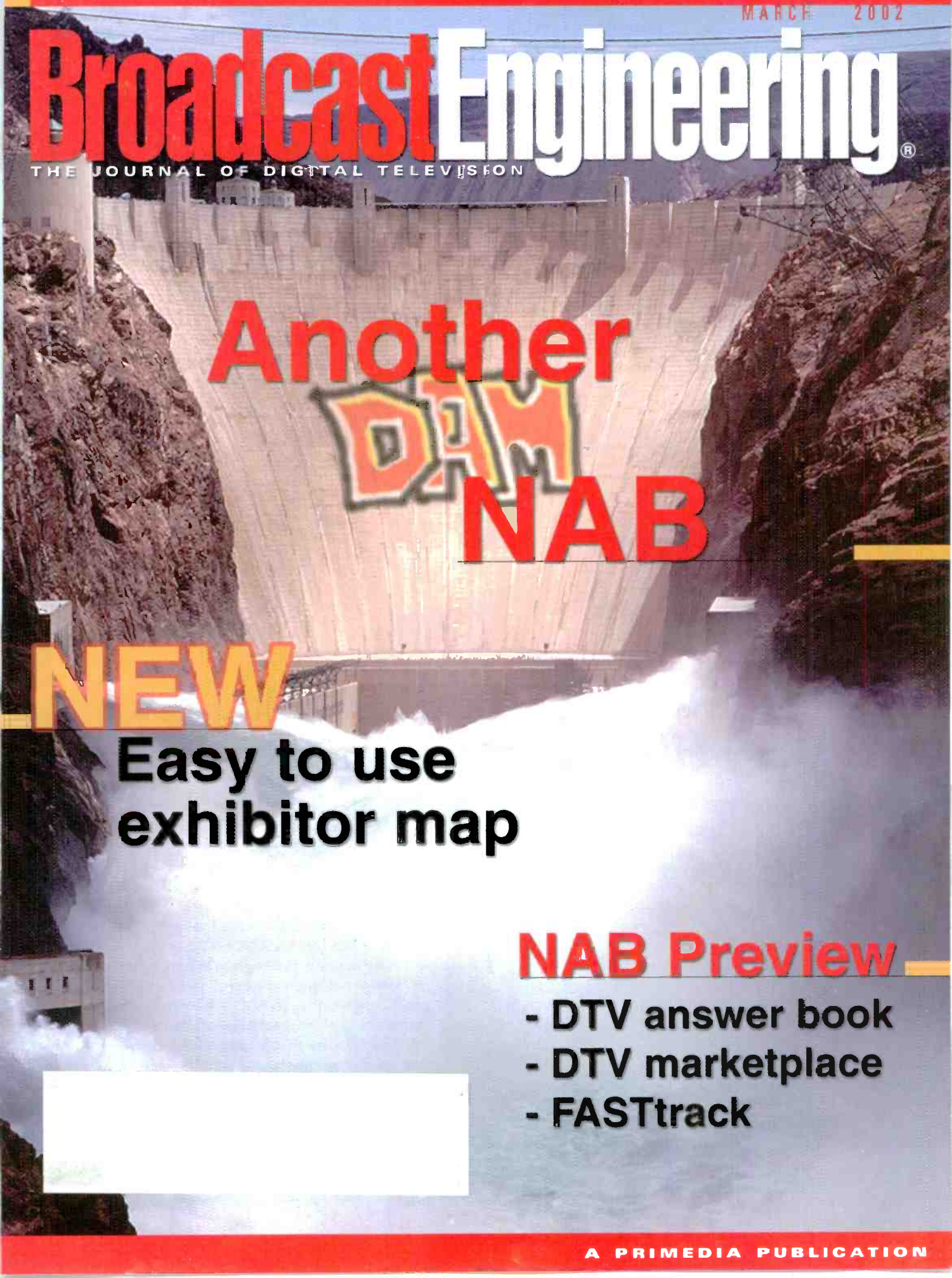
THE JOURNAL OF DIGITAL TELEVISION



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NAB Preview

- DTV answer book
- DTV marketplace
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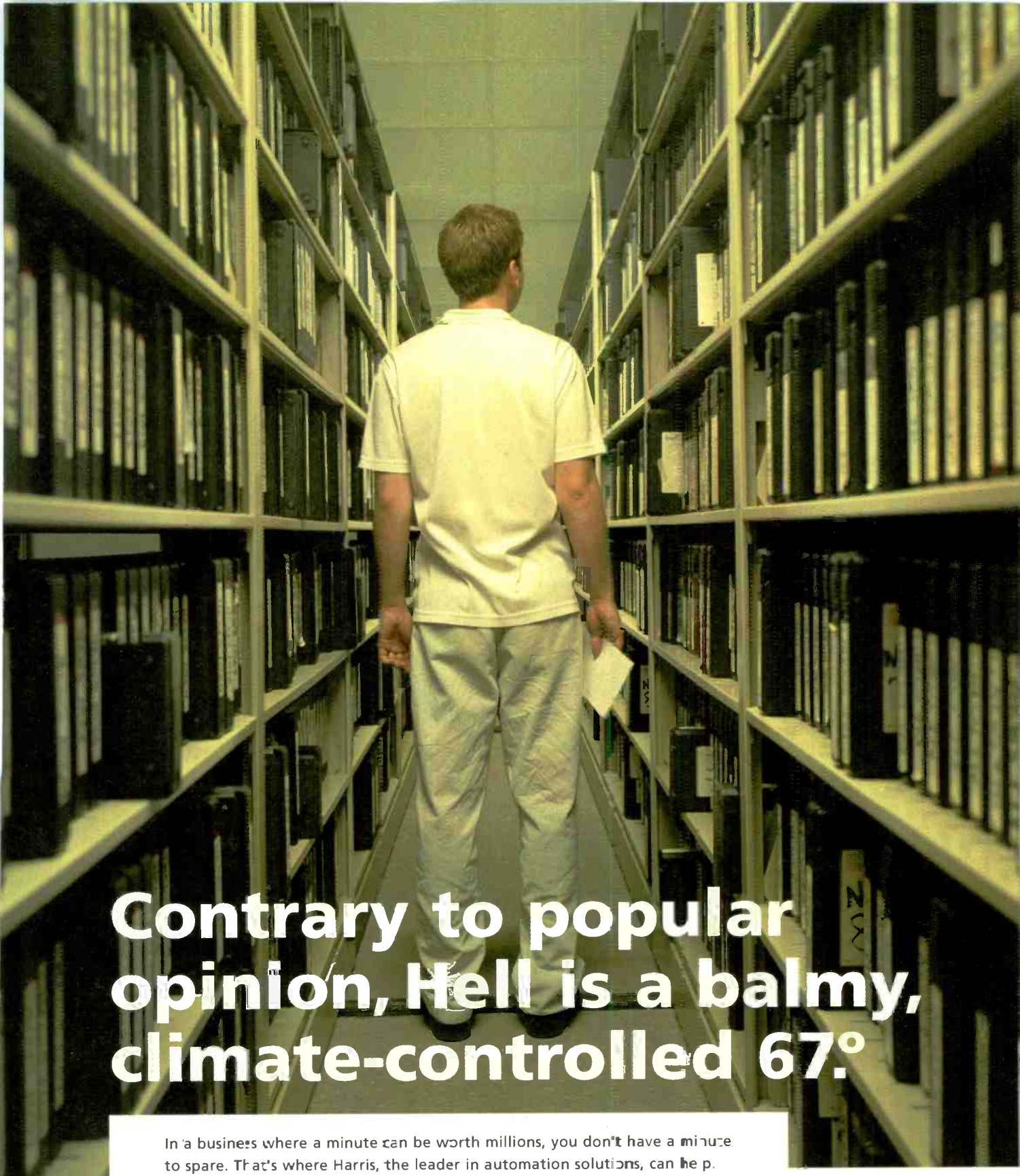

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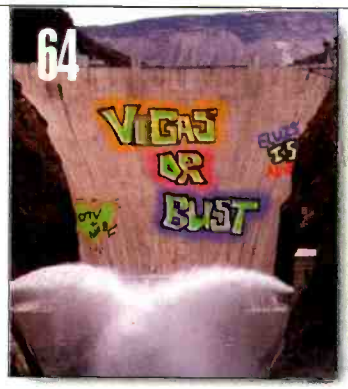
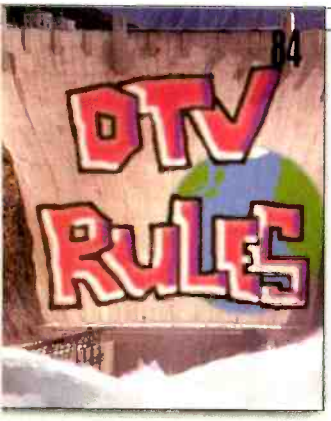


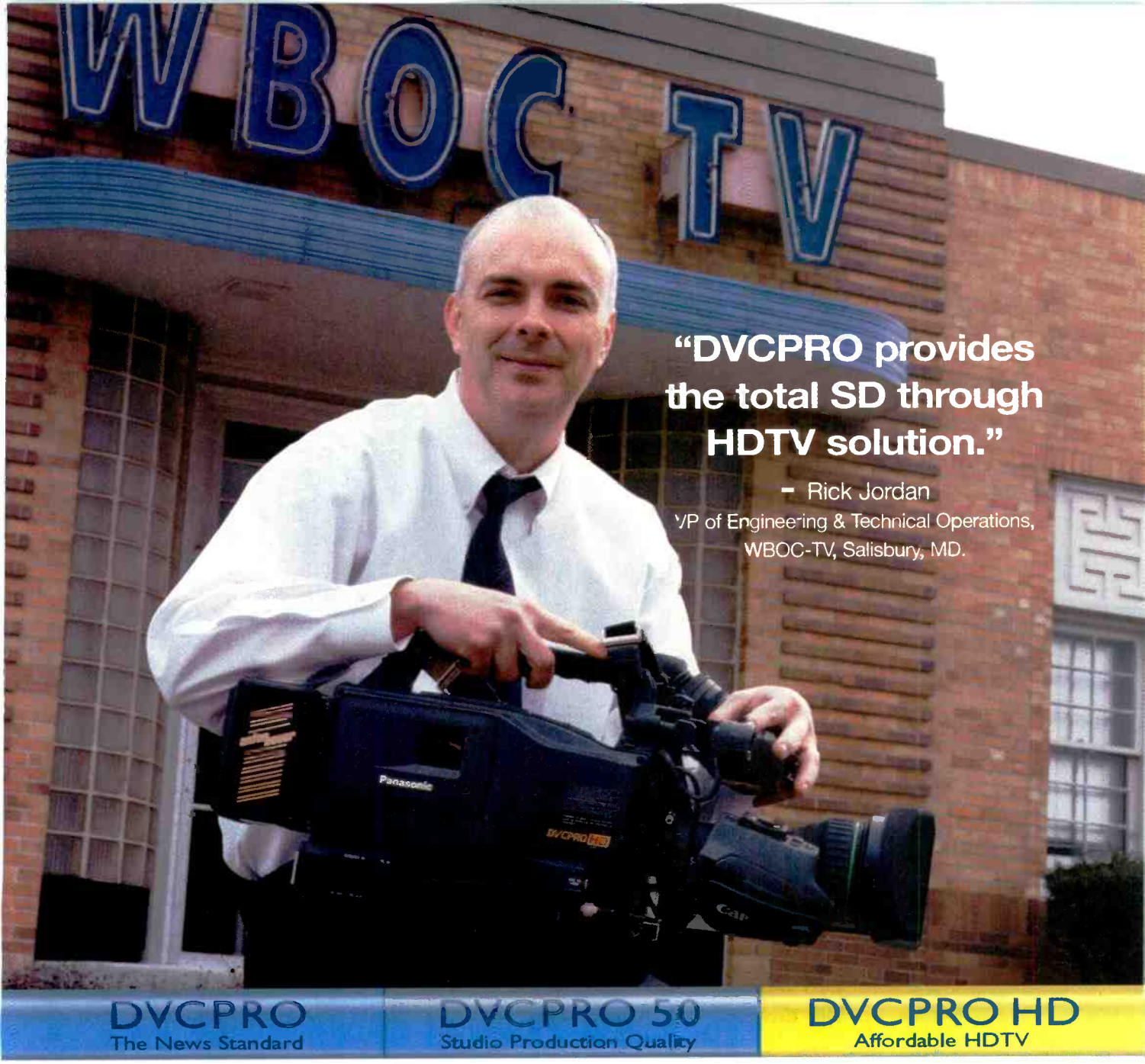


BEYOND THE HEADLINES

DIGITAL HANDBOOK

ON THE COVER: NAB is a pleasure for some and a chore for others. Graphic design by Robin Morsbach. All Hoover Dam photos in this issue courtesy of the Bureau of Reclamation.

(continued on page 8)



How do you stay ahead of the digital curve without hitting the budgetary wall?

For CBS affiliate WBOC in Salisbury, MD, the solution is the interoperability and scalability of Panasonic DVCPRO. "DVCPRO is very cost effective, providing exceptional value from many different perspectives: ease of use, quality, reliability and maintainability," says Rick Jordan, WBOC's VP of Engineering & Technical Operations.

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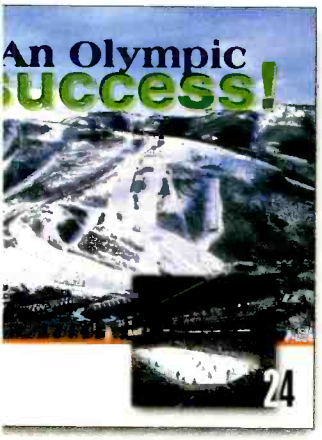

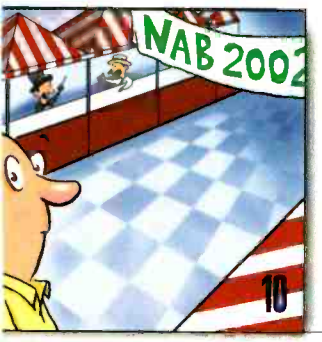

New Products & Reviews

Applied Technologies

Field Reports

Technology in Transition

Departments

Name this landmark

Name this famous broadcast landmark, photographed in 1967, and what important industry event took place in the city that year. Correct entries will be eligible for a drawing of the new *Broadcast Engineering* T-shirts. Enter by e-mail. Title your entry "Freezeframe-March" in the subject field and send it to: bdick@primediabusiness.com. Correct answers received by April 17th, 2002, are eligible to win.

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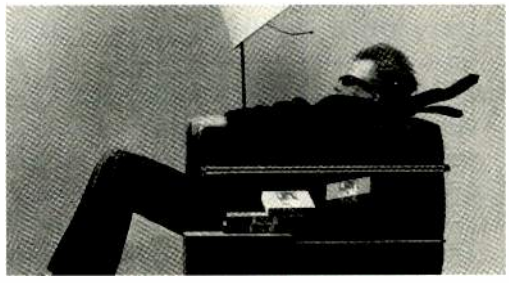

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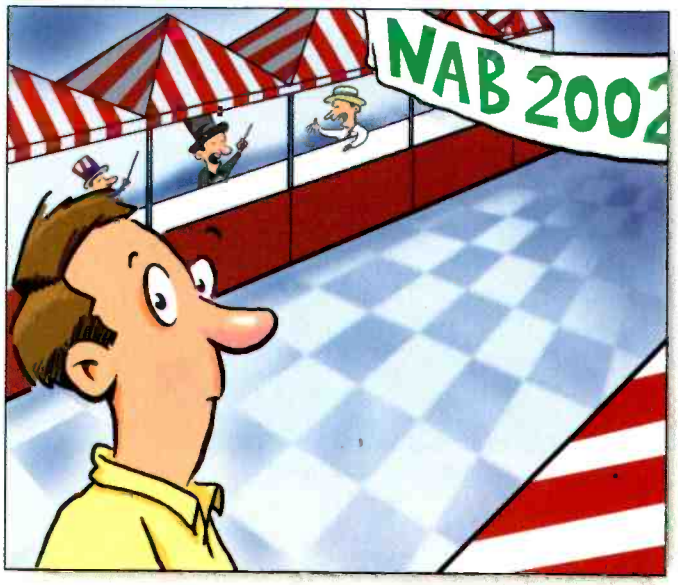
National Association of Everything

So are you planning on coming to the National Association of Everything (NAE) convention in April in Las Vegas? It's really called the National Association of Broadcasters, but now I call it the NAE. The show is such a cobbled together array of topics and technology, I wouldn't be surprised to see lawn mowers and appliances on display. Here are a few examples of how the NAE has gone to extravagant lengths just to claim high attendance.



Here are some of the sessions scheduled for you "broadcast-related" attendees. Specially designed for the international attendee, we have the "Cross-Media Partnerships" session. I'm not sure, but I think maybe it's a marriage seminar. Then we have the "Cyberjocking" seminar. It probably has something to do with horse racing on the Internet. Again, a special session for the international attendee, we have "Global Matchmaking." Pretty cool, huh? Come to the United States and leave with a mate! What a deal.

NAE's newest conference is called Xstream. Here you'll learn everything you need to know about the Internet, including how to build "the 80 mile per gallon carburetor." I'm not kidding.

Not to leave the new media folks out of the touchy-feely sessions, there's another one of those classes on relationships, "Strange Bedfellows." You'll have to tell me what happens, I'm afraid to attend. Oh and don't miss the keynote session at 10 a.m. There you're supposed to be taught "how UPnP will facilitate an ecosystem of networked devices in your home." If you're still awake when it's over, let me know what that means.

The sessions on satellite technology sound kind of fun to me because I'm a runner. Maybe I'll ask my friend and fellow marathoner, Bob Pank, to attend this one with me, "From the Backbone to the Last-Mile." Must be a chiropractic clinic for runners. Bob and I will then jog on over and pick up some tips in the session, "Playing Monopoly."

The exhibits are as schizophrenic. How about this for a list of exhibition areas: e·topia, mobile media, interactive living, digital cinema, multimedia and Internet/streaming halls. Hey, I'm not done, these are in addition to the regular radio/audio hall, three TV/video/film halls and satellite/telecommunications areas including the Sands. Whew, are you confused yet?

And how come we still have to slog over to the Sands anyway? With an additional 300,000 square feet of new exhibition space in the new South Hall, couldn't NAB move the Sands exhibitors to the LVCC? No, you'll still have to wait in two lines, bus it and waste a couple of hours to see the Sands exhibitors.

Adding sessions with cutesy titles, and unrelated exhibitors to try and drive attendance does not make this show any better. It just makes it less focused. What's next — an "open to the public" day at NAB?

All these changes and the diluted focus remind me of previous NABs, where exhibitors included luggage and jewelry dealers. Given this year's hodgepodge of sessions and exhibit arrangements, should we expect to see the Vegamatic and Gingsu knives on the show floor next year? This show is starting to smell like a flea market.

Brad Dick
editorial director

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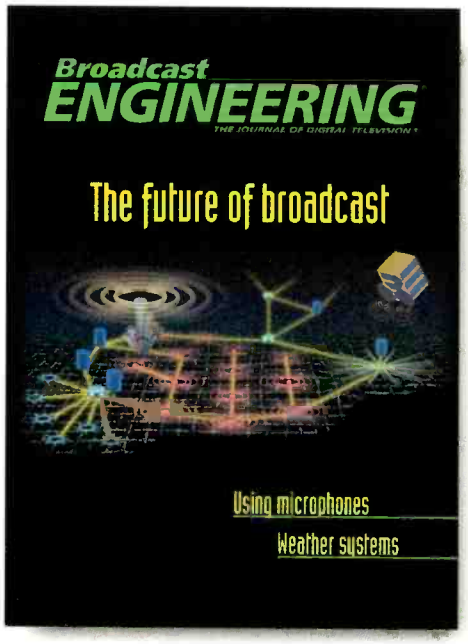


The future of broadcast

I just read your article titled "The Future of Broadcasting." You chose people it seems with a vested interest in the area they wrote about. As a person who has been in broadcasting for over 35 years, you seem to still miss the point (or maybe I did).

All the "digital technology is great" made things better in many respects with more channels, more information and better quality. The part I disagree with is that people are really that excited about HDTV. Picture quality is great, but I don't want to see Jerry Springer in HDTV.

What we need is access to better quality news programs (BBC, CBC) and better entertainment shows. DTV can bring some of that to us. People I talk to do not say my picture looks bad, they say there is nothing to watch.

LARRY BAKER

More on fiber

Dear Mr. Gilmer,

I always take pleasure in seeing fiber optics highlighted in magazines to improve its visibility and acceptance. The Light Brigade is the world's largest fiber optic training company and a corporate member of the Optical Society of America (OSA). As such, we like to make sure articles are correct. Understanding that you have a fixed amount of space in an article I can see where mistakes can be made. For this reason, I wanted to clarify a few issues in the article.

- The 50/125 fiber is a multimode fiber and not single-mode.
- This fiber has been well accepted for high bandwidth (video) applications versus the 62.5/125 fiber, which is preferred for local area networks.
- Missing in your article was the "next generation multimode fibers" (NGMM), which are designed for laser transmission and higher bandwidths than the standard multimode fiber types.
- You referenced the use of 1550nm, which is great for long distance (50-100Km) because of its lower attenuation. However, the lower cost and high performance of the 1310nm wavelength for single-mode fibers is still much more cost-effective than 1550nm fiber.
- In reference to the "fiber to the desk (FTTD) statement," we have used FTTD since 1990 in three different buildings and now operate at 100 Mbits/s (Fast Ethernet), and I've never had a failure due to optical or mechanical problems. This includes the fibers, cable, connectors and jumpers. An entire generation of patch panel products and office furniture has evolved to handle fiber as just another media.
- I would add a note of caution on the issue of connectors. The performance of a connector is limited by the skills of the installer and the quality of the tools used. The low-cost kits mentioned have cheaper tools for scribing the fibers. As a technician, I would invest in a better cleaving tool and be assured of good cleaves, which would increase my yield substantially and lower maintenance costs.

We have worked with fiber since 1977, and with Belden cables in many diverse applications. We have produced two customized training programs on fiber optics for Belden cables and look forward to working with Belden further as HDTV continues to grow and expand.

LARRY JOHNSON
PRESIDENT
THE LIGHT BRIGADE

Recent Freezeframe winners

The August Freezeframe question generated more entries than any question to date. Many readers offered their own histories and experiences with the *Videograph* or *Vidifont*. The August question:

Who invented the CG?

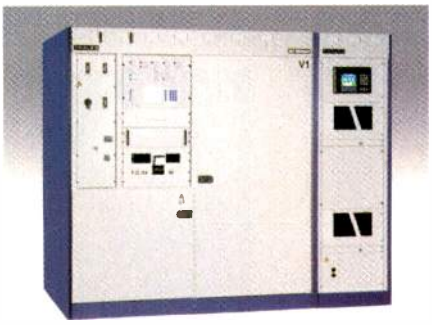
Name the year, model number and the famous, but long-gone, company that developed the first working "videographics" device. The device allowed the operator to correct a spelling mistake in only "40 minutes"! Hint: The device wasn't called a "CG".

The correct answer is the A.B. Dick Videograph, circa 1967. It was the first character generator used in TV stations. It was this device that evolved into the familiar company CHYRON.

Readers submitting the correct answer;
George Lemaster
Murray Bevitz
Jim Wulliman
Harvey Caplan
Alan Schoenberg

All these winners will receive a *Broadcast Engineering* T-shirt. See page 8 for this month's question. Enter and win! BE

High-Power Transmitter Solutions



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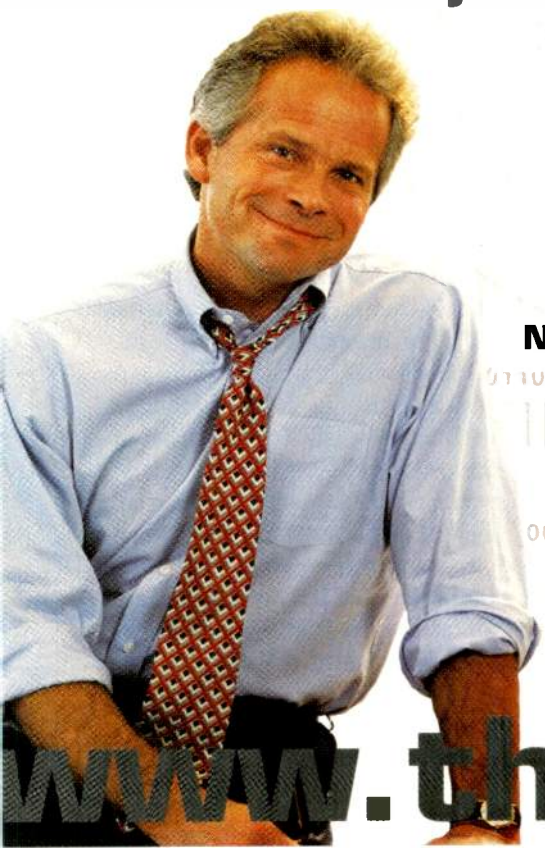

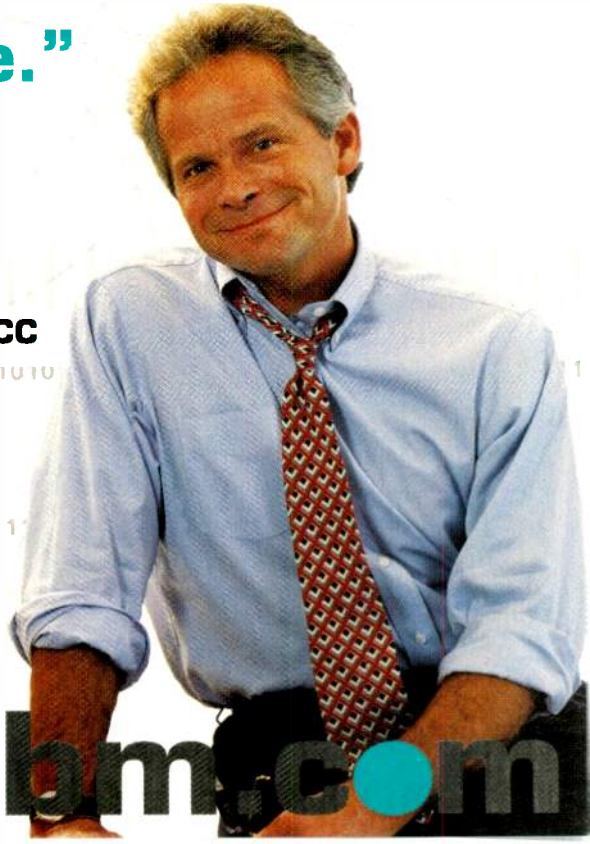

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BEYOND THE HEADLINES

IP broadcasting

BY CRAIG BIRKMAIER

If you had to pick two letters from the English alphabet with the potential to have the greatest impact on the future of broadcasting, what would they be?

I would humbly suggest that the letters I and P are tightly coupled to almost every decision being made about the future of broadcasting.

IP (Internet Protocol) is used to refer to a group of emerging technologies that are reshaping the landscape of every industry involved with mass communications. Enabled by the IP concept, the Internet has emerged as a massive threat to TV, radio, cable, DBS and other broadcast distribution infrastructures.

TCP/IP

TCP and IP were developed by a Department of Defense (DOD) research project to connect a number of different networks designed by different vendors into a network of networks (the "Internet"). It was initially successful because it delivered a few basic services that everyone needed (file transfer, electronic mail, remote logon) across a large number of client and server systems.

TCP/IP is composed of layers. IP is responsible for moving packets of data from node to node. IP forwards each packet based on a four-byte destination address (the IP number). The Internet authorities assign ranges of numbers to different organizations. The organizations assign groups of their numbers to departments. IP operates on gateway machines that move data from department to organization to region and then around the world.

TCP is responsible for verifying the correct delivery of data from client to server, as data can be lost in the intermediate network. TCP adds support to detect errors or lost data and to trigger retransmission until the data is correctly and completely received.

TCP/IP is *not* a broadcast technology.

TCP/IP is *not* a broadcast technology. It is a one-to-one packet-based communications protocol designed for the reliable delivery of data across interconnected networks. Digital broadcasting, on the other hand, is a one-to-many stream-based technology designed for the isochronous delivery of data across a variety of competing, largely non-interconnected networks.

Isochronous means that the data packets within a stream must be delivered on time, and that the network must provide guaranteed bandwidth to support the peak bit-rate requirements of the content that is being delivered – typically audio and video streams. If the data does not arrive on time or it is corrupt, too bad – there are no second chances with real-time broadcast streams.

Given these realities, one might question why TCP/IP is so important to the future of broadcasting. After all, we have SMPTE 259M (SDI) to move digital video through the routing switchers found in modern video facilities. And the MPEG-2 transport protocol is optimized for the delivery of compressed digital video streams; it is the transport layer of choice for digital cable, DBS and DTV broadcasting around the world.

The answer is becoming obvious as the worlds of mass media broadcasting and the Internet collide. TCP/IP has become the language of peer-to-peer digital networking. It is found at the transport layer for the Ethernet networks that link computers together in offices and homes worldwide. And it is the transport layer for cable modems and digital subscriber lines, the broadband pipes that threaten to deliver mass media content on demand, to anyone, anywhere, anytime.

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

Use of internal facility video transport links double

Video file transfer will be dominant transport mode

System	Ownership			
	2000 Base	2001 Planned	2001 Proj. base	Growth
270 Mb/s digital routing	5%	3%	7%	41%
360 Mb/s digital routing	5%	3%	8%	45%
1.5 Gb/s digital routing	6%	3%	8%	36%
SDTI data routing	1%	2%	3%	89%
Video transfer file over gigabit Ethernet	11%	7%	15%	46%
Video streaming over gigabit Ethernet	3%	3%	5%	50%
Video file transfer over Fibre Channel	7%	7%	12%	72%
Video streaming over Fibre Channel	2%	3%	5%	146%
Other internal video transfer system	2%	3%	4%	84%
Any internal video transfer	*27%*	*22%*	*34%*	*25%*

SOURCE: Scenic Wonders www.swonders.com

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One Server. Unlimited Opportunities.

In a pre-NAB press conference, Sony demonstrated a new feature of their latest IMX studio digital video recorder — an Ethernet port that allows digital video streams to be delivered to all of those computer-based video tools that are popping up around digital broadcast facilities.

At a recent Society of Cable Engineers conference, keynote speaker Jim Chiddix, president of interactive personal video for AOL Time Warner, suggested that the cable industry needs to build one broadband network, probably IP-based, that can seamlessly unite all cable services on one network. A unified network simplifies network design and allows for improved bandwidth allocation among services.

The emerging reality is that IP networking is the driving force for the future of virtually every form of digital communications.

IP networking is the driving force for the future of virtually every form of digital communications.

While traditional broadcasters are succumbing to the economic advantages of moving to an IP-based digital network infrastructure, the world of the Internet is succumbing to the one-to-many bandwidth-conservation advantages of broadcasting.

Logically, if you want to deliver a live streaming event over the Internet, it would be more efficient for a server to route one stream to many users. Unfortunately, most existing Internet routers cannot do this. Typically the server must duplicate the stream for every client.

It is not surprising that many engineers have been working on this problem, and that there are new protocols that will make broadcasting over the Internet a practical reality ... eventually. At the top of the list is IP multicast.

IP multicast offers the ability to set up a variety of multicast services for any size group. Typically each user still initiates a transaction with the remote server. The server then adds their address to the routing information so that one stream of packets is routed to multiple destinations. Unfortunately, many routers do not support the IP multicast protocol, so IP multicast is only being used in subnetworks that support the protocol.

Today there are several ways to bypass the bottlenecks. One is a separate network known as the MBONE – in essence a virtual network that is layered on top of sections of the physical Internet — an interconnected set of Internet subnetworks and routers that support the delivery of IP multicast traffic.

Another approach is to mirror streaming media content on servers around the world, a concept pioneered by Cambridge-based Akamai. When you request a streaming media file from a Web site, you are connected to the closest mirror site. Even using TCP/IP, this can help to alleviate problems with congestion at key interconnection points on the Internet. If you are lucky enough to have a clear connection to the mirror site you may be able to "tune into" an IP multicast.

Today a large number of companies offer the ability to host IP broadcasts via the Internet. Real Networks has one of the most evolved business models, having locked up exclusive deals to carry live Internet radio broadcasts of major-league baseball and basketball, using a paid subscription model. One such company, Broadcast.com – founded by Mark Cuban – was acquired by Yahoo, and has become Yahoo Broadcast.

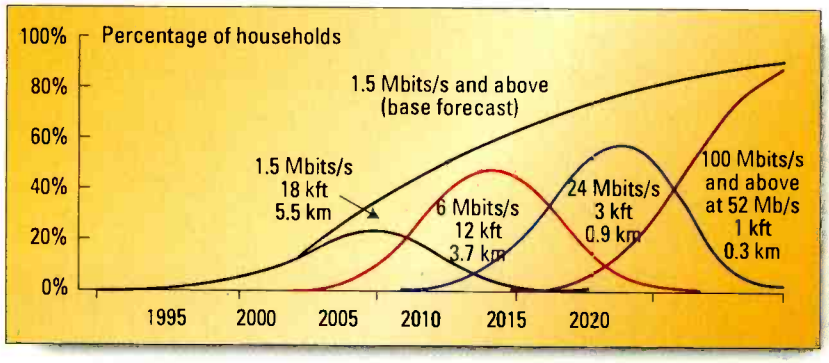

Figure 1. The optimistic view of networks to the home is that throughput data rates will increase in waves spaced by six to 10 years. By 2012, almost 50 percent of American homes will have access to Internet connections capable of 6Mbits/s.

Unrealized potential

The potential for IP broadcasting is difficult to measure, largely because of technical and competitive roadblocks erected by the entrenched industries that have risen to power using traditional broadcast technologies. The physical infrastructure of the Internet is a barrier that is likely to linger for years, until existing routers are upgraded to support the IP multicast protocol.

While there is a glut of wide area network capacity – witness the recently announced bankruptcy of Global

Web links

Streaming media hosting services:
Akamai — www.akamai.com
Digital Island — www.digitalisland.com/
Generic Media — www.genericmedia.com/
Real Networks — www.realnetworks.com/
Yahoo Broadcast — broadcast.yahoo.com/home.html
Industry Directory of Streaming Media — www.streaminglist.com/

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Crossing – last-mile bandwidth continues to be a major issue.

Today broadband Internet services are largely controlled by the local cable and telephone monopolies. Provisions of the 1996 Telecommunications Act targeted at creating competition for broadband have proven to be ineffective. Broadband remains an expensive service – typically $40 per month and up – and the quality of service varies considerably. Intertainer, a web-based VOD movie service, has had to reject about half of its potential customers because their broadband service cannot reliably deliver the 500 kbits/s needed for the service.

The Internet has emerged as a massive threat to TV, radio, cable, DBS and other broadcast distribution infrastructures.

Another issue is control of key patents for the compression of streaming media content. The owners of content and some key video compression patents have been somewhat reluctant to enable new competitors who want to use the Internet to bypass the traditional broadcast distribution infrastructures. Concerns about rampant piracy and battles over distribution rights and fees have been used to block and delay, even as the media giants develop their own Internet-based services.

Meanwhile, IP broadcasting is beginning to make inroads as traditional broadcast media upgrade to digital broadcast techniques based largely on MPEG-2 technologies. The cable industry is likely to migrate to IP broadcast techniques in the near future. And the major DBS systems, which are also offering satellite broadband services, may be a step ahead — DirecTV and DISH are both offering set-top boxes that take advantage of IP data delivery for new interactive services.

All of the groups behind the emerging standards for terrestrial DTV broadcasting – ATSC, DVB and ISDB – have been working on enabling standards for IP broadcasting. Work on the Multimedia Home Platform, the Interactive TV component of the DVB standard suite, is now addressing the delivery of IP data services. The A-90 data broadcast standard, developed by the ATSC, supports the delivery of IP data packets, and work is in progress on an IP multicast protocol optimized for terrestrial broadcast. And the Japanese ISDB system is being optimized to deliver IP broadcasts to a variety of wireless digital appliances. BE

Craig Birkmaier is a technology consultant at Pcube Labs, and hosts and moderates the Open DTV Forum.

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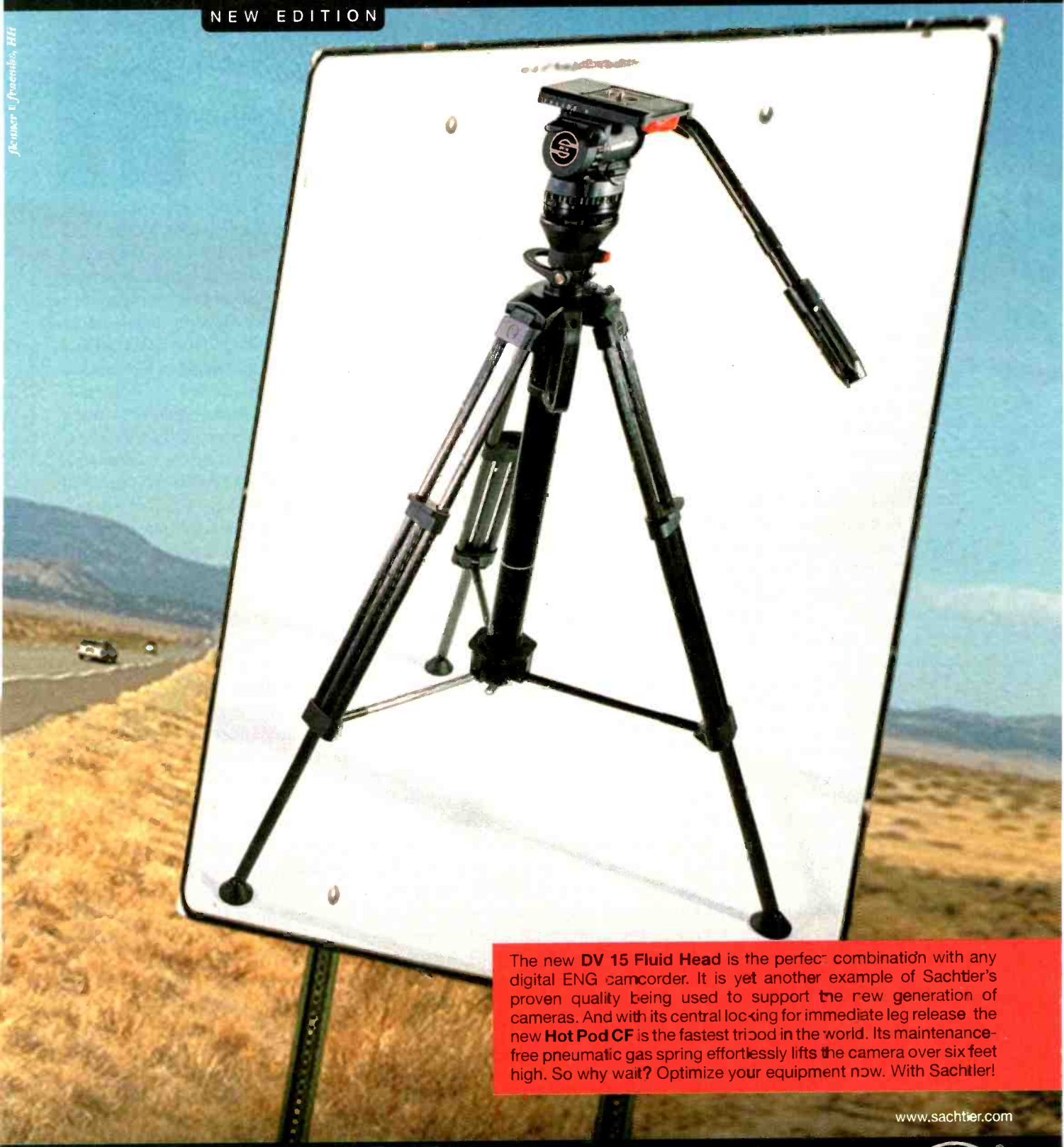

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BEYOND THE HEADLINES

New tower standards

BY HARRY C. MARTIN

According to a new fact sheet issued by the FCC, broadcasters who propose to locate their antennas on new towers near historic sites will face greater scrutiny to determine the environmental impact of their towers.

The proliferation of wireless towers has drawn the ire of the National Conference of State Historic Preservation Officers (NCSHPO), which sees the recent rapid increase in towers as a threat to historic sites. With their consciousness raised, NCSHPO and the Advisory Council on Historic Preservation (ACHP) signed an agreement with the FCC on March 16, 2001, to protect historic sites from encroaching towers. The new fact sheet, which is available at www.fcc.gov/mmb/mmb_siting.html, embodies this agreement.

The agreement encourages collocation on existing towers, buildings and other structures to protect historic properties while reducing the need for new towers. However, the agreement — which is peppered with references to the wireless communications facilities that inspired it — is ambiguous as to its applicability to broadcasters. The fact sheet, released jointly by the FCC's Wireless Telecommunications and Mass Media bureaus, clarifies that broadcasters are indeed covered. In fact, broadcasters may face serious sanctions, such as fines, if they locate on a structure that does not adhere to the agreement.

The terms of the agreement are straightforward. Commission licensees and applicants must comply with National Historic Preservation Act (NHPA) procedures for facilities that may affect sites that are listed or eligible for listing in the National Register of Historic Places. If a broadcaster's antenna is located on a tower, building or other structure constructed on or before March 16, 2001, the broadcaster likely falls under the agreement's grandfather clause and will not need new review under the NHPA, except under enumerated special circumstances.

But if a broadcaster is located on a tower, building or structure built *after* March 16, 2001, it *must* ensure that the tower has passed muster under the NHPA and have documentation to prove it. Collocation on a new tower will still require review if: (a) the NHPA analysis is not yet complete; (b) the FCC has determined that the collocation has a continuing adverse effect on a historic property; (c) a complaint against the collocation's impact on a historic property is before the FCC; or (d) the collocation will result in a substantial increase in the size of the tower.

Broadcasters who locate on new towers that were built after March 16, 2001, but that have not undergone historic review may face sanctions. To avoid this, broadcasters should check with the relevant State Historic Preservation Officer before putting their antennas on a "new" (*i.e.*, post-March 16, 2001) tower. Also, broadcasters leasing space on new towers might consider insisting on a clear provision in their lease agreements requiring the tower owner to demonstrate and maintain its compliance with NHPA.

Independent reviews by the FCC, ACHP and NCSHPO on the impact of collocations on historic sites have been infamously cumbersome, often resulting in long construction delays. The NCSHPO/ACHP/FCC agreement is intended to streamline that process. The fact sheet, in turn, provides guidance to broadcasters on how to satisfy requirements and speed review of requests to collocate on new towers. Additionally, the ACHP has organized a telecom working group to streamline historic preservation siting requirements and create a model that individual states may use to speed their own reviews of the impact of communications antenna and related infrastructure on historic sites.

EEO update

In January, the Supreme Court declined to consider an appeal of a decision by the federal appeals court in Washington holding that the FCC's former equal employment opportunity rules were unlawful. The Supreme Court's decision is the end of the line for the Commission's old EEO rules, which were adopted in 2000.

In December, the Commission initiated a rulemaking proceeding to consider a new set of proposed EEO rules. The new rules would require significant recruitment and record-keeping efforts, but would not require the maintenance of race-based employment data. Comments on those newly proposed rules are due on March 15, 2002, and reply comments are due on April 15, 2002. BE

Dateline

No biennial ownership reports are due in 2002. However, new permittees and new licensees, as well as parties acquiring stations, are required to file ownership reports within 30 days after approval of a construction permit, the filing of an initial license application or the consummation of a transfer or assignment.

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

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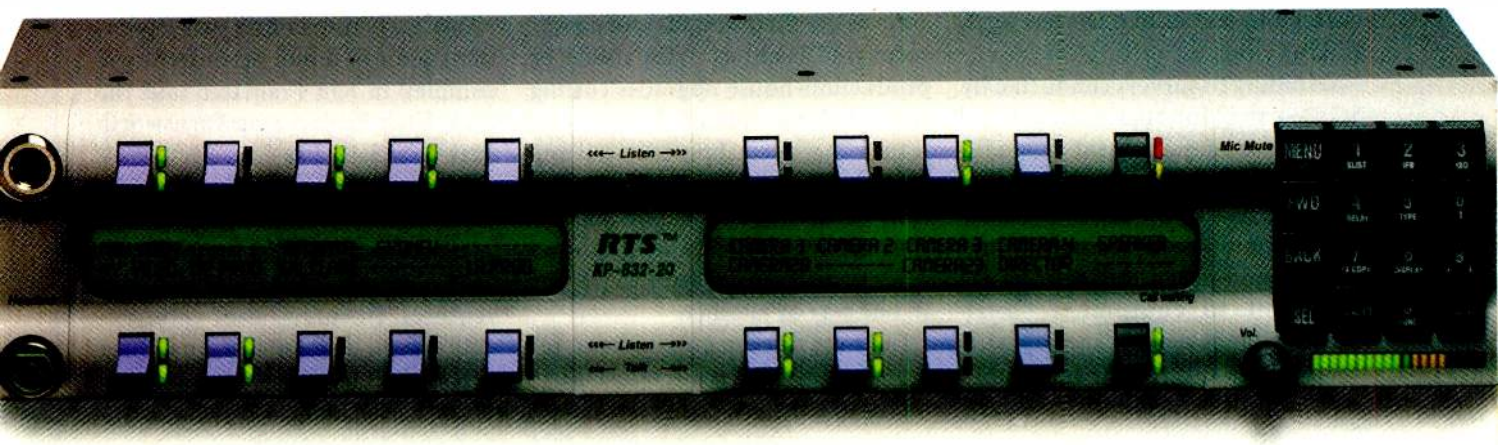

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Leasing equipment

BY LARRY BLOOMFIELD

Over their lifetimes, television facilities must buy new equipment and expand. And soon they will have to bear the additional expense of making the transition to digital television. But, with the downturn in advertising revenue over recent months, not everyone can just sit down and write a check. Many facilities are considering alternative ways to fund these expenses.

The critical issue facing television facilities is the mismatch between the capital investment needed to make equipment changes (whether digital or analog) and the uncertain revenue streams the new equipment will generate. The potential profit from DTV, as well as the timing of such revenue, is still unclear to many lenders. Despite reports of the growing number of digital television facilities and receivers, the current consumer base is very limited. And, even though the consumer base should grow over the next few years, the rate of growth is unknown. This puts shivers down the spines of lenders. Add to this the limited life expectancy of equipment and other "tangible assets" necessary to remain in the television business, and lenders tend to scatter like rats leaving a sinking ship.

According to surveys conducted by SC Research International, the life expectancy of equipment at studio and production houses ranges from five to 10 years; at transmitter plants, it ranges from 15 to 20 years. In the television industry, the insistent attachment to equipment "buzz words" and the need to keep up with competitors can force participants into a race not unlike the Kentucky Derby. An example is the all-too-familiar situation in which a facility feels it must purchase a newly introduced piece of equipment on short notice. When a new "must have" device comes out on the market, there goes the capital budget. But, whether it's a short-notice purchase, a well-planned long-range equipment upgrade, or equipment for the transition to digital, it all comes down to the same question: "How will we pay for it?"

Companies like Sony offer some rather creative funding: nothing down and pay nothing for a year or more. Harris has created its own leasing division called Harris Broadcast Financial, which will either fund the sale or find a way to get it funded.

It all comes down to the same question: "How will we pay for it?"

If the customer needs or prefers financing of some form, they get AMEX or a number of others, such as California Leasing, involved. As far as the vendor is concerned, the structure and pricing is the same, regardless of payment form.

Systems integrators, large and small, will go the extra mile and find ways to get their designs and equipment into facilities. With studio or production-house upgrades costing tens of thousands of dollars, and transmitter-plant upgrades starting near the $1 million mark, it makes little difference if you buy and install or have a systems integrator do it for you – you still have to pay for it, one way or another.

There are three main assets that require funding: real estate, transmitter-site equipment and studio/production house equipment. Keep in mind that the primary objective is to minimize the "gap" in cash flow created by the mismatch between any capital investment and the undetermined revenue streams that the new equipment can potentially create.

Regardless of the way a television facility decides to fund its equipment or other purchases, it is exceedingly important to deal with a financial institution that is experienced and familiar with the television industry. This tends to make things go much easier for all concerned.

So what is the best way to pay for new equipment now to be better prepared to reap its benefits later?

With respect to real estate, many competitors have found it financially desirable to share equipment and operate under one roof. Centralcasting or hubcasting has been one approach. Other broadcasters have formed corporations, built mega-facilities and then rented them back to themselves and, as new kids come on the block, rent to them as well.

Two such transmitter-site operations come to mind: the Sutro tower complex in San Francisco and the DTV Utah Project atop Farnsworth Peak near Salt Lake City. Each has it own particular nuance, but the concept seems to be working quite well at both locations. There are, of course, several other successful joint ventures. In some cases, entrepreneurs have developed transmitter sites and rented them to stations, all with varying degrees of participation and maintenance.

It certainly makes a great deal of

Continued on page 207...

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An Olympic success!

BY BRAD DICK, EDITORIAL DIRECTOR

Viewers all over the world watch the Olympics for amazing feats in sports. Few realize the feats of engineering behind the Games. Photo courtesy Panasonic.

The 2002 Olympic Winter Games have inspired pride in the minds of both American and international viewers. This year marked the second time in six years that the Olympics were held on American soil, and set new standards of performance and technical competence.

A core of dedicated engineers, mostly from NBC, worked diligently in the background to make the Games a success.

Let's look into the technology behind this year's Olympic broadcasts and meet three of the key people who helped make it happen. It's a story of challenges, choices and dedication.

Detailed planning

An Olympic broadcast is probably the most complex television event ever attempted. David Mazza, vice president of engineering for the NBC Olympics, says "The Olympics is like having 16 Super Bowl games going on at the same time." This year, his team helped produce a total of 375 hours of Olympic coverage.

Broadcasting the Olympics requires a whole lot more than a few trucks parked next to a skating rink. In fact, planning

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Thirty thousand Panasonic DVCPRO tapes were used to produce the Winter Olympics. More than 4000 tapes were required just for graphics.

for the Olympic broadcasts took two years of full-time work by a core group of about 100 NBC engineering, production and administration people.

The 2000 Sydney Olympics marked the first of five consecutive Olympic broadcasts for NBC. With an exclusive U.S. rights contract covering every Olympics through 2008, the network is in a unique position to select and then reuse technology for multiple games. Even so, it was only 16 months from the end of the Sydney Olympics to the start of the 2002 Winter Games.

For the NBC crew, many elements had to be specified two years in advance. "We have to define to the host broadcaster so many [technical] things long before we know what we'll be doing at each venue, the amount of van space, even the number of phones we'll need," Mazza said.

The Olympics broadcast involves two broadcast centers. One center serves the NBC feeds and the other the international feeds. The host broadcaster – International Sports Broadcasting (ISB) handles most of the origination of competition coverage, passing off clean video to other countries so they can add their own announcers and graphics as desired.

This year, a U.S. high-definition feed was added to the mix. Said Mazza, "We are very excited to have found a way to bring a true HDTV Olympic feed into American living rooms. With the help of International Sports Broadcasting and HDNet, NBC and the NBC DTV affiliates will broadcast six to eight hours a day of original HD programming and then repeat the same throughout each 24-hour block. This will be 1080i with 5.1 Dolby Digital sound with no upconversion. It should look and sound spectacular!"

In addition to the core NBC staff, the broadcast team includes 600 freelance engineers, camera operators, tape, CG, still store operators and editors. Add another 600 producers, about 1000 support staff and hundreds of local folks and that's a lot of technical people to train, feed, house and support. Perhaps most critical, about 2300 of these people don't show up for their work until the Games are only four to seven days away. That means all of their training must take place very quickly.

One key to getting things up and going quickly is the use of pre-packaged technology. First used at the Sydney Olympics, racks-in-a-box (RIBS) are complete systems prewired with equipment rack mounted and ready for interfacing. This technology allows complete systems to be built and tested long before they ever arrive on site. They are then simply connected to the rest of the broadcast chain once on site. (See April 2000, *Broadcast Engineering* for an article on the Sony/NBC RIBS system.)

New vs. proven technology

An Olympic broadcast must not fail. The loss of even seconds of a program feed could result in the entire world not seeing the winning goal or the finish of a highly competitive race.

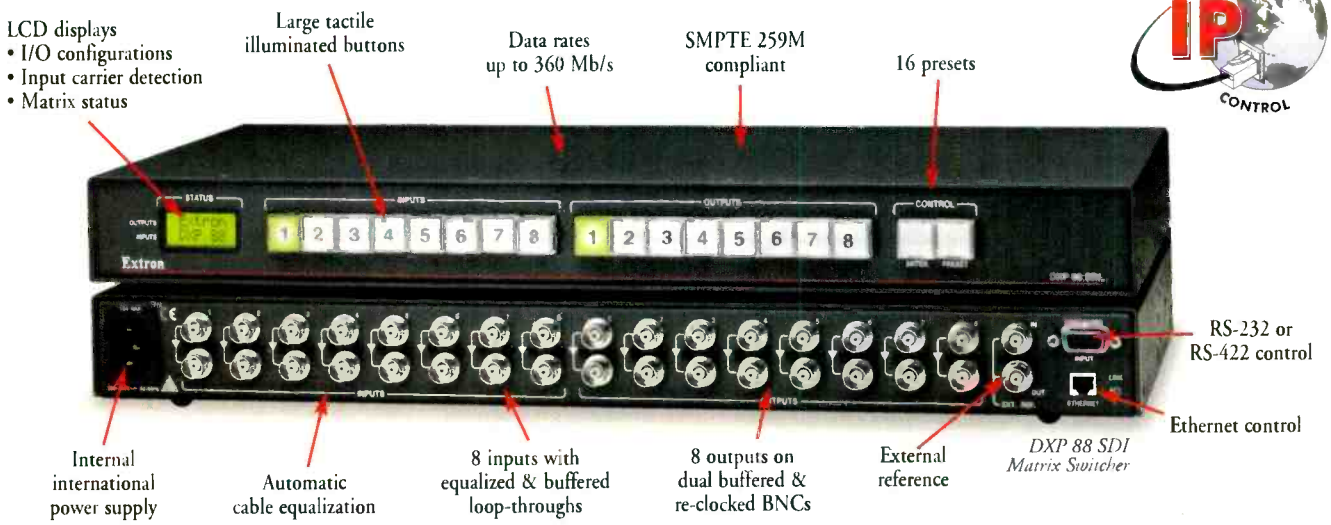
The Olympics is like having 16 Super Bowl games going on at the same time.

By the numbers

It takes a whole lot more than cameras and wire to bring the Olympics to the world. Here are a few facts from the 2002 Winter Olympics you probably never thought about. Or, maybe you did, but just didn't know the answer.

On the technical side:
375.5 total hours of NBC coverage
254,418 square feet of NBC compound space at venues
10 television/production trucks
3 SNG trucks
100 ocean sea containers shipped directly to Salt Lake City from Sydney
180 tons of portable studio air-conditioning
250 VTRs
458 camera positions
1000 miles of cable
25,000 blank videotapes
30,000 tapes in the NBC Salt Lake City Olympic library
9000 CDs in the NBC music library

On the human side:
3260 NBC staff on site
2123 hotel rooms
4 tons of bacon
3400 lbs of broccoli
320,000 cups of coffee
34,000 apples
130,000 eggs
188,940 meals prepared at 22 locations



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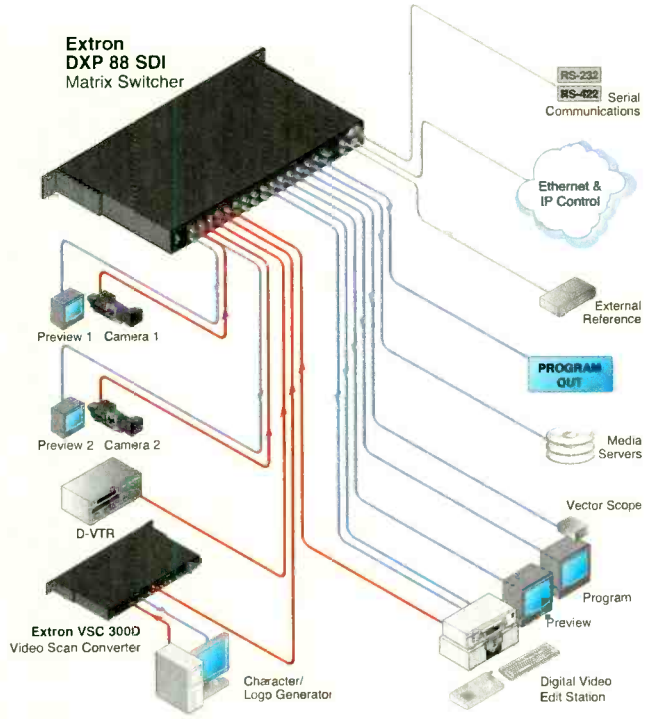

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Dave Mazza is vice president of engineering for the NBC Olympics.

For once-in-a-lifetime events like the Olympics, the choice of technology becomes more than a little complicated. The trade-off between what has proven reliable before, and new and less tried technology, is crucial.

The NBC staff settled on a two-phase method for technology selection. First, the viewer must perceive the change as a benefit. Second, on the financial and operational side, any new technology selected cannot be at the relative end of its life cycle.

While proven equipment and technology may be the easy choice, for other equally important reasons, that technology may not be the best choice.

The network often uses the Olympics as a testing ground for new technology. If something works well in this high-pressure environment, then other stations know it's probably a safe purchase for them.

It's a huge issue to bring a new product to the Olympics, but because the Olympics uses a closed-loop system, it's easier to roll out new technology. With less legacy equipment in place, there isn't so much to support or interface with.

Several key pieces of new technology are being used at this year's Olympics. They include Sony's IMX multiformat tape machine and MVS-8000 production switcher, the Graham Patten 8000 audio console, and Pinnacle's FX Deko character generators, Thunder servers and DVEXcel DVEs.

As technical director of the NBC Olympics, Steve Laxton's job was to help identify and integrate the technology into the two main NBC control rooms and make sure everything was stable. He also served as technical director for the network's prime-time show broadcasts.

Graphics capability similar to the "first and 10" video line seen in football games was used for the ski jump competition. Viewers were able to see how far the skiers needed to jump to take the lead.

Graphics and networking

Graphics capability was crucial to this year's Olympics broadcasts. Devices that would allow the network to produce

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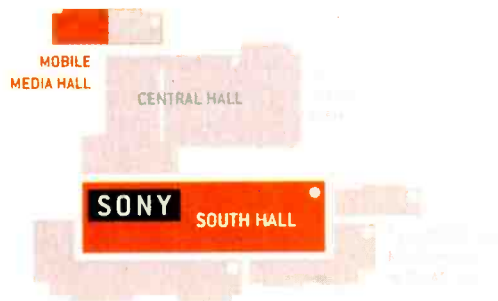

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stunning images were at the top of the must-have list. A key player in the selection of the graphics technology used at the 2002 Olympic Winter Games is Philip Paully, director of graphics engineering and operations for the NBC Olympics. He had to identify contemporary creative technology that could be integrated with other Olympics technology.

Once the basic graphic look devices have been selected, key issues were two-fold — the ability to provide unlimited font access online and the need to manipulate the video in new, creative ways.

The Pinnacle FX Deko with Clip Deko became the workhorse for on-air graphics. Pinnacle Thunders served as local storage. Systems from Avid and Quantel were interfaced together. The goal was to make every graphics system serve as a workstation on a single network.

Paully selected a Cisco 6000 router to handle the TCP/IP routing. With this, he was able to create discrete networks appearing to the users as a single "virtual" LAN. This configuration allowed everyone to share folders and files, graphics and directories.

Paully also needed the ability to convert the various file formats into a format readable by each of the different graphic platforms.

The Australian company Proximity provided the needed solution with their new program, Xenoclip. Xenoclip transfers images via TCP/IP and provides automatic file format conversion, pixel aspect correction and image transfer between divergent systems.

Is tape dead?

Many of the past Olympics have marked the first large-scale release of a new tape format. NBC has a history of pushing the edge with technology. In fact, the network debuted new tape technology at three previous Olympics.

While the Sony IMX tape machine is being used at the NBC Olympic broadcast center, it can't be called the establishment of a new tape format. However, according to Mazza, the machine does bring several important new production benefits to producers, including a three-hour tape load and multiformat capability. It also gives producers eight tracks of audio.

NBC produced 40,000 tapes at the Summer Olympics and 30,000 tapes at this year's event. It required 4000 tapes just to upload graphics. The network started the Winter Olympics with 25,000 blank videotapes.

What's ahead?

The question must be, will we ever get to the point where ingest, edit and playout all reside on single or multiple servers? Mazza suggests that the answer is "yes, but it won't happen in one step." For him, it's an issue of risk management. He doesn't believe that it's safe to put all your resources in one technology. BE

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DIGITAL HANDBOOK

Elements of psychoacoustics

BY MICHAEL ROBIN

Sound is defined as an oscillation in pressure, stress, particle displacement or particle velocity in an elastic medium. Sound is also the sensation these oscillations produce in the ear. Sound may be desirable (music or speech) or undesirable (noise). The oscillations that create sound can occur at any frequency. The widest range of frequencies audible to humans extends approximately from 20 Hz to 20 kHz, but few of us can hear frequencies at either extreme.

This article examines some basic characteristics of the human auditory system. Future articles will deal with amplification, distribution and monitoring of audio signals (April) and performance measurements of audio equipment and systems (May).

Band	CTR. FREQ. (Hz)	Bandwidth (Hz)	Band	CTR. FREQ. (Hz)	Bandwidth (Hz)
1	50	100	13	1850	280
2	150	100	14	2150	320
3	250	100	15	2500	380
4	350	100	16	2900	450
5	450	110	17	3400	550
6	570	120	18	4000	700
7	700	140	19	4800	900
8	840	150	20	5800	1100
9	1000	160	21	7000	1300
10	1170	190	22	8500	1800
11	1370	210	23	10500	2500
12	1600	240	24	13500	3500

Table 1. Critical bandwidths of the human ear

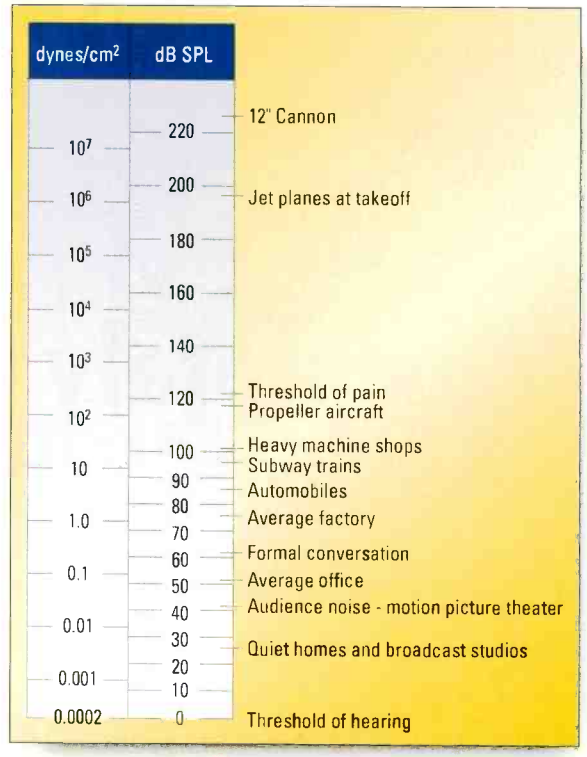


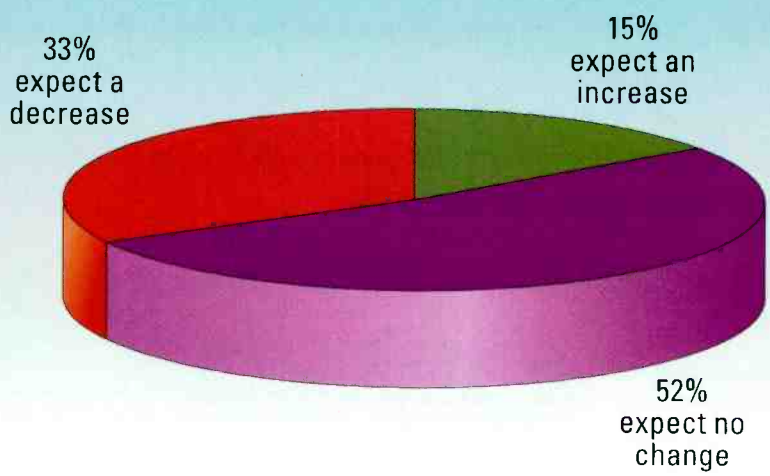
Figure 1. Sound-pressure levels encountered in various environments

FRAME GRAB

A look at tomorrow's technology

News budgets are mixed for 2002

Most news executives see no budget increase for 2002



SOURCE: CONUS Communications www.conus.com

Sound-pressure level

Sound pressure can be measured in four types of absolute units: dynes per square centimeter (d/cm^2), microbars, Newtons per square meter (N/m^2) or Pascals (Pa). (The variety of measurement units surely does not make life easy for audio engineers.) These units are related to each other by the following equation:

1 d/cm^2 = 1 microbar = 0.1 N/m^2 = 0.1 Pa

For an average person below age 30, the lowest level of sound pressure at 1 kHz that he or she can hear is 0.0002 d/cm^2. This hearing threshold is the

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reference for measuring sound-pressure level (SPL), a relative measurement expressed in decibels (dB). The SPL of a sound above the reference sound pressure is given by the following formula:

$$SPL\ (dB) = 20 \log_{10} (P/P_{REF})$$

where SPL (dB) is the number of decibels, P is the measured sound pressure in d/cm^2, and P_{REF} is 0.0002 d/cm^2

Figure 1 shows some SPLs the human ear encounters in various environments, expressed in d/cm^2 as well as in dB relative to the threshold of hearing.

In a broadcast environment, we can identify three typical SPLs:

- 120 dB SPL – The typical peak SPL of a symphonic orchestra or a rock concert
- 74 dB SPL – The average SPL of typical voice programs. It is used as a reference level by microphone manufacturers
- 30 dB SPL – The typical SPL of ambient noise

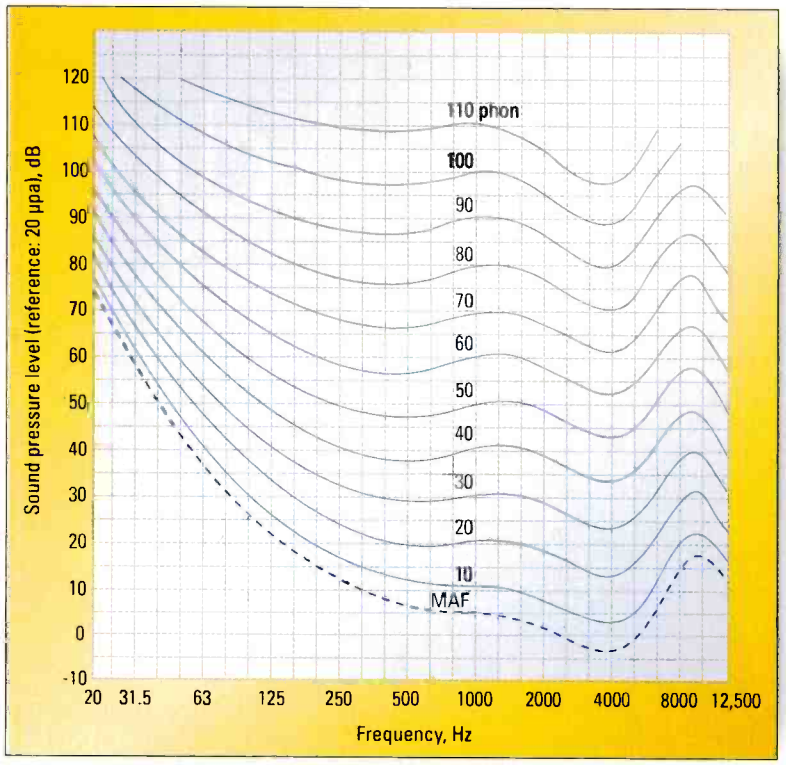

Figure 2. Normal equal-loudness level contours (from ISO 226:1987)

Loudness and loudness level

The loudness of a sound is not only relative, it is subjective, and depends on the sound pressure and the frequency of the sound. It is an auditory sensation that describes sounds on an ascending scale from soft to loud. The unit of loudness is the sone. The calculated loudness of a steady sound, in sones, is related to the loudness level, in phons, by the equation:

$$n_s = 2^{(L-40)/10}$$

where n_s is the loudness in sones and L is the loudness level in phons

The loudness level of a sound, expressed in phons, is numerically equal to the median SPL, expressed in decibels relative to 0.0002 d/cm^2, of a 1 kHz reference tone. The calculated loudness level of a sound, in phons, is related to the loudness, in sones, by the equation:

$$L = 40 + 10 \log_2 n_s$$

where L is the loudness level in phons and n_s is the loudness in sones

At frequencies other than 1 kHz, the ear requires different SPLs for the human auditory system to perceive the same loudness. Figure 2 shows the normal equal-loudness contours for pure tones as per ISO standard 226. The SPL is expressed in dB with reference to 20 µPa. These curves can be viewed as inverted frequency-response curves at various SPLs for the human ear. A 1 kHz tone having an SPL of 40 dB has a loudness level of 40 phons. To give the same sensation of loudness at 63 Hz, the SPL must be increased by about 20 dB. This shows that the sensitivity of the ear is considerably lower at frequencies below 1 kHz. Equal-loudness contours have different shapes at other SPLs. As the sound level increases, the ear's frequency response becomes flatter. At an SPL of 110 dB, it is reasonably flat – within ±10 dB.

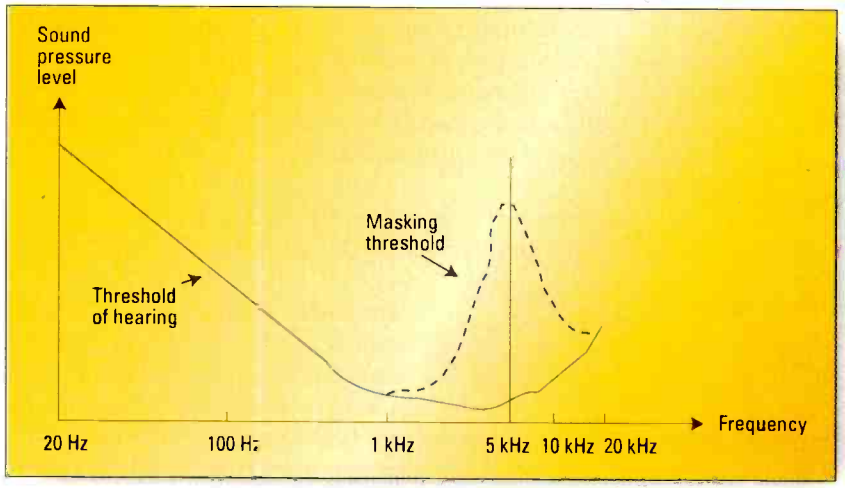

Figure 3. Example of 5 kHz tone creating a masking threshold

Human auditory system

The dynamic range of the ear is bounded at the top by the threshold of pain and at the bottom by the threshold of hearing. The threshold of pain is typically 120 dB, but it varies from individual to individual. Sounds having SPLs of about 120 dB and above can cause pain as well as immediate and

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permanent loss of hearing. Regular exposure to sounds of about 90 dB SPL will eventually cause hearing loss. Sounds having SPLs below 0 dB are inaudible. Above age 30, hearing normally deteriorates. The hearing threshold rises and perception of the higher frequencies diminishes. But, for persons of any age, the threshold of hearing depends on the level of ambient noise, which has a masking effect. Noise masking is defined as the process by which the threshold of audibility of a wanted sound is raised by the presence of an unwanted sound – in this case, noise.

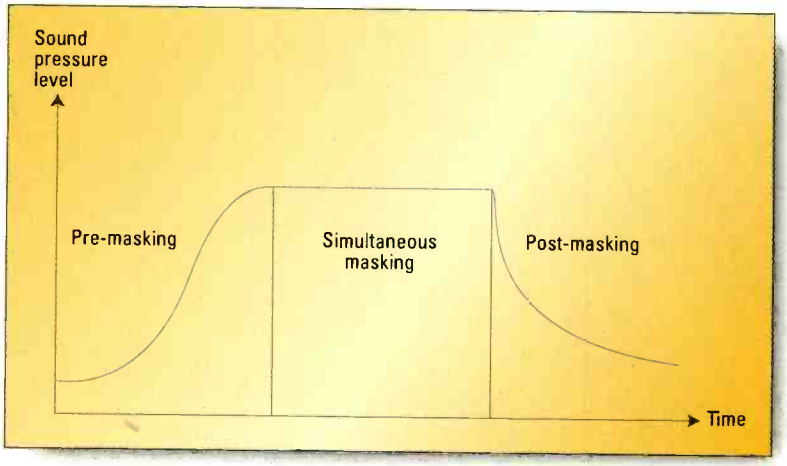

Figure 4. Example of the temporal masking effect

The human auditory system resolves sound in much the same way as an array of overlapping bandpass filters, resulting in so-called critical bands, shown in Table 1. The "comb filter" effect of these critical bands accounts for the masking phenomenon. In the presence of a dominant sound at a given frequency, other, lower-level sounds whose frequencies are inside the same critical band may become inaudible. This psychoacoustical characteristic is called frequency domain masking. Figure 3 shows the effect that a steady-frequency, steady-amplitude, 5 kHz tone has on a person's hearing threshold at adjacent frequencies. It creates a raised masking threshold that causes adjacent frequencies, whose levels are below the raised threshold, to become inaudible. Digital audio compression techniques take advantage of this characteristic by assigning fewer bits to audio signals in the raised masking region. The resulting increased quantizing noise is below the raised masking level and cannot be heard, so the bit-rate reduction has no adverse effects. Multiple simultaneous signals of different frequencies, such as music, result in an overall rising of the threshold of hearing at all frequencies. This permits digital audio compression systems to dynamically reduce the bit rate without affecting the reproduced sound quality. Compression systems based on this property are called perceptual encoders.

In addition to the frequency masking effect, the human auditory system exhibits a temporal masking effect. Experiments have shown that temporal masking starts before a masking signal is applied to the human auditory system (pre-masking) and slowly decays after the tone is stopped (post-masking). Figure 4 shows an example of the temporal masking effect and reveals that the post-masking lasts longer than the pre-masking. BE

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

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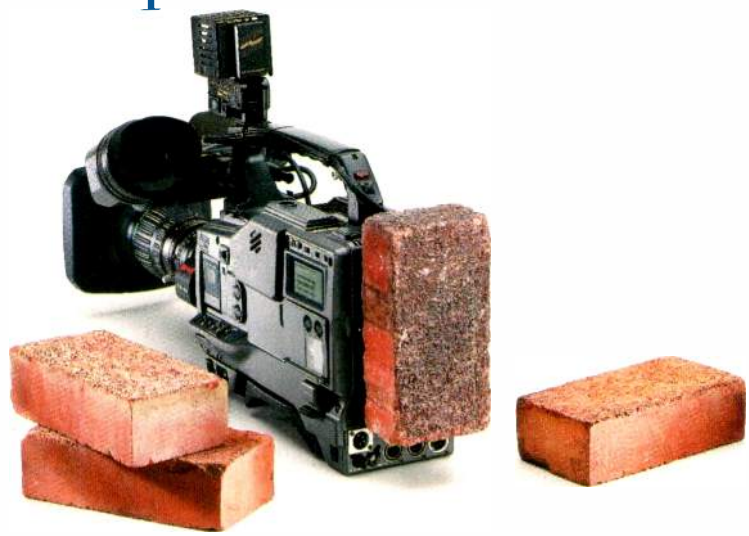

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IT networks

BY BRAD GILMER

When discussing IT networks for broadcast and post production, there are two main issues to consider. The first is streaming vs. file transfer. The second is performing these functions over a local area network (LAN) (within a facility) vs. over a wide area network (WAN). The single asterisk (*) in Figure 1 indicates that current ubiquitous IT-based protocols do not support functions such as partial file transfer and automatic resumption in the case of an interruption. The double asterisks (**) indicate that successful deployment over a WAN almost always requires a private network, dark fiber and/or ATM using permanent virtual circuits (PVCs).

The drawing shows that, as you might expect, LANs and WANs designed for file transfer can be used to move video files. They can also be used to stream video in real time. But, in the LAN environment, the user must exercise caution. And in the WAN environment, if the user does not have a purpose-built network, the result is unlikely to meet his or her needs. Local streaming using TCP/IP is possible, but the user must carefully design the network to support isochronous operation. Even in this situation, interruptions can occur. Work is underway in the Video Services Forum to identify user requirements for IP streaming over public networks.

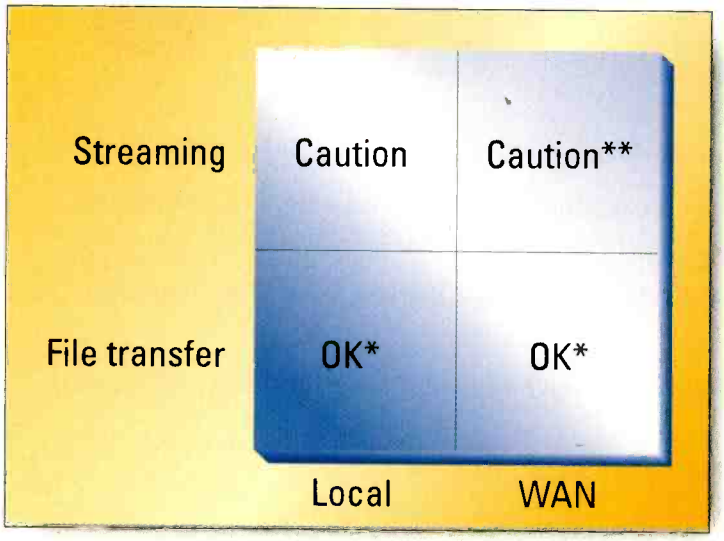

Figure 1. There are two main axes to the discussion of IT technology for broadcast and post production: streaming vs. file transfer and local vs. WAN.

Video over LANs

Inside a facility, Fibre Channel and Ethernet are the primary technologies used for networking. Most video applications use Fibre Channel to establish a channel over the network so that remote storage looks like it is physically connected to the local computer using SCSI (see *Broadcast Engineering*, June 2001, Computers and Networks, Fibre Channel Storage). Fibre Channel provides high data rates (up to 1 Gbits/s if optimized protocols are used), and can be designed so that the network is quite reliable.

TCP/IP over Ethernet is used in almost all post production and broadcast facilities. Video users move files over Ethernet all the time. Gigabit Ethernet (Gig-E) has a throughput of about 700 Mbits/s. 10Gig-E is under development and will likely have a throughput of 7 Gbits/s. Ethernet switches are now commodity products, allowing network designers to provide redundant links and to easily expand network capacity (see *Broadcast Engineering*, April 2001, Computers and Networks, Cable and Wiring for LANs). Furthermore, 100Base-T has become a commodity with very low prices due to huge volumes sold worldwide. You can expect Gig-E prices to fall rapidly in the next 18 months.

Inside a facility, Fibre Channel and Ethernet are the primary technologies used for networking.

Asynchronous transfer mode (ATM) can be used inside a facility, but it may not be the best answer. Compared to typical video payloads, ATM cells are small, so the relatively large size of the headers compared to the payload results in inefficiencies compared to Internet-protocol (IP) technology. Additionally, some claim that setting up an ATM environment requires specialists trained in configuring and maintaining ATM, and that the cost of ATM, compared to conventional IP networks, is high. For these reasons, ATM is not likely to become dominant in this application.

In summary, in the local environment, fast network speeds are now available at near commodity pricing. Furthermore, the network speeds available now are approaching those needed to support multi-user distributed ap-

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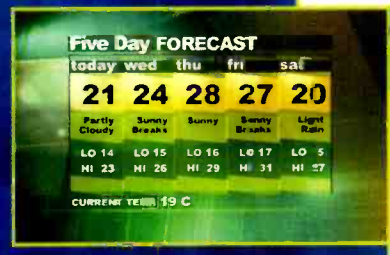

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plications that regularly move video over the network. This is in contrast to several years ago when the highest speeds available were in the 6 Mbits/s to 7 Mbits/s range.

So, as of 2002, if you want to build an IT network for video, you can do so. But you still need to employ your hard-won engineering skills to be sure that the network has adequate capacity, and you must be sure to keep video traffic separate from the business network.

Video over WANs

When moving material between two facilities, the predominant technologies are ATM and IP, both running over synchronous optical networks (SONET). In many locations, you can now use ATM to provide video service between two distant facilities. Through the use of permanent virtual circuits, service providers can create virtual point-to-point circuits that are capable of delivering 100 percent of their rated bandwidth 100 percent of the time. While it takes engineering skill to provide these circuits, they are available, although this service is not available everywhere. ATM pipes can be much larger than required for video streams, so bandwidth in the ATM environment is generally not a problem. You might think that ordering a big pipe from your local service provider is a waste of money. After all, why pay for such a big pipe when occasional video traffic is only going to take a portion of this bandwidth.

You might want a bigger pipe for several reasons. First, you should realize that, even if you have a big pipe, the service provider is only going to transmit the active payload in the pipe. For this reason, you may only have to pay for the portion of the pipe you use. Second, the extra bandwidth is almost immediately available if you need more capacity. Finally, the pipe can be used for other services besides video, such as voice and data. When talking to your video service provider, you may be surprised to hear that prices have become very competitive over the last several years.

It is also possible to order very big IP pipes from a service provider. These pipes are capable of handling video, but there are severe limits on the ability of IP-based networks to carry real-time video. Also, for some facilities, the "last mile" problem still exists. That is, the service provider's central facility in town has plenty of bandwidth, but getting a circuit from the central facility to the broadcaster is an issue. Watching the trends in bandwidth in recent years, one can quickly conclude that this problem has been overcome, or will be overcome soon.

If bandwidth is no longer the major stumbling block to using IT infrastructure for video, then why is it that this technology has not become the norm for our facilities? The reason is that there are still infrastructure issues to be resolved.

When moving material between two facilities, the predominant technologies are ATM and IP.

Infrastructure and QoS

What is infrastructure? Infrastructure involves a broad range of topics, from network monitoring and control to establishing appropriate service-level agreements to identifying or developing IT protocols appropriate for use in broadcast and post production.

Many television engineers operate on the basis of "implied quality of service." So even though QoS is not a term used to specify analog television circuits, television network engineers expect a certain level of performance, delay, jitter and so on. They order the transmission service that is most appropriate to the case at hand and expect the appropriate quality of service.

If the engineer is confronted with a link that has a quality level below the tolerated level (i.e., a link whose implied QoS does not live up to his expectations), then serious repercussions will result. As users move to new technologies, especially technologies employed within the Internet, they bring with them this innate sense of QoS. When television engineers or computer network designers try to map this implied QoS onto the types of pathological conditions that may occur in digital transport networks, especially IP networks, there is a strong possibility that misunderstanding will occur if the parties involved do not establish clear specifications for these networks.

Regarding the challenge of carrying real-time video over IP, IP is a connectionless network-transport protocol built around an any-to-any environment that does not require provisioning of individual circuits to connect each site on the network. IP networks – in particular IP network backbones – use two routing protocols to enable the distribution of routes to all routers connected to the network, or to make them accessible through another connected network. Interior-gateway protocols (IGP) such as the open-shortest-path-first (OSPF) protocol and the border-gateway protocol (BGP) control how traffic flows from end to end by distributing routes within any particular backbone IP network and, externally, to peer backbone IP networks. If a link fails, traffic may be forced to switch quickly from one path to another, causing packet loss and changing the packet delay.

Because IP networks handle traffic on a per-packet basis, not a fixed-cell-size basis, latency through any one port can dramatically vary depending on the size of the packet, the link and other traffic transiting the link. In other words, the transmission delay over a public IP network can change dramatically from one packet to the next.

Additionally, the automatic scheduling adaptation across the network provided by ATM cell admission control (CAC) capability is not currently available for IP-based networks. CAC is a critical technology in ATM, and is used to reserve bandwidth for subsequent use.

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To compound the complexity of providing the level of QoS required for real-time video services, it is impossible to monitor all of the traffic flows on a backbone network. Traffic flows change from minute to minute, and can significantly shift in a matter of minutes. For example, significant changes can be seen during specialized, IP video streaming events. Since IP networks are dependent on each other, problems on one backbone network can significantly impact the routing on another.

Multi-protocol label switching (MPLS) has been touted as the cure for all of the current shortcomings of IP-based backbone networks. It does have several characteristics that can provide a better mechanism for controlling, routing and monitoring traffic across a backbone network. But MPLS requires modifications to existing routing protocols to provide traffic engineering features (i.e. CAC-like functionality), and equipment manufacturers are just now realizing that they need to modify their products to better support a broader range of QoS offerings. MPLS and various protocol enhancements are still being developed and have not yet been completely standardized. However, several equipment manufacturers have already implemented proprietary MPLS and traffic engineering methods, improving their equipment's ability to interoperate with other manufacturers' equipment.

It appears that bandwidth will no longer be the limiting factor in using IT-based technology for video – if not now, in the near future. File streaming technology is well advanced and, with some exceptions, can be used to move video both locally and in the WAN environment. IP technology is ubiquitous, and can be used for streaming in the local environment, but with several serious caveats. However, IP streaming of real-time, high-quality video over public networks faces serious challenges. These challenges exist because of fundamental technology choices in the IP protocols. Finally, the video user must begin to understand QoS and to think in these terms if he or she is to make successful use of IT technology for video.

It is worth mentioning that the Video Services Forum has been especially active in the area of IP for video. Recently, the Forum submitted an informative paper to the ITU in an attempt to raise IP for video as an issue to the telecommunications and computer industries. BE

Brad Gilmer is president of Gilmer & Associates, executive director of the AAF Association and technical moderator for the Video Services Forum.

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Selecting lenses

BY GORDON TUBBS

When the time comes to choose a lens for your broadcast or pro video camera, it can be tempting to look for a "magic bullet": one piece of glass that does everything you need and nothing you don't, all at the right price.

However, reality is rarely so streamlined — with the increasing sophistication of lenses comes a constantly widening range of choices and decisions. Fortunately, if you do a little advance research, lens selection can be an accurate and efficient process that will have a positive impact on the entire production chain.

First, determine your budget. If you only have a certain amount of dollars to spend on your new lens, or it's slated for an under-$10,000 camera, the field of appropriate choices will narrow immediately. The good news is that the dramatic increase in quality and features in pro video lenses has created new options for buyers on a tight budget.

Next ask yourself what the lens will be used for: Will it be for broadcast news, sports, documentaries or something else entirely?

Assuming quality and specifications are the first concern, start by examining your HD needs. If you're currently shooting in SD but expect to be using an HD camera in the near future, then HD lenses (which are also fully compatible with SD cameras) should receive serious consideration.

An important decision for SD shooters is whether or not to get a switchable lens capable of shooting in both the 16:9 and 4:3 aspect ratios. If you're in the 4:3 world and 16:9 is on the horizon, a switchable lens provides a flexible solution for a switchable camera. The issue of switchable lenses is a complex one, and contacting a lens manufacturer can go a long way towards simplifying it.

All told, there are three categories of portable lenses to choose from — standard focal length, telephoto focal length and wide-angle focal length. It's a cliché, but "wide" and "economical" usually don't appear in the same sentence. Widening a lens while keeping image quality high is a more costly process, but for situations like interviews or documentaries, wide angle is often essential. Going super wide in a 2/3" camera, such as a 4.5mm spec, isn't possible in pro video, but if the pro video 6.5mm spec works for you, then the latter may be a good compromise.

If a standard lens, say 16X telephoto with an 8mm (16x8) wide angle isn't enough and more telephoto is your priority, portable zooms can come in sizes ranging from 21x7.8 all the way to 40x14. Again, what's right depends totally on the application – sports and newsgathering will probably require more telephoto power, while studio newsroom use calls for less. In broadcast grade, the 2X extender is standard on all lenses, but in pro video it becomes an option worth some thought. If you're only going to need more telephoto once in a while, a front-mounted teleconverter for an additional 1.5X focal length increase is a less expensive option, but it also adds weight.

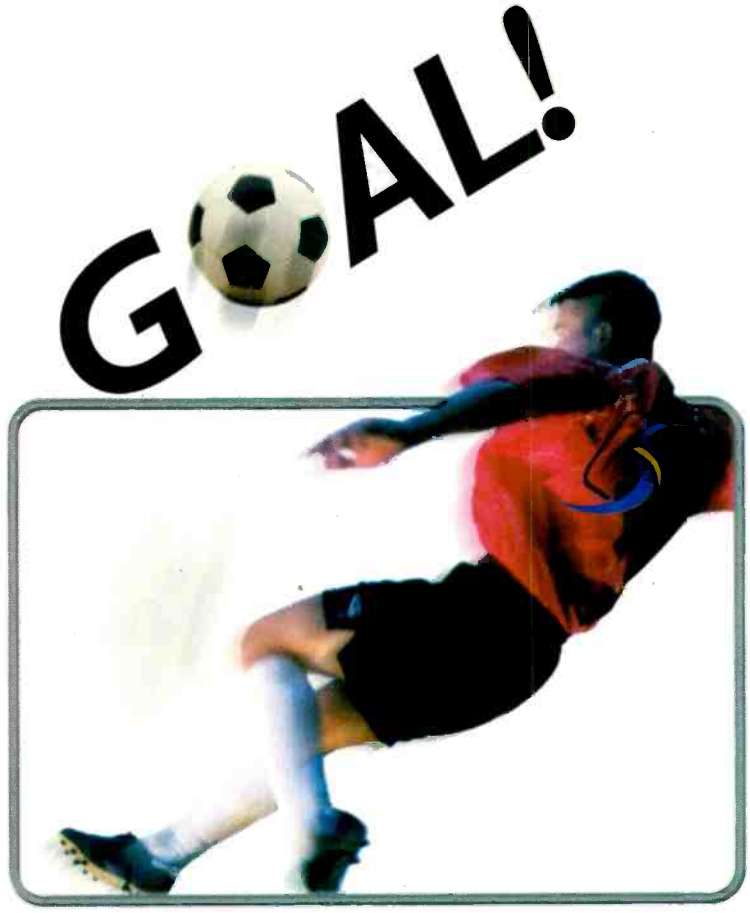
When the time comes to choose a lens for your broadcast or pro video camera, it can be tempting to look for a "magic bullet."

When selecting lenses, broadcasters must make decisions on features including switchability, telephoto power and HD capability. Photo courtesy Canon.

Sometimes a lightweight telephoto isn't telephoto enough, so bigger zoom lenses must be considered. These could range from 40X portable (not handholdable), all the way up to the box-style 86X lens.

By going through the above checklist and thinking about budget, specifications, HD and SD, switchability, and telephoto and wide angle issues, the lens selection process can become much simpler. Once you narrow the field from a possible 15 or more lenses down to a more manageable two or three, you'll find the right lens on your camera. BE

Gordon Tubbs is assistant director for Canon Broadcast and Communications.



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Cisco Systems' new broadcast and production facility

The central master control at Cisco's facility, featuring PESA routing systems and Leitch distribution equipment, is the glue of the system and the room from which the central distribution originates.

BY MARK SIEGEL

Cisco Systems has added a broadcast and production facility to its headquarters in San Jose, CA. The facility, designated as Building 8, is a completely new structure built from the ground up. It includes a master control center, four broadcast control rooms, four production studios and several labs.

Cisco contracted Digital System Technology (DST) as systems integrator for the facility. DST provided Cisco with a broad array of services for this project, including design, consulting, engineering, equipment provisioning, integration and installation.

Cisco expects to use the facility to test and demonstrate the capabilities of its IP/TV Solution product line as well as to conduct training, distance learning and corporate communications. The IP/TV Solution line uses multicast

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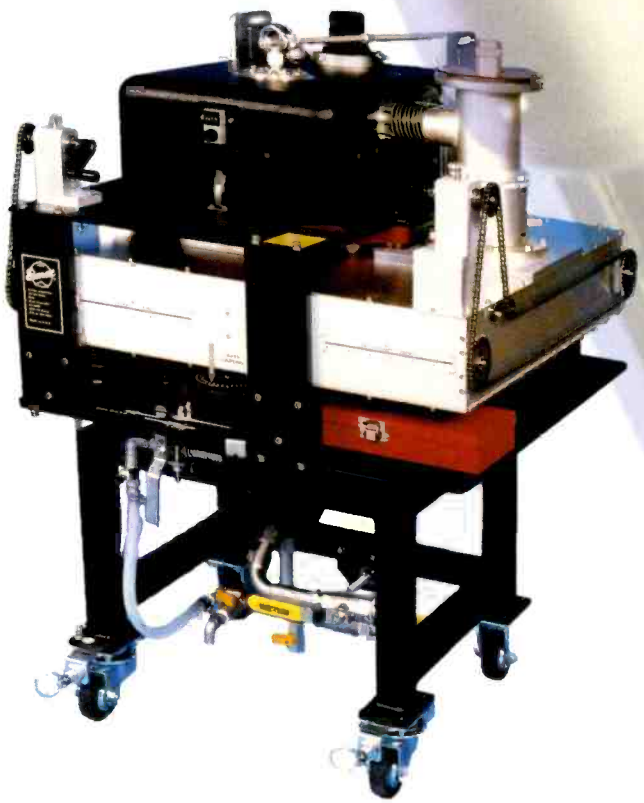

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technology to deliver TV-quality live video programming such as management broadcasts, training programs, university classes, business television and satellite programs to desktop PCs, classrooms and meeting rooms. This facility will allow Cisco to train clients, employees and customers worldwide via multicast and unicast streaming — a highly cost-effective alternative to flying the trainees in to San Jose from various countries.

Above: The server room, adjacent to master control, houses all equipment used for encoding content to stream to the Internet for worldwide training purposes.

The original completion target date of October 2001 was extended through January 2002 following additional requests by Cisco. DST's job was to keep up with each extension —on time and on budget. The flexibility provided by both companies allowed them to meet their goal of opening a fully functioning facility in early 2002.

Cisco provided a preliminary equipment list, which was somewhat altered through discussions and evaluations of the best choices for the facility. DST made changes to the list and began the process of bringing the facility to light. DST pre-wired several of the equipment racks at its Atlanta facility. These consisted mainly of racks required for the new facility's central control room, including the signal routing and patching equipment. The remaining racks, as well as the majority of the build, were done on site at Cisco's San Jose headquarters.

The heart of the system is the master control center, a 20' by 20' room housing 10 racks of equipment that tie the operational aspects of the entire facility together. To ensure that all required equipment could fit into the available space, DST designed exceptionally high racks to house the equipment.

Below: The master control quality assurance station is used for encoding to all delivery systems, including fiber, terrestrial and the Internet, as well as sending material outside the facility.

The master control center's core equipment consists of PESA Tiger and Cougar routing and switching systems, which address SDI and NTSC video, plus AES and analog audio. All electronics for the entire facility live in this space. This includes all processors for the various production switchers found in all four broadcast control rooms, plus a variety of Leitch distribution equipment and Tektronix test and measurement equipment.

This facility will allow Cisco to train clients, employees and customers worldwide via multicast and unicast streaming.

The master control center also houses the videotape operations center, complete with Sony Betacam, Digital Betacam, DVCam and VHS systems. An adjacent server room houses all IP products for corporate broadcasts and distance learning (the Cisco IP/TV 3425, 3424 and 3432 for multicast and unicast streaming), as well as the RTS Adam intercom matrix for facilitywide communication.

The facility also features four broadcast control rooms, each with its own adjacent production room. Control A, measuring 20' by 20', is the largest of the four control rooms. Its adjacent 35' by 45' production room is the largest of the four production

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rooms. Control A is the facility's primary control room and features a large Sony DVS7150 production switcher and associated production equipment: a Pinnacle Systems DVEXtreme digital effects system, a Pinnacle Deko computer graphics system, a Pinnacle Lightning still store and a Crest audio console.

Over the duration of the project, Control A proved to be among the greatest challenges in regards to serviceability — an issue that Cisco will face in the future. Control A's construction made it necessary to install the racks against a wall. This placement eliminates rear access to the equipment and all service must be handled from in front of the racks.

The three remaining control rooms employ most of the same equipment as Control A, except for Ross 210D production switchers. But, unlike Control A, the layout of these three rooms allowed DST to provide rear access to the racks, affording much better serviceability in these rooms.

The production rooms adjacent to Control B, C and D are roughly half the size of Control A's production room. Generally, all four production rooms have similar equipment: multi-camera setups featuring Sony DXC-D35WT cameras with Fujinon Ah18x9.7 standard-definition lenses. The production studios for Control C and D also house Panasonic AWE600 robotic cameras. For production communications, the entire facility features numerous Sennheiser audio products, including EM1046 and EM3032 rack-mount receivers, SK50 bodypack transmitters and Evolution wireless and microphone products.

The final leg of the integration process included two labs for equipment testing and training: one for the IP/TV Solution line and one for Cisco's training development. DST provided the infrastructures for these rooms. DST installed a termination panel that allows Cisco to move equipment into these labs as required. The labs themselves connect to various studios and production rooms to create content, which is recorded directly to tape or distributed via the Internet.

Power sources include a central three-phase power system that feeds all of the technical spaces with isolated grounding. However, there is no generator or central UPS in this facility. Several rooms feature dedicated local UPSs, specifically where servers and computers require protection.

DST put considerable effort into the details of designing operation consoles. As with equipment integration, the main challenge was to install a large amount of material into a small amount of space while keeping it accessible and usable. To ensure that all necessary furniture fit properly, some unusual console design was required. DST customized the furniture to meet ergonomic and ADA requirements within the facility. Solutions Custom Furniture of Santa Fe Springs, CA, handled the assembly and installation of the furniture.

When Cisco is ready to expand, the core of the system allows room for growth, beginning with the PESA routing system in master control.

Dialogue between Cisco's and DST's engineers resulted in a fully functioning facility that satisfies all of Cisco's in-house broadcast and production needs. BE

Control A, the largest of the four control rooms, features a Sony DVS7150 production switcher, several Pinnacle Systems' products and a Crest audio mixing board.

Design team

Dick White, project manager
Phil Popp, senior project engineer
Mickey Kroll, design engineer
Mike York, construction foreman

Equipment list

PESA Tiger and Cougar
Sony DVS7150 production switcher
Ross 210D production switchers
Pinnacle DVEXtreme
Pinnacle Deko
Pinnacle Lightning still store
Crest VX audio console
Sony DXC-D35WT cameras
Fujinon Ah18x9.7 SD lenses
Panasonic AWE600 robotic cameras
Sennheiser SK50 transmitters
Leitch distribution equipment
Tektronix test and measurement
Sony Betacam, Digital Betacam, DVCam and VHS systems
Cisco IP/TV 3425, 3424 and 3432 for multicast and unicast streaming
RTS Adam intercom matrix

Mark Siegel is vice president of business development at Digital System Technology.

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It's not NIMBY anymore – it's BANANA

BY DON MARKLEY

The common cause for objections to towers used to be NIMBY – not in my backyard. This has now changed in some areas to BANANA – build absolutely nothing anywhere near anything. In some cases, it seems to be even worse than that. In one zoning hearing in Colorado, the zoning was denied for a tower less than 200 feet high when the nearest home was 1.5 miles away. In that case, the local staff officials had no objection to the tower, but the applicable zoning board denied the request just because a group of the public objected, albeit without plausible testimony to show harm.

When it comes time to apply for a zoning variance or permission to build a structure, it is often necessary to present your request to a zoning board, a zoning board of appeals or a county board – sometimes more than one of those groups. Unfortunately, many of the members of those organizations are elected by the public, which means that they may be concerned about being re-elected. That concern, or the desire to simply go along with a friend's wish, may outweigh the evidence presented by professionals in the field. The situation is horrible and shows little promise of improvement in the near future.

If it is necessary for a station to build a new tower, it is probably advisable to make the first step be a visit to an area attorney experienced in zoning and land use issues. He should be able to advise you of areas that might be totally impossible for future sites. For example, some counties have decided that there will be no more towers at all, even in what has come to be considered the area tower farm, where multiple structures exist. The attorney will also be able to help you prepare your presentation in accordance with the format that the locals prefer.

> The fact is that towers have become a part of the landscape in our society.

If the attorney anticipates difficulties, it will be to your advantage to prepare thoroughly and to bring in all the help you may need. For example, you should have engineering assistance that is thoroughly familiar with non-ionizing radiation calculations and the various standards.

Another argument that you will face is that the tower will hurt property values. Have a licensed appraiser on hand to dispute that argument. The fact is that towers have become a part of the landscape in our society. They hurt the property values less than the loss of a nice tree. Most people will notice the presence of a tower, then ignore it totally. Towers become something that is simply there, ignored as they don't make noise, throw parties or play their radios too loud. Again, there will be those who will still insist that property values will go down regardless of any testimony that you may present.

The next problem will be hazard to aircraft. You should have a no-hazard determination from the FAA in hand prior to going before the zoning authorities. If not, you will probably be denied immediately on the basis of possible hazard. Even if you have a no-hazard determination, you may have arguments made that the FAA missed an airport. The FAA does not protect restricted landing areas, such as little private fields. Yet, those who fly from those fields can be planned on to object loudly.

The one thing that you cannot really beat is the fact that there will be a tower, and it will be visible. If those on the tower board simply don't want a tower in the area, you lose. It's that simple – unfair, perhaps, but simple. Fortunately, some states, and even some counties, have carefully defined criteria for denial or acceptance. In those cases, it may be possible to seek assistance from the courts. Again, look to your attorney to help you with that possibility.

The problem of zoning is serious. After you have fought a construction permit application through the commission,

FRAME GRAB A look at the consumer side of DTV

E-commerce grew 20 percent to $53 billion in 2001

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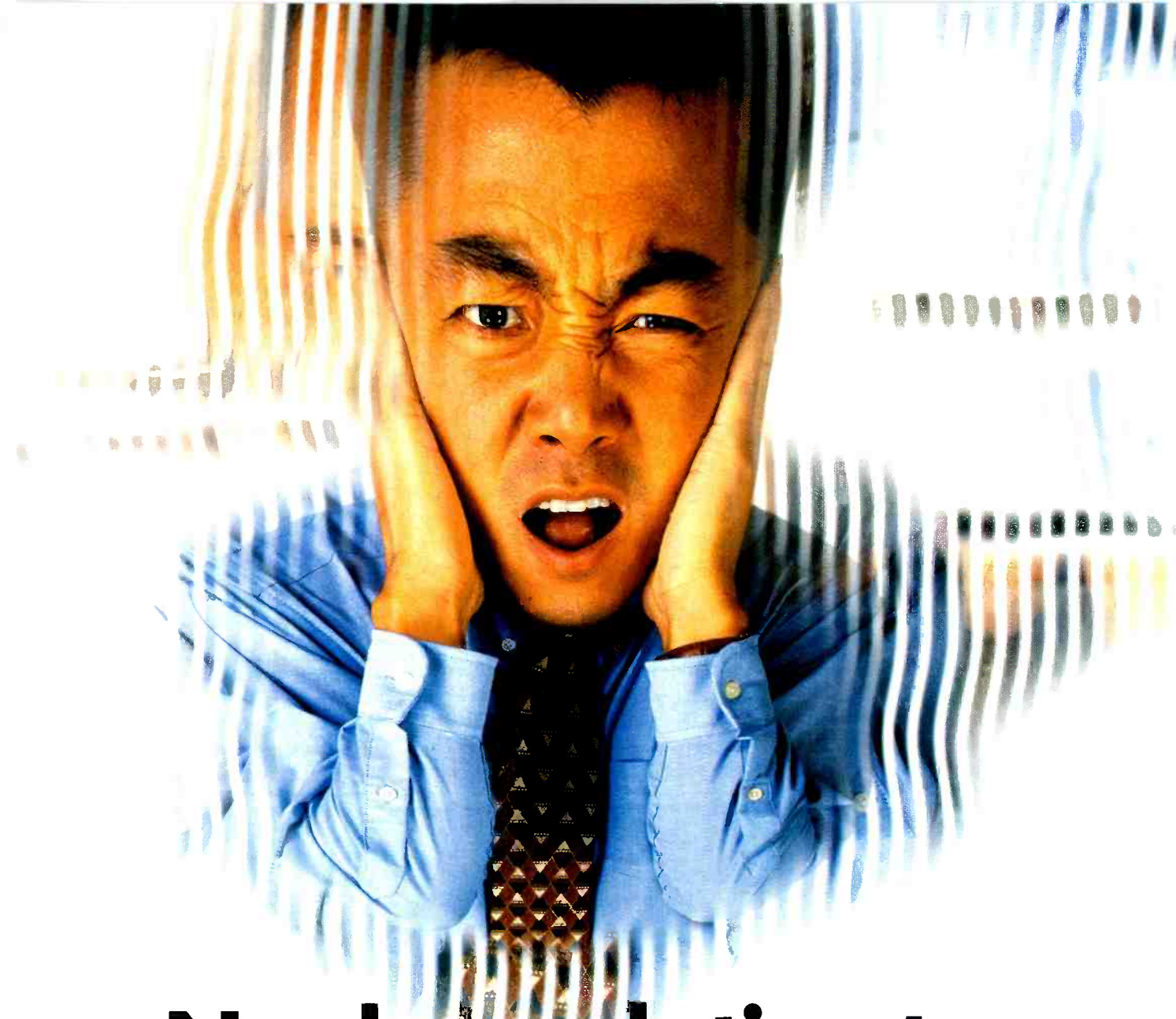
($ millions)	1Q01	2Q01	3Q01	4Q01	TOTAL
Non-travel	$7755	$7585	$7565	$10,804	$33,709
Travel	$3727	$4892	$5735	$5003	$19,357
Total	$11,482	$12,477	$13,300	$15,807	$53,066

SOURCE: ComScore Networks www.comscore.com



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with all of the associated costs, you may still find yourself in a situation where you simply can't build the station. Obviously, the situation has been aggravated by the construction of somewhere around a zillion new towers for the wireless industry. Those things are now everywhere, and zoning boards are simply getting tired of dealing with them. Their response then becomes simply to deny everything. If the courts won't help, it is not inconceivable that you will lose the construction permit simply from being able to build in an area that will meet required coverage and spacing requirements.

There is a new organization on the horizon that may bring some help. It is called the National Antenna Consortium and will be holding an open meeting on the Monday of the NAB convention. One of their goals is to obtain legislation that will cause broadcasters to be treated fairly in zoning matters. That is going to require the cooperation and assistance of tower manufacturers, broadcast organizations and even individual broadcast groups. Obviously, something must be done to level the playing field. (I'm not quite sure what that phrase may mean, but politicians seem to like it.) It is too much to expect that the Commission will exempt broadcasters totally from local zoning. However, it may be possible to establish some reasonable criteria that will override zoning decisions that are either without technical merit or are simply capricious.

As an example, if a proponent can clearly show that there will be no nonionizing hazard, as he will already have done in obtaining the construction permit, zoning boards should be restricted from using that as an excuse to deny an application. It isn't reasonable to expect a zoning board to grant a tower approval for a 1000-foot tower in the middle of an area zoned for single-family residences. However, maybe approval could be forced in areas zoned as agricultural or industrial. There has to be a meeting ground somewhere that will cause tower proponents to be treated fairly.

At one zoning hearing, the author observed a huge group of opponents dressed in T-shirts with a tower symbol accompanied by a circle and diagonal line. They were vocal, numerous and obnoxious. They also had no intention of accepting any presentation of factual information without regard to the technical qualifications of the presenters. Guess what – the tower was denied. No reason, it was just denied. That type of situation has to be changed. Maybe the new consortium will be able to help - it would be helpful to see broadcasters attend that meeting at NAB and get involved. BE

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

SEND Send questions and comments to: don_markley@primediabusiness.com

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Broadcast ENGINEERING Engineering Excellence Awards

BY BRAD DICK, EDITORIAL DIRECTOR

And the winners are...

The 2002 *Broadcast Engineering* Engineering Excellence Awards were created to recognize innovation and quality design and construction of production, broadcast and Internet/new media facilities. The goal is to highlight the work of engineering and management staffs, systems integrators and manufacturers. The first of those nominees appeared in the December 2001 issue of *Broadcast Engineering*'s Buyers Guide.

Readers were encouraged to vote for their preferences on the *Broadcast Engineering* Web site. The votes were then tallied and reviewed by the magazine staff.

These facilities showcase the best in today's design, innovation and construction. If you want to see how it's done right, look no further than these winners and companies. The complete stories detailing each facility's construction are available on the *Broadcast Engineering* Web site, www.broadcastengineering.com. Look for the *Broadcast Engineering* Engineering Excellence Awards cover.

And now onto this year's winners.

Internet/new media facilities

Winner:

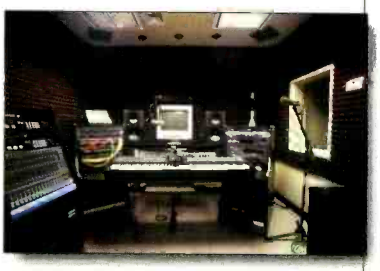
Doyle Technology Consultants, Activate studios

Key technology: Nvision Envoy 6904 super-wide-bandwidth router, PESA Jaguar router, ADC distribution products, Belden cable, DH Industries satellite antennas

Runner-up:

Creative Studio Solutions, Xact Internet production complex

Key technology: Mackie consoles, Denon CD players, HHB CDR recorders, TASCAM DAT recorders



Audio facilities

Winner:

Solid State Logic, JC Studios

Key technology: SSL Aysis Air console, Zaxcom DMX1000 mixer, Thomson digital VTRs, Ikegami cameras and monitors, Canon lenses, Vinten heads, Grass Valley Group edit system

Runner-up:
Wheatstone, Marshall Space Flight Center

Key technology: Wheatstone SP-8 console, ADC patchbays, Mohawk cable

Overall studio design

Winner (a tie):

AZCAR, WABC-TV

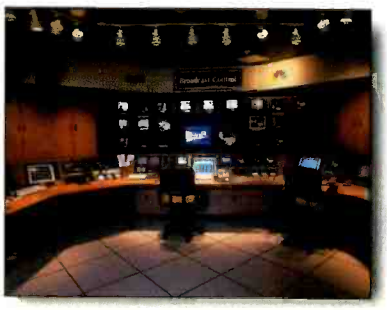
Key technology: Thomson MC switchers, Grass Valley Group SMS-7500 routers, Nvision 3064 machine control, Pinnacle MediaStream 1600/700 servers, Ampex DST-712 data archive, Avalon Archive Manager, Encoda MCAS automation, Ikegami monitors

DST, WGCL-TV

Key technology: Grass Valley Group M2100 router, Kalypso production switcher, Wheatstone consoles, Accom 3300 editors, DNF machine control, Leitch conversion and distribution, Miranda Kaleido image processors

Runner-up:
Professional Communications Systems, WFLA-TV

Key technology: Panasonic DVCPRO VTRs, Grass Valley Group 7000 routing, Pinnacle still store and servers, Chyron iNFiNiT!, Miranda and Leitch conversion, Ikegami HK 388 cameras/Canon lenses



Automation/Centralcasting

Winner:

Sundance, Crawford Communications Satellite Services

Key technology: Pinnacle 1600 media servers and DekoCast CG, ASACA DVD archive, Snell & Wilcox signal monitoring

Runner-up:
A.F. Associates, New York 1 News

Key technology: AP's ENPS newsroom system, Omnibus automation, Thomson DD35 switchers and Venus router, Time Base consoles, Pinnacle's Media servers, Vortex editors, DekoCast CG, DVEXcel DVEs and StreamFactory media encoder

RF systems

Winner:

Andrew, KERA-DT

Key technology: Andrew Trinity mask filter, Axcera transmitter

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Runner-up (three-way tie):
Andrew, KHRR-TV
Key technology: Andrew TRASAR antenna, ITS modulator/pulser, Videotek DM-200 demods, Tektronix 492P spectrum analyzer

Thales, KWHY-TV
Key technology: Thales DCX transmitters, Pearl, Opal and OpenMux PSIP/datacast system, MRC Twinstream STLs, Harmonic encoders, Tektronix modulation measurement system

AgileVision, KAID-DTV

Broadcast ENGINEERING
Engineering Excellence Awards

If you have a facility that may qualify for entry into this year's contest, go to the *Broadcast Engineering* Web site, www.broadcastengineering.com, for complete instructions.

Manufacturers, systems integrators and facilities are encouraged to plan now to enter the contest.

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Thanks to everyone who voted for their favorite facility. Readers who voted online were eligible to win a *Broadcast Engineering* T-shirt. The following readers were drawn to receive a T-shirt:

Laura Gross
A.F. Associates

Leah Alford
Crawford Communications

Scott Whitcomb
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Scott Gregg
millennium III

Dave Benco
Axcera

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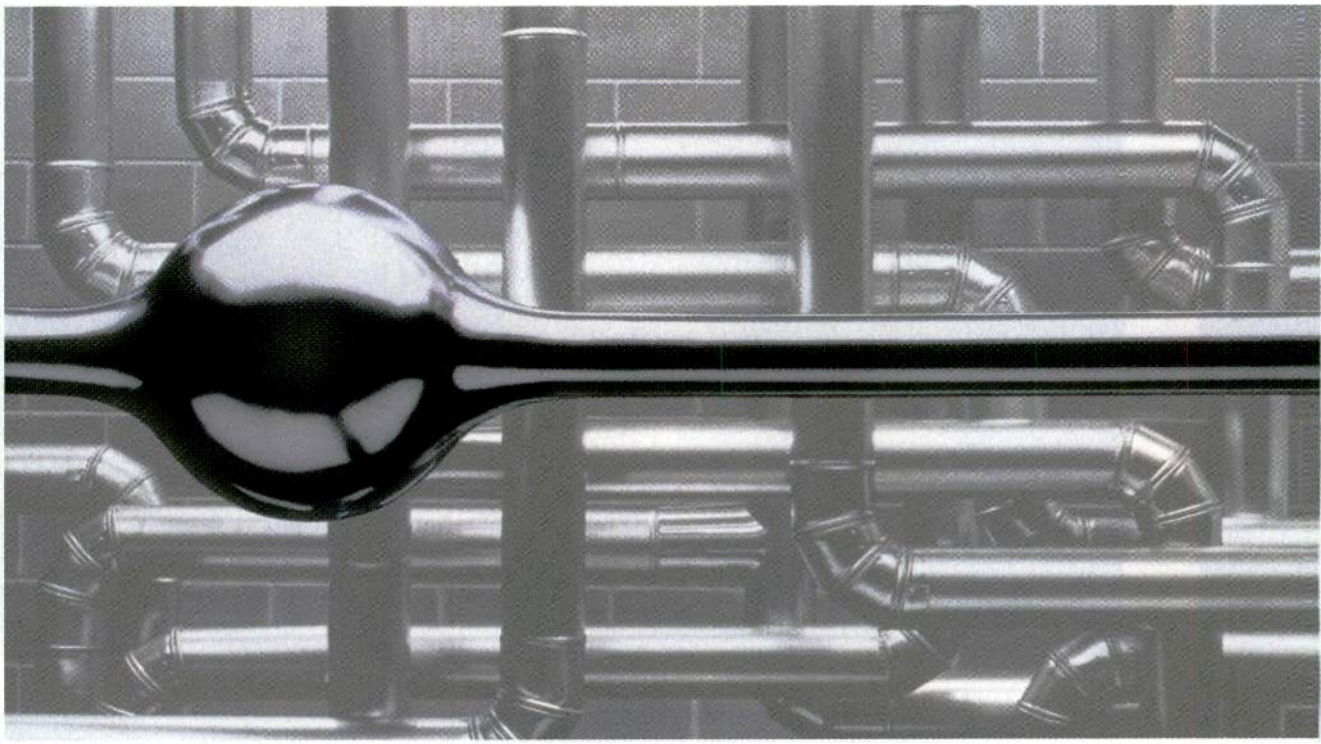

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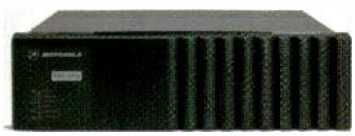

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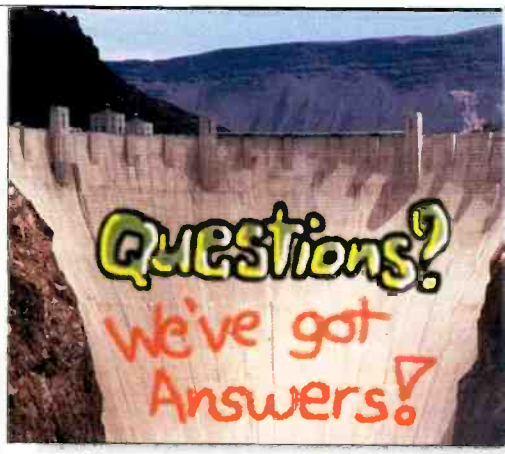
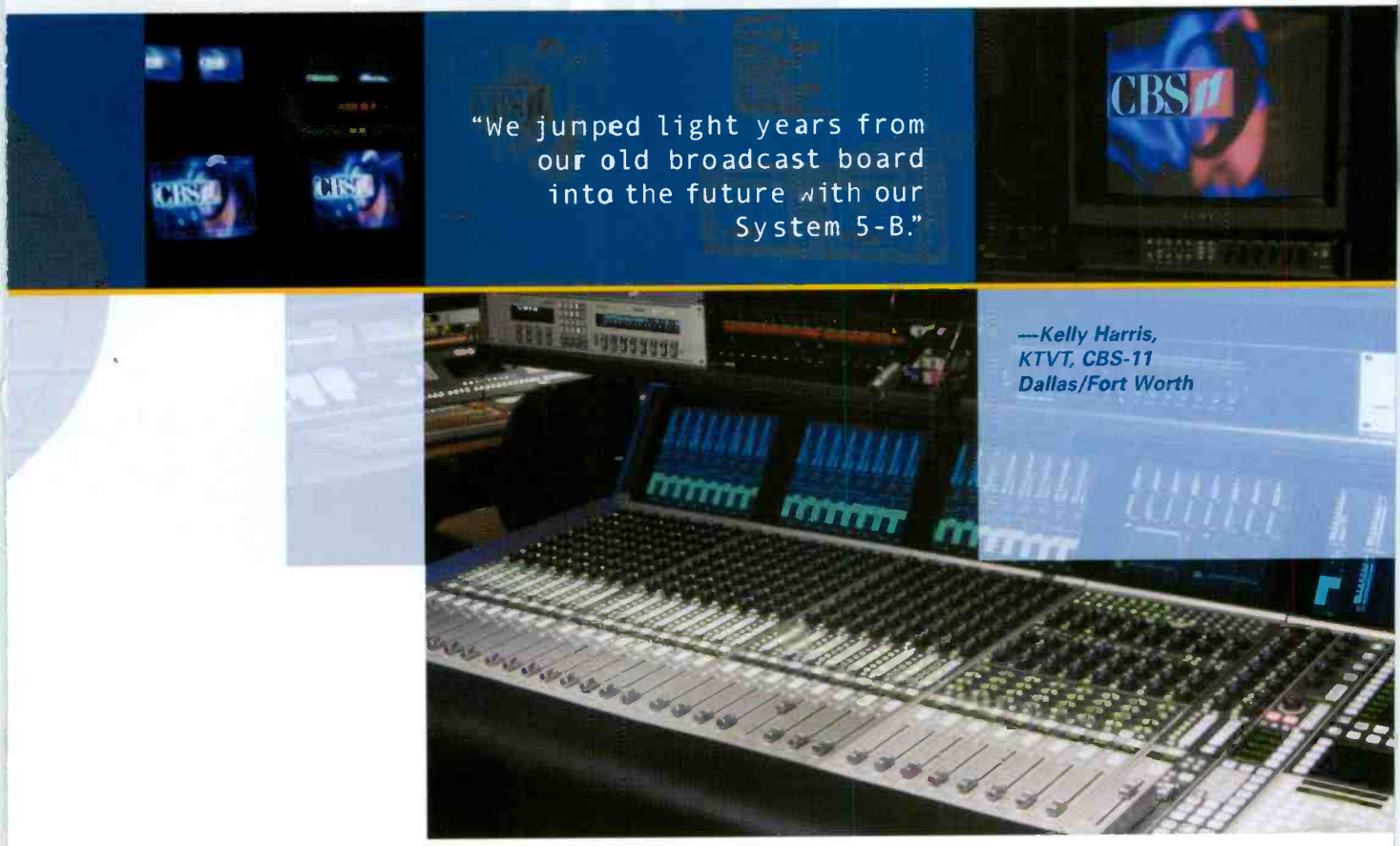


Questions? We've got answers! Technology, business, standards, consumer acceptance and equipment selection are issues on the minds of most professionals. Trouble is, where can you get the "inside" information on trends and technology? *Broadcast Engineering* coordinated a group of experts and surveyed them on the top issues facing production and broadcast facilities. Headed by leading technologist Craig Birkmaier, key experts in five subject areas were asked to provide their professional guidance on these topics.

DTV answer book

Be Sure

with euphonix digital broadcast consoles



Euphonix

digital emotion

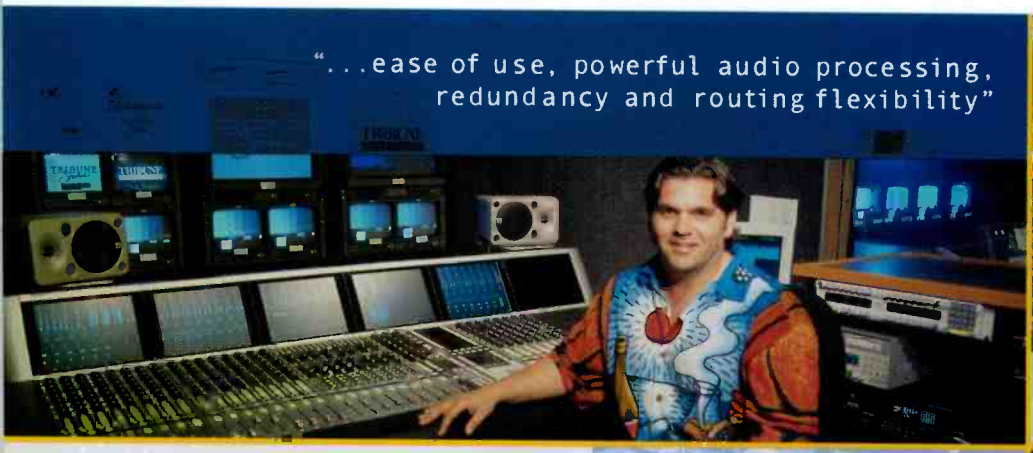
Tribune Studios, Los Angeles:

Euphonix System 5-B Installed, Up and Running

Tribune Entertainment is looking to the future of television production with its 10-acre facility in Los Angeles. It hopes to help support and drive digital TV production with newly designed sound stages, control rooms and machine rooms. One of its first steps has been installing the Euphonix System 5-B all-digital broadcast console into Sound Stage 2. It's all part of the newly refurbished 'Tribune Studios' located on the historic KTLA-TV studio lot.

—Michael O'Donnell
—Brian Powell

"...ease of use, powerful audio processing, redundancy and routing flexibility"



—Kelly Harris

The System 5-B broadcast console is up and running and the soundstage is producing live-to-tape TV of daily talk shows as well as the famous specialty show, *Candid Camera*. The console is used regularly by several engineers and Tribune reports that they have found it highly intuitive after some basic training from Euphonix.

...why he chose the System 5-B
—Jim Toten

The design and integration of the digital audio and video components was extremely well planned and executed. On the audio side, the MADI (Multi-channel Audio Digital Interface, an AES standard) cabling connection proved to be easy to set up and cost saving. Located in a distant machine room far away from the System 5-B are multiple Euphonix AES/EBU-to-MADI converters that handle all the inputs and outputs of the digital video tape machines to and from the console. The control room and the machine room are connected using MADI, with each single cable supporting 56 channels of 24-bit 48kHz digital audio.

Tribune has spent a lot of time planning the new installation. They made sure to offer technology that would support the anticipated production needs of digital TV and surround sound. Jim Toten, Director of Engineering and Technology said, "Characteristics that stood out the most about the System 5-B included the console's ease of use, powerful audio processing, redundancy and routing flexibility." He added, "We needed a digital console that could easily be reset between two stages on a day-to-day basis and was modular enough to allow mic-pre's and I/O to be reallocated upon demand. The Euphonix System 5-B does this very elegantly."

Tribune Broadcasting owns and operates 22 major-marketing television stations (including national superstation, WGN) and reaches 80 percent of U.S. television households. Tribune is the largest TV group not owned by a network.

—Greg Reams

ABC TV Australia:

ABC TV chose Euphonix to supply 10 System 5-B broadcast consoles for their new Ultimo studios and a fleet of 7 mobile vans

Last year, ABC TV, Australia's largest TV broadcaster, ordered 10 System 5-B digital audio broadcast consoles. They chose Euphonix technology for the flexibility, extensive layout capabilities and time-saving aspects of recallable routing. The consoles will be used for live TV broadcasting. Brian Powell, Manager TV Systems Technology and Distribution, is the engineer heading up ABC TV's changeover to all-digital broadcast components. Michael O'Donnell is the Technology Project Manager at ABC TV in charge of the audio side of the company's digital conversion.

KTVT Dallas/Fort Worth:

"The System 5-B lets me set up a number of different outputs with the push of a button and accommodate multiple inputs easily and conveniently."

KTVT in Dallas/Fort Worth, installed a System 5-B for their extensive Southwest news coverage. Kelly Harris, a KTVT audio operator, recently wrote in *Broadcast Engineering* magazine, "Other console designs we looked at were lacking a number of important features, including sufficient mix-minus buses and clean feeds, and lacked the System 5-B's versatility and ease of use."

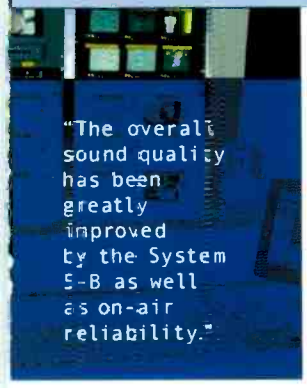
KOMO-TV Seattle:

"For our new all-digital facility, we needed a flexible console that handles live programming and studio production."

—Pat Holland

Fisher-owned, KOMO-TV in Seattle, installed a System 5-B console. Fisher Broadcasting's VP of Technology, Pat Holland said, "Technically, the console needed to accommodate MADI, which we use throughout the facility, 96 kHz sampling rates and 5.1-channel surround-sound panning and monitoring for HDTV production." KOMO-4 provides local news covering Seattle, Tacoma and the Northwest.

WCPO Cincinnati:



"The overall sound quality has been greatly improved by the System 5-B as well as on-air reliability."

Wayne Chaney, Chief Engineer and Greg Reams, Technician at WCPO in Cincinnati wrote about making the jump to digital in *Broadcast Engineering* magazine. "We wanted to provide a transition for the operators that could be fairly smooth. Requirements included the capability for future expansion, low heat dissipation of the console surface, ease of integration and most importantly, the console's dependability."

The System 5-B Broadcast Console

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Headquartered in the Silicon Valley of California, Euphonix was founded in 1988. Euphonix has always maintained aggressive investment in product development and customer support. Chairman of the Board, Gregg Meier and Director, Walter Bosch, recently invested a further $6 million in Euphonix.

Mr. Meier commented, "Euphonix is perfectly placed to become the number one broadcast console manufacturer in the world. One of our main focuses right now as a company is to provide the broadcast industry with the tools it needs to move into the digital age."

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What are the benefits of 24p, and for what applications should it be considered?

BY LARRY THORPE

The advantages of 24p center largely about the augmented *creative* capabilities facilitated by this digital production system. 24p digital acquisition offers new creative freedoms when compared with shooting on film. While all of the craftsmanship of the film director and cinematographer – in terms of lighting, filtration, lensing, framing, etc. – is fully utilized in 24p digital shooting, the digital camera further empowers them both. The camera allows real-time intervention to the imagery being shot – aided by the presence of a large-screen HD monitor on set. Picture sharpness, tonal and color reproduction can all be digitally altered to refine the imagery to a chosen aesthetic look. On the audio side, the 24p camera includes the capability to record up to four tracks of 20-bit AES sound. Being inherently sync-sound this can be a special boon on location shooting.

The 24p camera has impressive operational sensitivity – combining in one acquisition package the equivalent of a very slow-speed low-grain film (an exposure index of perhaps EI 50 – for shooting in brightly lit scenes), with instant switchability to effective high-speed operation (exposure index around EI 1000 – for image capture in deeply shadowed or nighttime scenes). This obviates the need for the later "matching" of different film stocks within a given production.

The visible *economic* benefits lie in the low cost of 24p tape vs. that of 35mm film stock, the absence of processing costs, lower shipping costs and, in the case of television production, the absence of telecine transfer costs. This lowering of "front-end" costs offers better cash flow management on a production.

The 50-minute load of the 24p cassette can greatly lower costs in the case of underwater and aerial shooting, and on difficult location shooting. That same long record time compared to a 35mm film load can expedite uninterrupted multiple takes – thus maintaining spontaneity and emotional dynamics between the director and talent. This too has been reported as saving time and, hence, related costs.

Being digital, the 24p capture can expedite the creation of blue/green screen imagery in that the related compositing can be viewed in real time and in high resolution. This further facilitates optimization of lighting, framing and camera moves, contributing to a considerable speed-up of a traditionally time-consuming process.

The digital capture and downconversion abilities within the 24p VTR expedite the offline editing process. This has proven a major boon in improving workflow on episodic television production where rigorous schedules are the norm. The low noise in 24p imagery allows wider latitude in post production – tape-to-tape color correction or digital image manipulation in workstations—that can be particularly beneficial when the final output is transferred to 35mm release film. Workflow innovation will be dramatically extended as new metadata capabilities are incorporated into the total 24p acquisition and post production system. BE

Larry Thorpe is senior vice president, content creation systems, for Sony.

JEFF ROSICA

Production in 24p has some very obvious benefits. The first, since commercial production is a business, is the cost savings over film stock and lab fees. Compared to 16mm and 35mm film stock and lab fees, a 24p format tape cassette is extremely inexpensive. The longer the shoot schedule (with more takes and more coverage), the greater the savings that can be realized by shooting in 24p.

Another major consideration is whether the spot will have complex CGI elements. If the raw footage is already electronic, there is savings (in time and money) in not having to telecine the film in order to import shots into a CGI system.

One caveat to 24p is that commercial production is also an art form, and quality matters. On the small screen (the television), the characteristics of 24p might not appear so obvious to the untrained eye, but they exist nonetheless.

Producing in 24p takes a little extra care as you first enter the medium. Those who have seen 24p say that it doesn't look like traditional video or film, but something else. It is a different look, but electronic filtering can make 24p "appear" like specific film stocks or video. In this way, 24p electronic footage can be almost seamlessly intermixed with existing film footage (stock footage, for example), especially since 24p's frame rate matches that of 35mm film.

Today, 24p electronic cinema production (1920x1080) does not have the same resolution as film (2048x1536).

It truly is a question of the right tool for the right job.

In fact, the most common HD recording formats offer significantly less resolution than film with the ability to record only 1440i (HDCAM) or 1280i (DVCPROHD) pixels. True 1920x1080i recording on tape is only available on D5-HD and the Thomson VooDoo Media Recorder (D6-based), which records HD uncompressed.

Film will always have its place in the production world. It truly is a question of the right tool for the right job. For an electronic format such as 24p to truly be equal in quality to film, a mindset change needs to happen. We have to stop thinking of 24p as "video" and start thinking of the images that are acquired as true "electronic cinematography" or "virtual film." To provide a true choice of formats (film or electronic), the 24p signal must not be processed like video. The 24p signal must be a full, unfiltered, uncompressed 4:4:4 signal with full color RGB gamut from the camera. The camera itself must output everything that falls on the sensors without any modifications. This may be an idea that is hard to swallow for video people used to traditional video processing, but 24p isn't (and shouldn't be considered) video. BE

Jeff Rosica is vice president of Thomson Multimedia Broadcast Solutions.

Is DTV now a two-step (first low power, then high power) process?

BY BRUCE M. ALLAN

The FCC's action of Nov. 8, 2001, on low power requirements could conceivably offer some relief to smaller market television broadcasters from new expenditures to meet the DTV transition deadline.

At first blush, this two-step approach looks promising. For broadcasters that are under budget constraints, low power equipment may not require costly modifications to the existing facility. Television broadcasters may be able to use their existing tower as it

stands or place a low-power transmitter and antenna on the broadcaster's STL tower, if the studio is centrally located in the city of license.

There are several drawbacks to broadcasting low-power digital television. First of all with cable carriage unresolved, how is the broadcaster going to get that signal into the home? Penetrating houses and buildings attenuates the signal to a large degree and set-top, indoor antennas with decreased gain capabilities (over conventional outdoor antennas) degrade signals further. In other words, a broadcaster may end up with a limited coverage area and frustrated viewers.

There are several drawbacks to broadcasting low-power digital television.

With low-power transmission, the ability to cover a station's city of coverage depends on the location of the transmitter. If the transmission facility is located outside of the city, then chances are the low-power transmitter will not be able to provide full coverage. And if their competition decides to go full power for the digital transition, then the broadcaster runs the risk of losing viewership to the stations offering the extended coverage.

Ultimately, a two-step approach to the transition to digital may satisfy the FCC's new digital rollout rules. This action provides new opportunities for stations to cost-effectively get DTV on the air, but it also may raise competitive business issues for each station to consider. BE

Bruce M. Allan is president and general manager of Harris Corp., Broadcast Communications.

BY DANE E. ERICKSEN, P.E., CSRTE

In its Nov. 15, 2001, Reconsideration Order to MM Docket 00-39 (the "DTV review" rulemaking) the FCC decided that DTV stations would be deemed to have met their May 1, 2002, on-air deadline (May 1, 2003, for noncommercial DTV stations) if they build facilities that place a DTV "city grade" contour over their principal community. What many broadcasters, and possibly even the FCC, may not realize is just how low an ERP this allows. For example, Table 1 lists DTV stations (all UHF) in four example markets, all with construction permits already granted for either maximized or class maximum DTV facilities.

These ERPs are based on continued use of the permitted, high-power antenna, generally top-mounted or side-mounted near the top of an existing tower.

I believe that such power reductions are typical; the FCC decision to only require the ERP necessary to place a DTV city grade contour over a station's principal community turns out to be a breathtaking reduction, typically on the order of 20 dB to 30 dB below the station's allotted ERP.

Does it make sense actually to build such low-power DTV facilities in order to meet the FCC deadline? Probably not, for two reasons: First, it is unlikely that such low ERPs would provide usable service, particularly in light of some recent technical papers suggesting that the FCC got the DTV threshold contour too low by 10 dB to 20 dB. Second, if a DTV allotment has tolerable interference from an existing NTSC full-service TV station, that interference could become intolerable for a "micro power" DTV facility that just meets the new FCC minimum coverage requirement. This is because the interfering NTSC station will not be lowering its power, so the desired-to-undesired signal ratio will then also be worsened by 20 dB to 30 dB.

Station	Allotted ERP	Construction permit ERP	To just provide DTV city grade ERP
DTV #1	50.6 kW	326 kW	1000 *Watts*
DTV #2	1000	1000	5 *Watts*
DTV #3	120	452	100 *Watts*
DTV #4	238	723	250 *Watts*

Table 1 shows the allotted ERP, the maximized ERP and the ERP necessary to place a DTV city grade contour just over the community of license for UHF DTV stations in four example markets. This illustrates the range of low powers that could provide initial DTV service.

It probably makes sense for stations fortunate enough to have received in-core DTV allotments to go ahead and install their permitted high-power transmitting antenna and large transmission line, but for now only install a 100- to 500-watt DTV transmitter. Such low transmitter power outputs (TPO) will likely meet the DTV city grade requirement and represent virtually no "lost assets" to be discarded when higher operating powers make economic sense. For IP DTV stations with out-of-core assignments, the opposite likely makes sense: forget building a high-power DTV plant, and instead purchase a low-power LPTV/TV translator antenna, use 7/8-inch or 1 5/8-inch transmission line, operate with 100 to 500 watts of TPO, and take the FCC up on its "gift." One exception might be for a UHF NTSC/UHF DTV combination where the NTSC antenna is either in marginal condition or where a broadband UHF panel antenna can be used, allowing an immediate benefit for the station's UHF NTSC signal. BE

Dane E. Ericksen, P.E., CSRTE, is senior engineer, Hammett & Edison, Consulting Engineers.

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BY HARVEY ARNOLD

The FCC's recent decision to relax its rules on minimum DTV coverage is a very welcome and reasonable response to the broadcast industry's concerns relating to the digital conversion. It recognizes the range of difficulties and realities broadcasters face in rolling out DTV, and acknowledges the size and scope of the efforts needed to transition the consumer and our industry from one technology to another. By the end of this year we expect to have about 40 of our 62 stations on the air with DTV.

From the beginning, our plan was to "build it right the first time" using a maximized full power RF design. That way, we don't have to go back and rebuild the plant at a later date. The downside to this approach is that it takes longer to implement because of factors out of our direct control.

Since there are few over-the-air DTV receivers in consumers' homes, initially, the FCC's decision will allow us to realize common sense power savings in operating expense during the rollout, while still serving our digital viewers. Sinclair is installing high-power transmitters, but initially operating them at lower power levels.

We would rather be broadcasting at full power and supplying greater field strength throughout our entire market but, like most broadcasters, we are bound by fiduciary responsibilities to not keep shoveling money out the door when there are precious few working receivers. When the population of over the air receivers increases to that which CEA predicts in the next few years, we can then simply turn up the power to accommodate this audience growth.

Stations can take several steps to "work smart" when implementing DTV. First, exploit common antenna systems and community towers. The economics and synergy of multiple station towers are hard to dispute. The use of N-1, N+1 and community panel antennas generally do save money if stations can live with common antenna radiation patterns.

Second, combine UHF and VHF transmitters into common transmission line systems and then split them out before the antennas. Combining VHF and UHF into a single transmission line is very practical when tower loading is an issue. This strategy has saved Sinclair the cost of constructing at least two new towers, and has little downside to either station.

Another step stations can take is to design a quality transmission plant. Put money into important items such as high quality antenna systems and transmitters that will be with the station for the long term. Remember that it is expensive to replace an antenna system because it can't handle the power you need it to or has substandard radiation efficiency. Transmitters from many vendors offer similar performance. Take a hard look at ease of maintenance, cost of ownership and overall stability – these areas may drive you to a specific provider.

Finally, build for high power, but initially operate at a lower power during the transition. The savings in electric and other operating costs is significant. Increase power when there is a real need to do so. BE

Harvey Arnold is corporate director of engineering for Sinclair Broadcast Group.

What are some key features and capabilities broadcasters should look for in a new camera?

BY PHILIP LIVINGSTON

Stations needing to replace existing cameras are in a quandary. Let's first address the studio/field production situation. If stations buy standard definition cameras that integrate easily with the existing production switcher and infrastructure, Murphy's Law dictates that the station will surely decide to go high definition next week. If they buy HD cameras, then it means replacing "everything" or paying for downconversion options that may eventually be superfluous. Nevertheless, it's reasonable to assume that for local stations that have been just carrying prime-time network HD programs the studio(s) will be the next element to go HD. Clearly, what users need is an upgradeable camera that can be SD today and converted to HD when the need arises.

One option is a multiformat DTV camera system that supports variable frame rate capture and is upgradeable to a 720p or 1080i HD output. The CCD technology utilized by the camera plays an important role in ensuring a flat frequency response through the 30MHz pass band of HD systems. This technology provides greater sensitivity than a 920x1080 CCD. (While more pixels give better resolution, they also reduce the area of each site and therefore reduce the sensitivity.)

Broadcasters can utilize a basic SD camera with a built-in signal converter that provides a 480i standard-definition output from the high-definition 720p CCD signal in today's TV studios. The super-sampling effect of having an HD imager and SD output produces high quality video. Having a selection of optional output signal processing modules available allows the unit to be cost-effectively upgraded to 720p or 1080i when the station needs to go to HD, and provides

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an economical path for broadcasters investing in a DTV conversion.

Once a station begins to consider HD studio cameras, the inevitable "news" question arises. While visionaries like WRAL-TV and groups like NHK are doing HD News, many broadcasters are not sure that this is the right approach. There are three factors to be considered: We regularly accept the fact that news field material does not look like studio material. Storage capacity and signal data rates are factors as news systems become ever more NLE and server centric. Upconversion technology is becoming better and more ubiquitous. Therefore it is easy to design a system where field material is captured, edited and stored in SD and upconverted just prior to integration (e.g. at the studio switcher), but upconverted 480i is perhaps not quite good enough. For many customers, 480p 60 appears to solve that dilemma. BE

Philip Livingston is vice president, technical liaison and technical spokesperson for Panasonic.

BY MIKE WOLSCHON

The process of selecting the proper camera for your use truly depends on two things: your need and your budget.

First - your needs. Today's digital cameras provide the utmost flexibility while shooting. The choice of aspect ratios (4:3 and/or 16:9), multiple camera configurations and digital signal processing in a number of digital cameras all combine to produce the best possible image.

While carefully considering the situation you need a camera for today, it is imperative that you give some thought to the camera's uses tomorrow. Consider the relative importance of image resolution, light sensitivity, signal-to-noise ratio, faulty pixel correction, and the ability to precisely control detail, contrast compression, black stretch, and color temperature, as well as other digital signal processing (DSP) functions. Especially important is how automatic controls can be manually overridden.

A major consideration is the possibility of upgrading your standard definition camera to high definition. Can the camera you buy today for standard definition production work be upgraded for high definition or will you be repeating this evaluation process a few years down the road (with the added capital expenditures)? Cameras that provide this feature without sacrificing quality provides you the biggest bang for your buck today and tomorrow.

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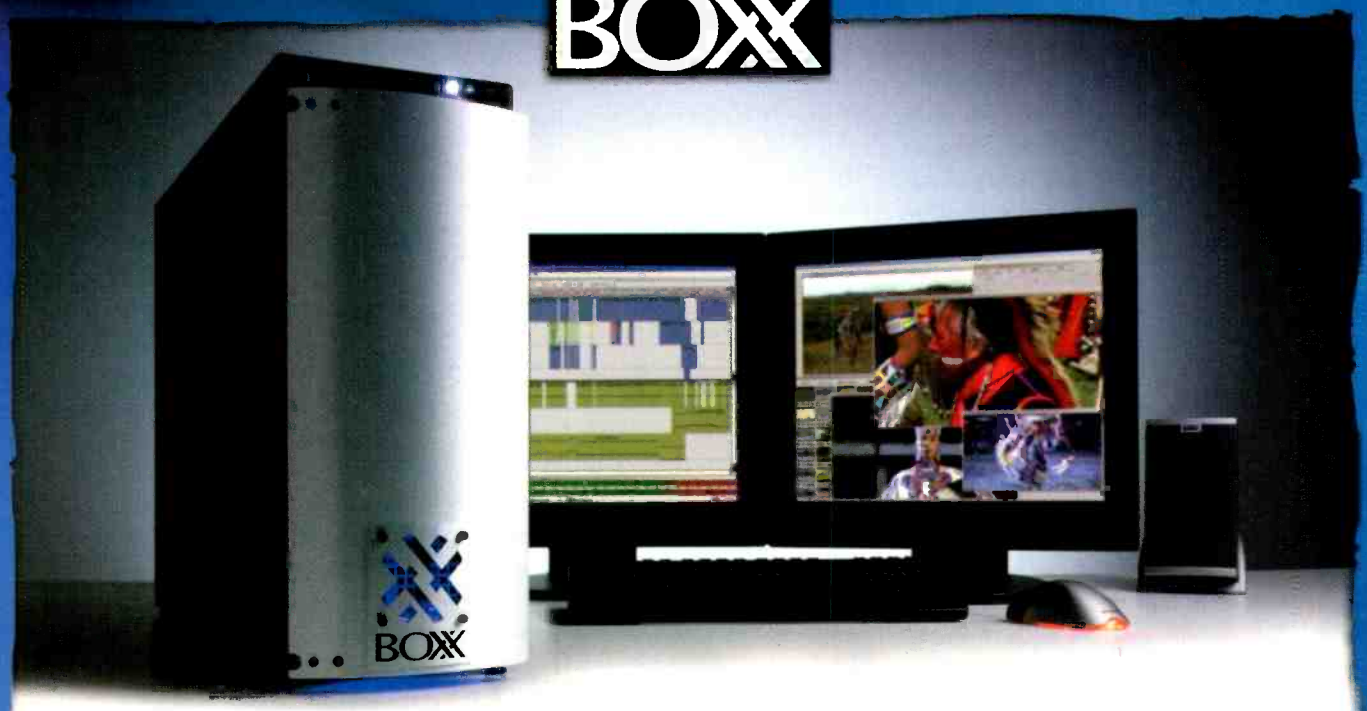

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Once you have narrowed your camera search based on your performance criteria, a review of a camera's physical size, power requirements, location of controls (buttons and switches), and location and type of input and output connectors is in order. Questions to ask include:

Are there any parts of the camera that stick out (such as a BNC connector for video output) that can easily be damaged because of where they are located on the camera body?

If a portable camera, what is the total weight with camera head, lens, viewfinder, tape and battery?

If a portable camera, is there shared power distribution for on-camera lights?

If a portable camera, what is the battery recharging cycle time and how does that compare to the battery draining cycle time?

If a portable camera, how easily can it be reconfigured for studio operations (viewfinder and lens controls)?

For a studio camera, how much power throughput is available for a teleprompter and timer?

Is triax available and what is the maximum cable length?

How detailed is the camera's control unit and what is the maximum cable length of multicore cable?

If the camera has a switchable aspect ratio, which ratio is native and which is derived? How does this affect resolution?

Probably the best way to actually compare cameras without an actual shoot-out is to take the product brochures and create a chart with the features that are important to you.

Finally, there are always trade-offs: resolution for flexibility, design for cost, etc. Assigning a weight to each of the features in your comparison chart can help in selecting a contender for purchase. Using a point scale (resolution is worth 10 points and this camera gets eight out of 10) can make the process much simpler as you narrow your search. BE

Mike Wolschon is director of segment marketing for the North American subsidiary of Thomson Multimedia Broadcast Solutions.

BY JUAN MARTINEZ

In the standard-definition world, choosing a camera to serve in both the studio and the field is a trade-off between the necessities of studio conformity and control and the necessities of field portability.

While we recognize that some broadcasters are moving to HD, we realize that most will continue to use standard-definition products, cameras and systems for quite some time. We want to optimize users' investments with high-quality cameras and with an up-converter that creates worthy DTV material.

Consider one of the key requirements of a studio camera—the ability to control and color match the device from a remote control room or truck. Having a DV camcorder operable from up to 330 feet from its CCU over a multicore cable allows a single camcorder to serve both EFP and ENG applications. A composite video input allows news gatherers to record pool feeds.

Another issue is compatibility between all the competing DV formats. Camcorder tapes need to be compatible with various formats. Finally, there should be no compromise in quality, whether the camera is set up for studio or field.

With advancement in camera technology, the importance of the Internet is increasing. Broadcasters should factor in Web streaming capabilities in their decision to purchase a new camera. Some cameras can be controlled via the Web. Streaming adapters enable these cameras to be plugged directly into any network or even the Internet, after which the camera becomes an IP addressable device, producing MPEG-4 streaming video on demand.

Upconverters are available to enable users working in an HD environment to conform their SD materials to HD. An upconverter can allow broadcasters to take SDI signals, especially scenes shot in 16:9, up to DTV resolutions like 720p and 1080i while maintaining audio synchronization. Once converted, broadcasters can add true HD graphic enhancements and deliver programming at a fraction of the cost of HD origination.

The importance of this type of upconverter is that it broadens the choices of suitable cameras for use in DTV. Virtually any camera in a broadcaster's current lineup can be pressed into a transitional paradigm.

We like to concentrate on where the real need is, not where it is going to be. These are tough times, and broadcasters don't want to hear about tomorrow, they just want to survive today. We know there is still an increasing movement to an inevitable HD world. We also know that someday the Internet bandwidth will become a real alternative to broadcast. But we want to offer solutions that work right now, out of the box, with an immediate return on investment. BE

Juan Martinez is national products marketing manager for JVC Professional Products Company.

What role does IP networking play in today's broadcast plant?

BY CLYDE SMITH

IP is becoming ubiquitous in the broadcast plant, from production and post-production through delivery, it is increasingly difficult to find areas where it does not apply.

Let's begin with system and system component performance monitoring. The Simple Network Management Protocol (SNMP) is the de facto industry standard today for monitoring and

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management of devices on data communication networks, telecommunication systems and other globally reachable devices. Today's broadcast plants contain many, perhaps hundreds, of networked computers and computer-based applications. Monitoring and logging their performance is essential to maintaining and improving the plant reliability. SNMP is an enabler of this functionality.

The SNMP Agent software is typically a subsystem software module residing in a networked device. Many broadcast manufacturers are including SNMP, or bridges from their proprietary monitoring protocols to SNMP, to provide greater knowledge of system status and performance as well as control of system elements.

Now that we know we have a well-running facility, we need to get content into it, process the content and distribute it. The File Transfer Protocol (FTP), a standard Internet protocol, is the simplest way to exchange files between servers on a network. FTP is another application protocol that uses the IP protocols.

Whether it is to transfer commercials, promotional material or programming, file transfer has many advantages; from the avoidance of delays through customs when crossing borders, through reducing the need for repetitive visual observation quality control monitoring processes. Material is delivered to the plant, distributed to editing, then transferred to air playout servers all using FTP.

Why would you try to build a broadcast plant without IP networking?

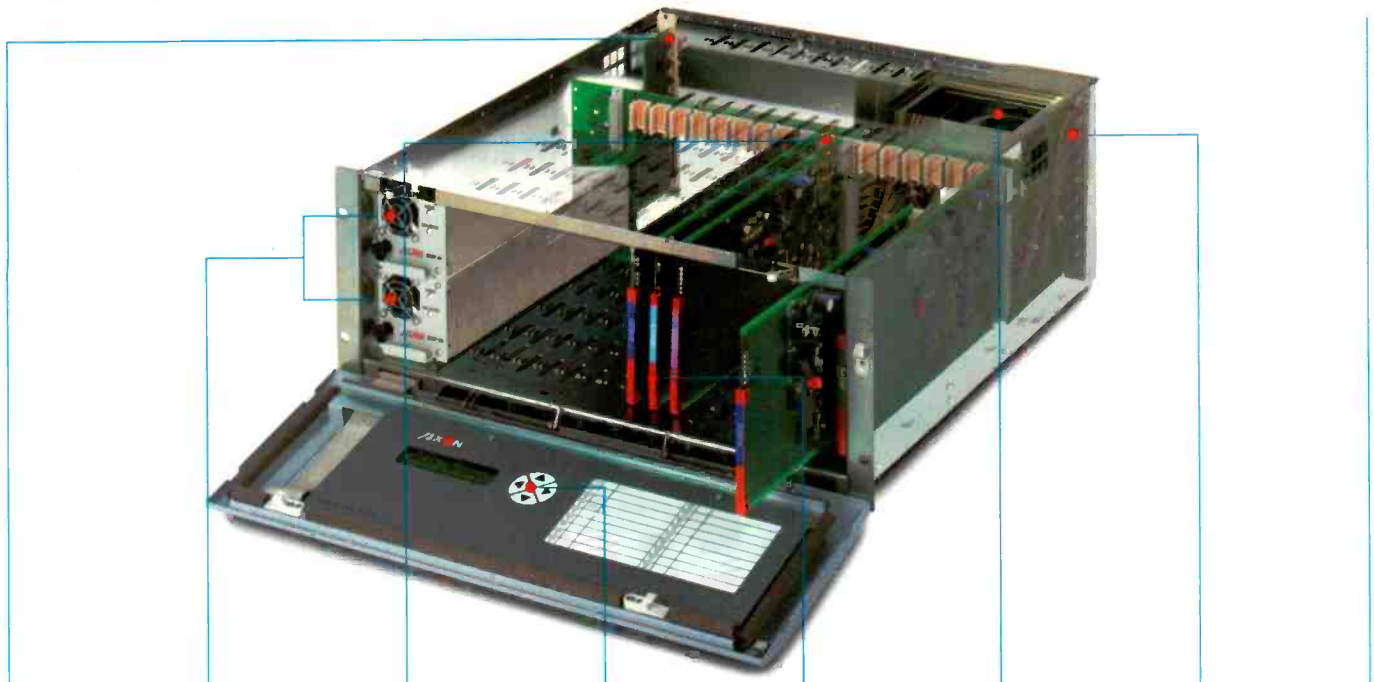
A file transfer and networked storage-based architecture can greatly improve the efficiency of operations by reducing the real-time video based digitization and layoff functions. This architecture opens up tremendous possibilities for intra-facility operations as well by providing multiple, relatively inexpensive, high-performance network connections between the Networked Storage Library and networked attached server, non-linear editing, graphics, media management and browsing clients.

In Distribution, if you accept the proposition that the "plant" is extending well out "into the rest of the world" through VOD, NVOD, Forward and Store PVR functionality and "Station in a box", as well as central casting centers feeding remote transmission sites, IP plays a key role here as well. Distribution to these diverse "plant elements" may utilize traditional methods or IP.

With all its attendant advantages of potentially reduced acquisition costs, improved workflow and operational efficiency, intelligent monitoring and reporting of errors, the question becomes: Why would you try to build a broadcast plant without it? BE

Clyde Smith is senior vice president of broadcast entertainment technology at Turner Entertainment Networks.

THE FUTURE



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DTV market

The world's moving to digital - be sure you go, too. To make it easier to find the products you need for the transition, the *Broadcast Engineering* staff has

collected information about the latest technology being unveiled at NAB 2002. Turn the page for the results of our search, neatly organized into categories to make it easier to find products from audio consoles to transmitters. Use the list at left to find the starting page for the category you are interested in. Each listing includes the company's booth number for easy navigation at the show, as well as phone, fax and Web site information to make it easier to contact them when the time comes to upgrade your facility.

Booth numbers are current as of the press deadline. *Broadcast Engineering* made every effort to ensure the accuracy of the listing. Advertisers are highlighted in red.

place

Audio accessories

DIGITAL AUDIO MULTI-PAIR

Gepco 552624GFC:

Joins the 5526GFC series of 110Ω digital audio multi-pair; provides a convenient way to interconnect between digital audio consoles, recorders, processors and routers; features an exacting 110Ω impedance, low jitter and attenuation, ease of termination, and flexibility.

847-795-9555; fax: 847-795-8770; www.gepco.com
Booth: L4929

AUDIO RECORDER

360 Systems DigiCart-E:

New networkable audio recorder operates at 16 or 24 bits and at all sample rates; features a large LCD display; files are compatible with earlier DigiCarts; editing tasks include trims, fades and level adjustments.

818-991-0360; fax: 818-994-1360; www.360systems.com
Booth: L2034

AUDIO MIXER

Henry Engineering MicroMixer:

Four-input, two-output stereo mixer for line-level sources; balanced bridging inputs accept balanced and unbalanced sources; provides adjustment from OFF to +10 dB of gain.

626-355-3656; fax: 626-355-0077; www.henryeng.com
Booth: L3102

DIGITAL AUDIO ANALYZER

Neutrik USA NTI Digilyzer:

Features include audio signal analysis, ancillary data interpretation, carrier signal analysis, and analysis of video related audio problems; handles AES3 signals, unbalanced S/PDIF signals and optical connections; includes consistency check.

732-901-9488; 732-901-9608; www.neutrikusa.com
Booth: L5838

AUDIO CONVERTER

SALZBRENNER STAGETEC TrueMatch:

Features 28-bit resolution, with sample rates of up to 96kHz; traces and eliminates all circuit-related inaccuracies; analog audio signals range between -128 and +22 dBu.

818-368-5153; fax: 818-368-5908; www.stagetec.com
Booth: L2771

AUDIO NETWORKING PRODUCTS

360 Systems Ethernet Audio:

New family of scalable audio networking products provides centralized audio storage on file servers using a dedicated 100 Mbit Ethernet network for distribution; features the ability to link with Mac and PC DAWs.

818-991-0360; fax: 818-994-1360; www.360systems.com
Booth: L2034

DIGITAL MIXING CONSOLE

AMS Neve Logic 7:

Multiformat digital mixing console for long-form broadcast, commercials, DVD and 5.1; features strip-by-strip routing buttons and displays, bank selection and Encore automation.

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Booth: L10249

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516-328-7500; fax: 516-328-7506; www.azdencorp.com
Booth: L2562

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Audio-Technica AT3035:

Part of Audio-Technica's new 30 series of microphones; large-diaphragm, side-address cardioid condenser microphone; features a flat, extended frequency response of 20 to 20,000 Hz, a professional shock mount and switchable low-frequency roll-off.

330-686-2600; fax: 330-686-0719; www.audio-technica.com
Booth: L2115

DIGITAL AUDIO CONSOLE

Calrec Audio Alpha 100:

Console provides 48 multitrack/matrix outputs, 20 auxiliary busses, eight audio groups and four main outputs; each track can be mono, stereo or surround.

+44 1422 842159; fax: +44 1422 845244; www.calrec.com
Booth: L2263

AUDIO CONSOLE

Calrec Audio C2:

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201-930-1000; fax: 201-930-4752; www.sony.com/professional
Booth: L18207, L515

DIGITAL PRODUCTION MIXER

Studer Professional Audio AG Vista 7:

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Booth: L2542

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Mainframe designed for decentralized digital audio/media networking; accepts a wide variety of audio, data and DSP modules without limitation to inputs or outputs; worldwide platform to mixing console and control surface manufacturers serving the broadcast, audio recording, multimedia and sound reinforcement industries.

678-966-9900; fax: 678-966-9903
www.klotzdigital.com
Booth: L1942

DIGITAL MIXER

Sony Electronics SRP-X700P AV:

Provides video and graphics switching with digital audio mixing, sound processing and multichannel amplification capabilities; includes an integrated wireless capability, with front panel bays for two WRU-806 Freedom receiver modules.

201-930-1000; fax: 201-930-4752
www.sony.com/professional
Booth: L18207, L515

DIGITAL AUDIO MIXING SYSTEM

Euphonix System 5:

Consists of the System 5-B digital broadcast console configured for live and live-to-tape production, the System 5-F digital film console configured with motion picture mixing in mind, the System 5-P digital post-production console configured for mixing audio for video, and the System 5-M music recording and mixing system configured for music and live applications.

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LOUDNESS METER

Dolby Laboratories LM100:

This analysis tool provides a broadcast-friendly solution for measuring the loudness of content; enables broadcasters to eradicate the subjective loudness differences in their television audio; capable of accepting PCM, Dolby Digital (AC-3), Dolby E, analog and combined RF cable television signals.

415-558-0200; fax: 415-863-1373; www.dolby.com
Booth: L19535

DIGITAL PRODUCTION ENVIRONMENT

TASCAM SX-1:

Combines automated digital mixing, hard disk recording, MIDI sequencing, powerful editing, DSP plug-in technology and multiformat capabilities; offers complete surround sound mixing capabilities.

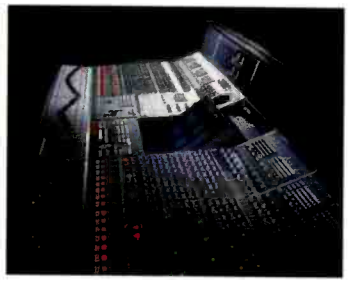
323-726-0303; fax: 323-727-7635; www.tascam.com
Booth: L2630

TELEVISION CONSOLE

Wheatstone TV-80:

Designed to be streamlined, economical and ergonomic; accommodates local news as well as independent, syndicated and network affiliate programming.

252-638-7000; fax: 252-635-4857; www.wheatstone.com
Booth: L2515



BROADCAST CONSOLE

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252-638-7000; fax: 252-635-4857; www.wheatstone.com
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Midas Broadcast 2000:

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+44 1562 741515; fax: +44 1562 745371; www.midasconsoles.com
Booth: L8437

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Harrison by GLW TVD-SL:

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615-641-7200; fax: 615-641-7224; www.harrisonconsoles.com
Booth: L2215

DOLBY DIGITAL EX

Dolby Laboratories Digital EX:

Enables the additional center-back surround channel encoded in Dolby Digital Surround EX movie soundtracks to be decoded; home cinema amplifiers and receivers with Dolby Digital EX use one or two extra loudspeakers behind the listener; flyovers and other special effects become even more realistic and localized.

415-558-0200; fax: 415-863-1373; www.dolby.com
Booth: L19535

COMPACT MIXER

Mackie Designs DFX series:

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Booth: L12855

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Solid State Logic MT Version 6:

Incorporates new channel and main busy dynamics options; features new digital algorithms and a selectable moving/non-moving fader control surface.

+44 1865 842300; fax: +44 1865 85222; www.solid-state-logic.com
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Booth: L1957

Automation

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201-930-1000; fax: 201-930-4752

www.sony.com/professional

Booth: L18207, L515

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www.hvs-dtv.com

Booth: S4555

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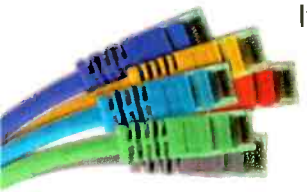

With Ethernet Audio it's easy to attach other workstations to the network. Now you can share your important production audio, download files from the web, and move content across the room or across the country.

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DTV marketplace

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Combines advanced DVB-SI and ATSC PSIP processing and capabilities with integrated remultiplexing features; offers a 1U design, up to eight transport stream inputs, data insertion using the SMPTE325M protocol and an interface to simulcrypt conditional-access systems.

413-569-0116; fax: 413-569-0679; www.thales-bm.com

Booth: L8700

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Sundance Digital NewsLink:

Provides control and management that interlocks video servers, editors and newsroom computers; provides a high-efficiency on-air interface, master system databasing, scheduled and ad-hoc recording, and integrated content archiving.

972-444-8442; fax: 972-444-8450; www.sundancedigital.com

Booth: L19958

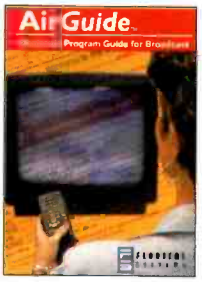
AUTOMATION SOLUTION

Harris CLARO:

Developed specifically for stations that need to manage a single channel of playout and are planning to use video servers for spot playback; single client workstation for on-air control and preparation of content; device server that can control all of the popular video servers, tape machines and switchers.

513-459-3400; fax: 513-701-5323; www.harris.com

Booth: L5414



ELECTRONIC PROGRAM GUIDE

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Updated electronic program guide for PSIP and the Internet that is updated from AirBoss, Florical's on-air presentation system; specifically designed to facilitate the multiple channel environment and provides TV stations an automated way to maintain their program guide.

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Booth: L19552

LIVE PRODUCTION AUTOMATION SOLUTION

ParkerVision PVTV NEWS CR4000:

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800-532-8034; 904-731-0958; www.parkervision.com

Booth: L5503

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303-237-4000; fax: 303-237-0085; www.encodasystems.com
Booth: L8416

GATEWAY AUTOMATION SYSTEM

Telestream FlipFactory TrafficManager:

Automates receipt and redistribution of commercials and other digital media at TV stations; detects incoming media from a variety of digital sources; notifies traffic operators and station automation systems; logs media; adjusts audio levels; automatically reformats media for digital delivery to destination devices.

530-470-1300; fax: 530-470-1301; www.telestream.net
Booth: L20658

MASTER CONTROL SYSTEM

Harris MC-PK DTV:

Comparably priced to individual components that need to be integrated into a system; available in four basic models with a wide range of configurations and options; versions are available for either single channel HD or single channel HD/SD applications.

513-459-3400; fax: 513-701-5323; www.harris.com
Booth: L5414

SECURE DATA BROADCAST SYSTEM

Triveni Digital SkyScraper:

Assists broadcasters to broadcast large quantities of data in a secure end-to-end environment from information providers through broadcast stations to information customers; includes head-end servers to mange the data flow from information providers to broadcast stations and customer-site receivers to extract the data from broadcast and make it available to end users.

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>> Quickest assembly time n the industry

>> Optional die-cast handle improves durability

>> Available in 3-7 pins, black and gold finishes

Front Access Audio Patchbay:

>> Easy slide-out tray for fast terminations from the FRONT of the rack

>> Availab e in both long-rame or bantam configurations

>> All jacks are nickel-plated, steel frame, with gold-plated crossbar contacts

>> Part of a complete line of audio patchbays, call for details

Video Patchbays:

>> MVP midsize High Definition version rated a: 3.0Ghz

>> VPP standard High Definition version rated at 2.4Ghz

>> VPP standard Serial Digital version rated at 1.5Ghz

>> Available in 1RU, 2RU's, 24, 26 or 32 jacks, terminated, non-terminated, or non-normal ed

Switchcraft

www.switchcraft.com

5555 North Elston Avenue / Chicago, IL 60630
Phone: 773-792-2700 / Fax: 773-792-2129

Switchcraft®

DTV marketplace

PLAYLIST PLAYOUT SYSTEM

DNF Controls 3040P:

Ideal as an on-air, automation system backup for video servers; works with existing video channels; allows for quick and easy creation of a stack of clips for playout; fast and simple to load and play a single clip.

818-898-3380; fax: 818-898-3360; www.dnfcontrols.com

Booth: L20800

DATABASE INTERFACE

Florical Systems MediaReporter:

Database tool that simplifies the task of monitoring and maintaining the automation system database; identifies for the traffic and/or operations department material that needs to be ingested into the video servers or needs to be purged or deleted from the system, as well as material that has expired.

352-372-8326; fax: 352-375-0859; www.florical.com

Booth: L19552

SERVER MANAGEMENT SYSTEM

BUF Technology Spot:

Updated server management system features VDCP protocol support; multichannel server control with VTR control and a clip name and time code/countdown video inserter option.

858-451-1350; fax: 858-451-6589; www.buftek.com

Booth: L8408

ASSET MANAGEMENT DATABASE

Crispin AssetBase 2000:

Web-browsable facility database with flexible device server architecture; based on a Microsoft SQL server with total facility playlist and asset control.

919-845-7744; fax: 919-845-7766; www.crispincorp.com

Booth: L20367

MULTICHANNEL MASTER CONTROL SOLUTION

Miranda Technologies Glass Cockpit:

Combines elements of branding, on-air presentation switching and monitoring into a compact single operator station; maximizes operator control and efficiency; keeps overheads to a minimum.

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

Booth: L10611

The difference between success and failure is in the details.

LEMO® Hybrid Fiber Optic Connectors for HDTV Cameras

- 2 single mode fibers + 2 power pins + 2 signal pins
- Exceeds ANSI/SMPTE, ARIB and EBU Standards
- Plug/socket designs permits daisy-chaining without adapters
- IP 68 seal rating
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LEMO® Triax Connectors

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

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

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Connections with a focus on details. That's LEMO.

NAB Booth # L11262

LEMO USA, Inc. 800-579-4144 x1015
www.lemousa.com email: info@lemousa.com

LEMO®

DMG PLATFORM

Pathfire Digital Media Gateway:

Users can aggregate content from a variety of sources; content arrives automatically on DMG servers at stations; minimizes the need to schedule or monitor satellite feeds; reduces the need for tape; integrates with other station gear.

770-619-0801; 770-619-0802; www.pathfire.com

Booth: L13653

Cameras, lenses, accessories

HD CAMERAS

Sony Electronics HDW-730 HDCAM and HDC-930 HD studio camera:

Features IT CCD image sensors that offer high sensitivity, high signal-to-noise, and low vertical smear on severe highlights; includes switchable 59.41 and 50i operation.

201-930-1000; fax: 201-930-4752; www.sony.com/professional

Booth: L18207, L515

PROFESSIONAL ENG LENSES

Fujinon A13x6.3E and A13x6.3:

6.3 mm focal length at wide end with magnification of 13 times (82 mm focal length at telephoto end); inner focus incorporated; high-quality images; substantial reduction of variation in angle of view caused by focus operation.

972-385-8902; fax: 972-392-3251; www.fujinon.com

Booth: L18241

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No Compromise

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Uncompressed Digital Transport System is setting the pace!

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VIRTUAL STUDIO PRODUCTION SYSTEM

Radamec Broadcast Systems Scenario XR:

Provides real studio image quality; an addition to Radamec's Virtual Scenario studio system; includes reflections of live inserted elements; runs under Windows NT operating system; imports 3D set designs.

877-RADAMEC; fax: 732-846-0544; www.RadamecBroadcast.com
Booth: L12233

MULTIFORMAT DTV CAMERA SYSTEM

Panasonic AK-HC931:

Supports variable frame rate capture; offers 480 interlace performance; upgrades to 720p, 1080i and 24 fps over 60 fps progressive acquisition; features three 2/3-inch 1 million pixel IT CCDs.

800-528-8601; www.panasonic.com/broadcast
Booth: L7214

CINEMA-STYLE GAMMA OPTION

Panasonic AJ-HDC27 VariCam HD Cinema Camera option:

Option extends the AJ-HDC27 range to provide control of the image's color saturation; improves master gamma, knee point and detail control; users can obtain more detail in an image's white area, while maintaining detail in the black areas.

800-528-8601; www.panasonic.com/broadcast
Booth: L7214

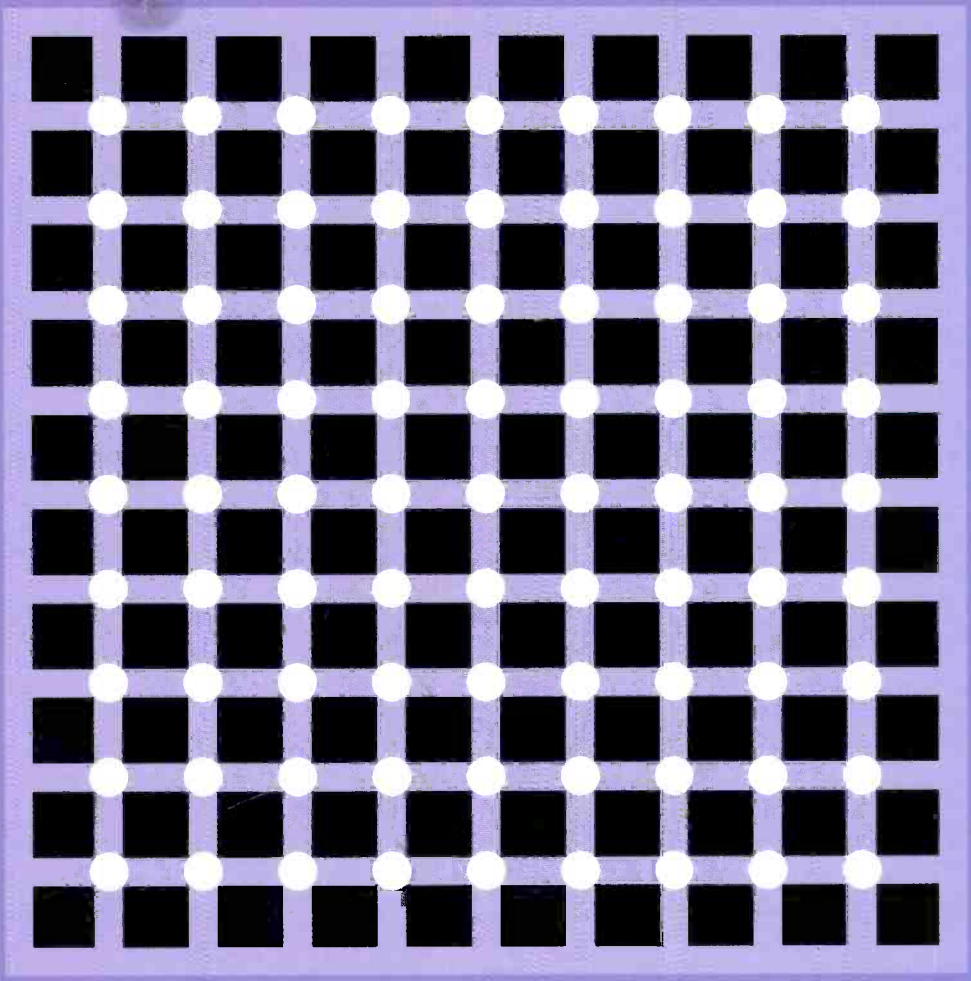
LENSES

Fujinon S13x4.5E and S13x4.5:

Provides comparable specifications as standard lenses and a wide range of shooting applications from wide angle; designed for ½ inch cameras; compact and lightweight, which allows for excellent mobility and an ease of operation; minimum object distance length of 0.4m.

972-385-8902; fax: 972-392-3251; www.fujinon.com
Booth: 18241

How many black dots can **you** see?



the answer's at www.get-the-answers.com

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TANDBERG Television is ready to help you with solutions that are changing the face of broadcasting. Maximize your digital broadcast opportunities, with visionary solutions that allow business models to be flexible and successful.

Worldwide, our systems drive the contribution and distribution of materials, enable the inclusion of high quality video in the broadband triple play mix and deliver direct-to-home cable, terrestrial and satellite television

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NAB 2002 The Convergence Marketplace

See us on stand S4555

www.tandbergtv.com

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Reach the highest level of ergonomic enlightenment by choosing the Trinix routing switcher family, enabled with Broadlinx technology. Trinix can take you to the next step in facility discovery. In addition to our amazingly dense 128x128 in 8 RU's and 256x256 in 15 RU's, contemplate our **new 512x512 Trinix router in only 28 RU's**. Trinix with Broadlinx gives you the advanced status monitoring and configuration you've always envisioned, allowing you real, useful communication to and from all active modules in the Trinix frame. Reach this information via SNMP or HTTP (webpage). All front accessible I/O matrix boards, fan modules, and identical power supplies are interchangeable between the 3 Trinix chassis's, allowing for minimum upgrade and support cost of ownership. It's the kind of product performance you can expect from the same team that created the Venus2001 routing switcher.

Trinix - It's a transformational experience. **Broadlinx - Empower your facility.**

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www.broadcastengineering.com

Broadcast Engineering®

THE JOURNAL OF DIGITAL TELEVISION

EXHIBIT HALL MAP

April 7-11, 2002

LEITCH®

FOCUSING ON CUSTOMER VALUE

DPS® POST PRODUCTION

dpsVelocityQ a multi-stream non-linear editor, features real-time simultaneous playback of four video streams, six dynamic graphics streams and four real-time 3D DVEs.

dpsVelocity™ 8.0, the new version of the dpsVelocity dual-stream, real-time non-linear editing system, features multi-camera editing, real-time garbage mattes, interface enhancements and multiple timeline support.

VIDEO SERVERS

Newsroom advancements include: enhanced functionality; DV-Cam; DVCPro and MPEG-2 one frame only editing; proxy editing & browsing; conforming of EDLs with Instant Online-II, Media Management; and MOS automated Rundown Manager.

Server system advancements include: increased scalability with 2 Gb/s fibre channel architecture; 180 GB FC drives; additional security with new health monitoring and diagnostics; DVD archiving extended to long-form programming; multi-media transcoding; Resource Manager; and Media Manager.

VIDEO PROCESSING AND DISTRIBUTION

Opus a state-of-the-art master control switcher, is the only system that can migrate from SD (270Mb/s) to HD (1.485Gb/s) within the same frame.

Command and Control System (CCS) provides real-time control, monitoring, and secures access to the devices on your network.

NEO™ single modules provide synchronization, processing and multiplexing and demultiplexing of video/audio signals with networked control.

MEDIAFILE™ Still and Clip Store offers price/performance, an easy-to-use interface and compatibility with file formats and networking protocols.

WHIPLASH SLO MO VIDEO offers slow motion/instant replay for fast-paced live sports.

THE LATEST VERSIONS OF...

DPS-575 Digital Processing Synchronizer
Genesis platform
CCS-Router Gateway
RouterWORKS 5.01

Integrator EX
CSD-3901 Master Clock System Driver
SPG-1601 Sync Pulse Generator
Integrator Multi-Format Router

Solutions in the South Hall, booth #L19511

TOC/Introduction

NAB Convention, April 7 - 11

Welcome to *Broadcast Engineering's* new 2002 NAB Convention map. Because the exhibition space now occupies more than 24 acres, we decided to reinvent our map design. Here you have an easy-to-use, removable map of all the exhibition halls.

Each hall is highlighted in a different color to make finding the right hall easy. Key convenience locations such as restaurants and restrooms are clearly marked in gold on every map. Also, restaurants located off the exhibition floor are identified with arrows and names pointing you in the right direction.

In some cases, the map rectangles representing booths are too small to completely identify the exhibiting company. In those cases, we've added a special listing to each map so you can locate these exhibitors by number. Find the company you want and then the map number. Simply locate that number on the map to find the actual booth location.

Advertisers in *Broadcast Engineering* and *Broadcast Engineering –World Edition* are color-highlighted on the map. Information contained on the map was current from the NAB as of February 1, 2002. Look for last-minute changes on the show floor.

So, welcome to NAB2002. Have a great show.

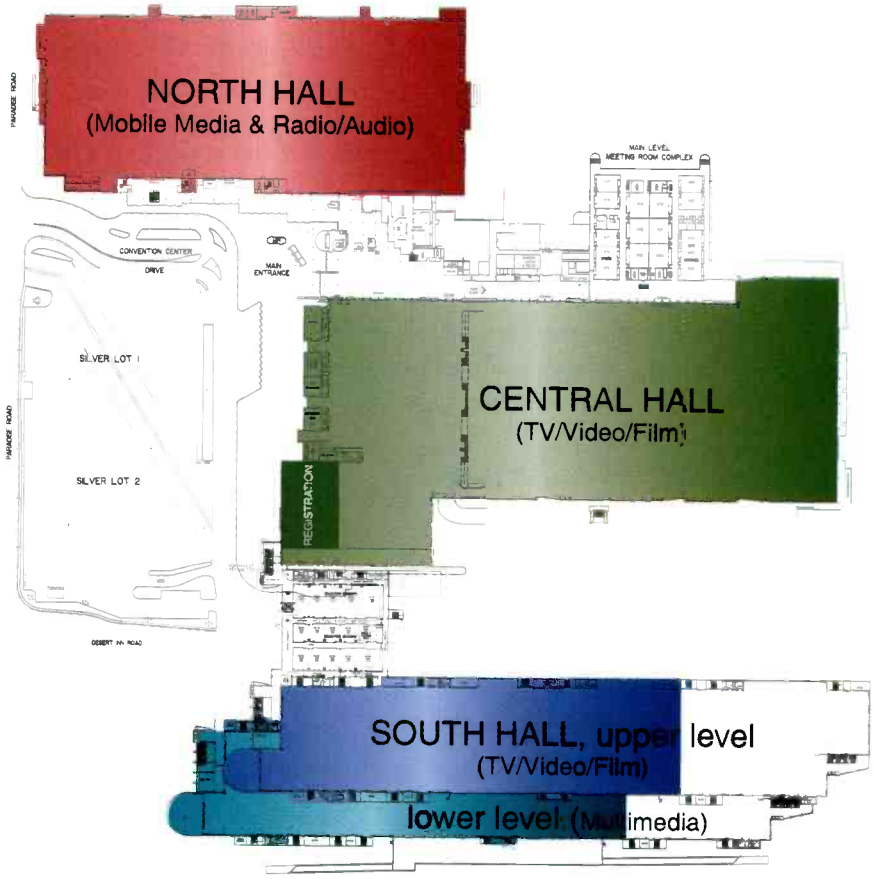
Brad Dick

Brad Dick
Editorial Director

★ *See Leitch at Booth #L19511, page 10*

★ See IDX at Booth #L11349 on page 9

Broadcast Engineering®
THE JOURNAL OF DIGITAL TELEVISION

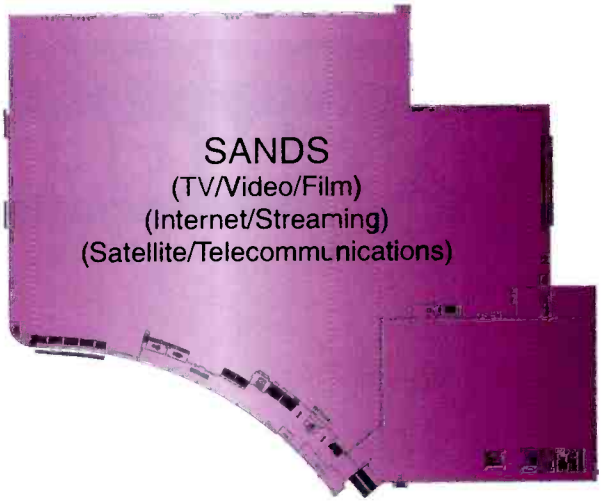


NAB Map Overview

NAB2002 Exhibit Hours

LVCC South Hall Premiere
Sun. (April 7) ..... 4 p.m. - 7 p.m.

Weekday Hours (All Halls)
Mon. - Wed. (April 8-10) ..... 9 a.m. - 6 p.m.
Thurs. (April 11) ..... 9 a.m. - 4 p.m.



LEGEND (all maps)

North Hall Advertisers	6-7
Central Hall Advertisers	8-9
South Hall, upper level Advertisers	10-11
South Hall, lower level Advertisers	12-13
Sands Advertisers	14-15
Points of Convenience	
Broadcast Engineering *(Primedia Business)*	

Information current as of February 1, 2002

NAB 2002 The Convergence Marketplace

NAB Convention, April 7 - 11

Exhibit Hours
Mon.-Wed. ..... 9 a.m.-6 p.m.
Thurs. ..... 9 a.m.-4 p.m.

Advertisers Points of Convenience

Map#	Company	Booth
1	Marconi	L1628
2	Dialight	L1517

★ *See Bogen at Booth #L10144 on page 9*

LVCC North Hall

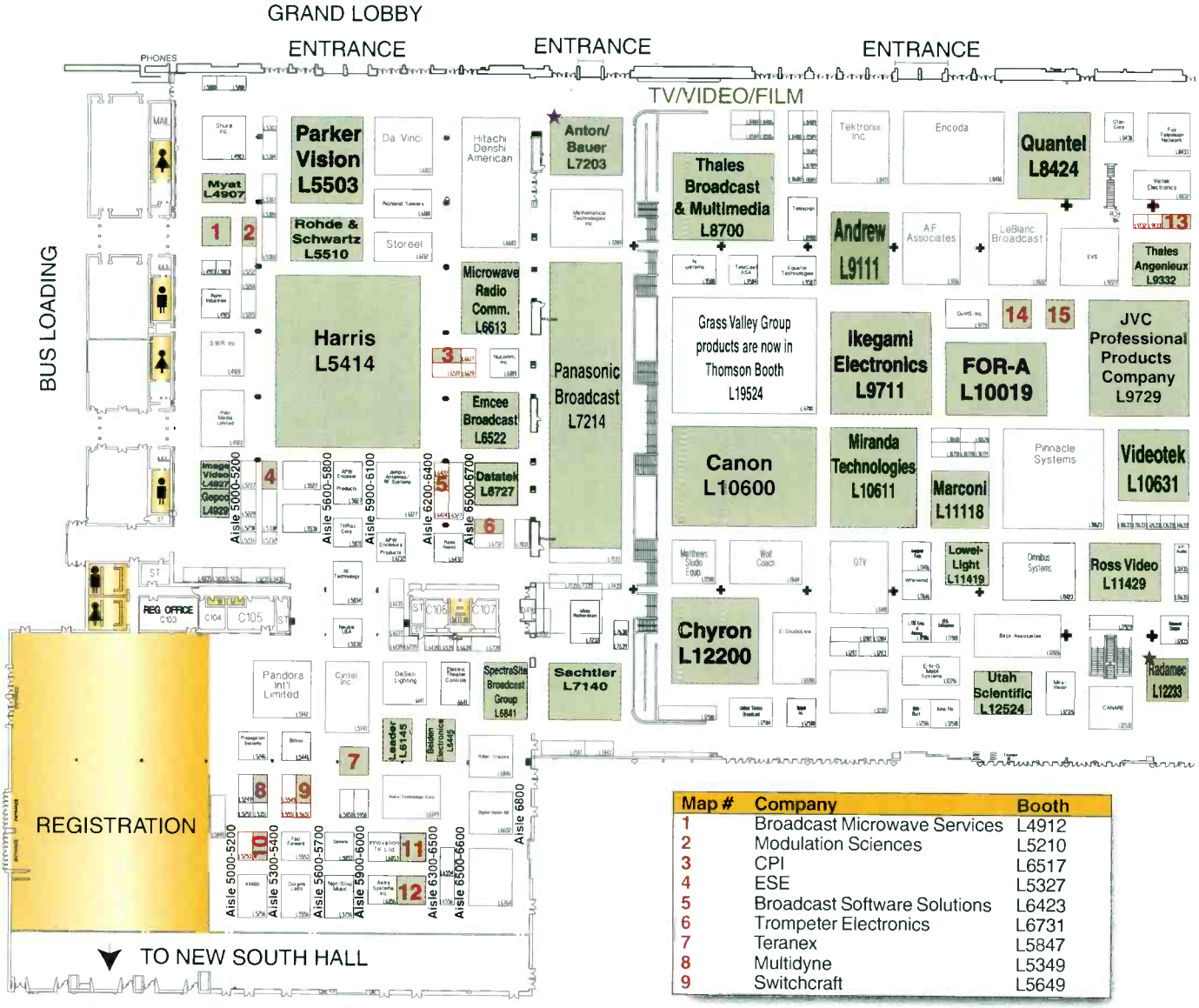
Map#	Company	Booth
3	Henry Engineering	L3102
4	B&H Photo	L3354

Map#	Company	Booth
5	Azden	L2562

NAB Convention, April 7 - 11

Exhibit Hours
Mon.-Wed. ..... 9 a.m.-6 p.m.
Thurs. ..... 9 a.m.-4 p.m.

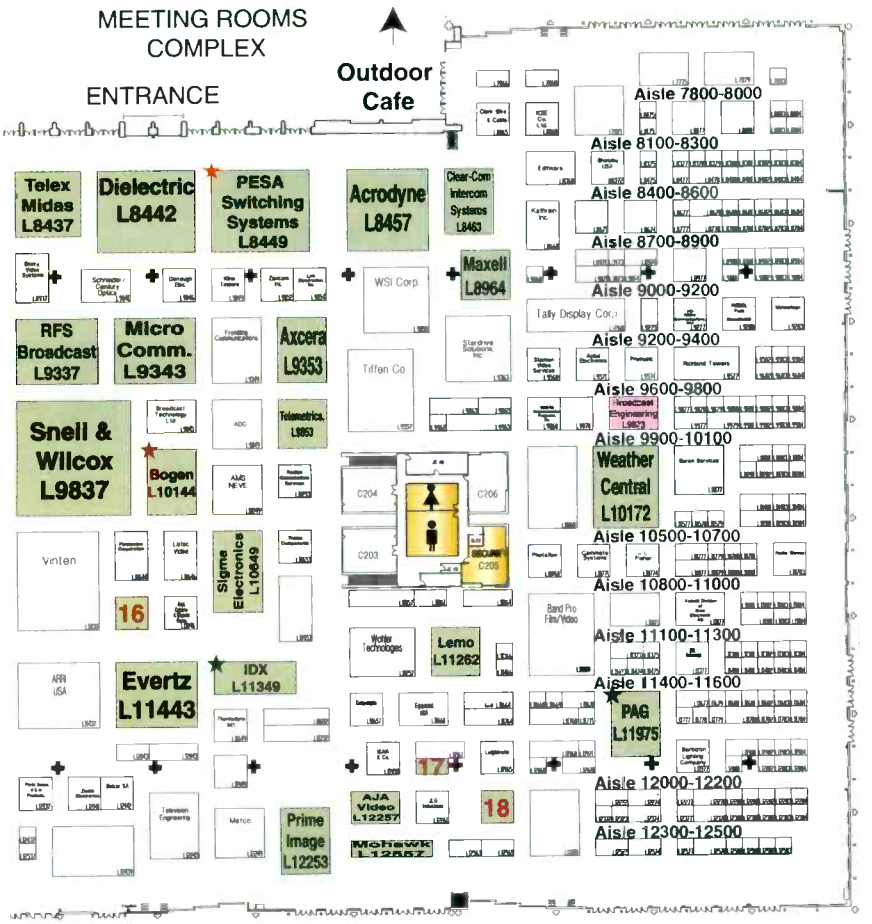
Advertisers Points of Convenience



Map #	Company	Booth
1	Broadcast Microwave Services	L4912
2	Modulation Sciences	L5210
3	CPI	L6517
4	ESE	L5327
5	Broadcast Software Solutions	L6423
6	Trompeter Electronics	L6731
7	Teranex	L5847
8	Multidyne	L5349
9	Switchcraft	L5649

★ *See Anton/Bauer at Booth #L7203, page 8 and Booth #L19507, page 17*

LVCC Central Hall

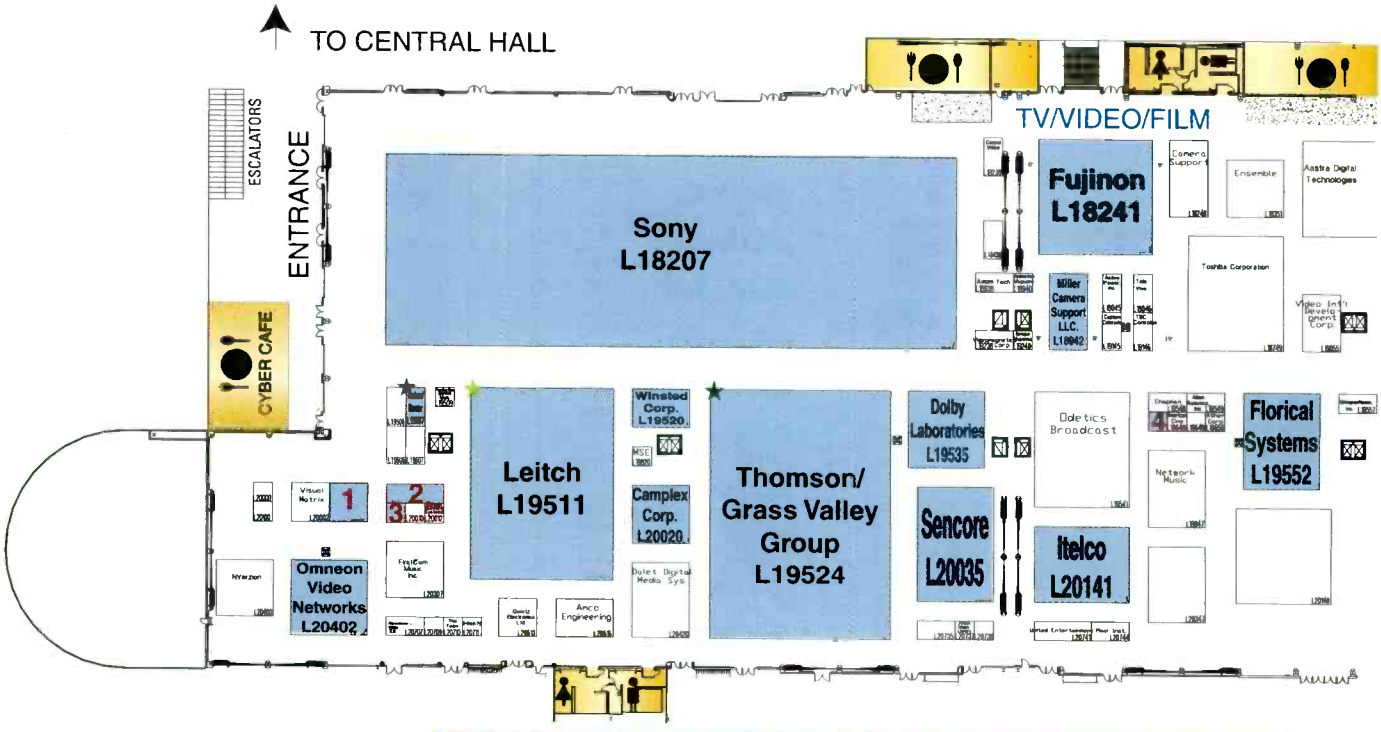


Map #	Company	Booth
10	TRON-TEK	L5353
11	NuComm	L6054
12	Northrop Grumman	L6256
13	Kings Electronics	L9134
14	Systems Wireless	L9723
15	Aspen Electronics	L9726
16	Fiber Options	L11043
17	Staco Energy	L12061
18	Forecast Console	L12265

NAB Convention, April 7 - 11

Exhibit Hours
Sun. (April 7) ..... 4 p.m. - 7 p.m.
Mon. - Wed. ..... 9 a.m. - 6 p.m.
Thurs. ..... 9 a.m. - 4 p.m.

Advertisers Points of Convenience

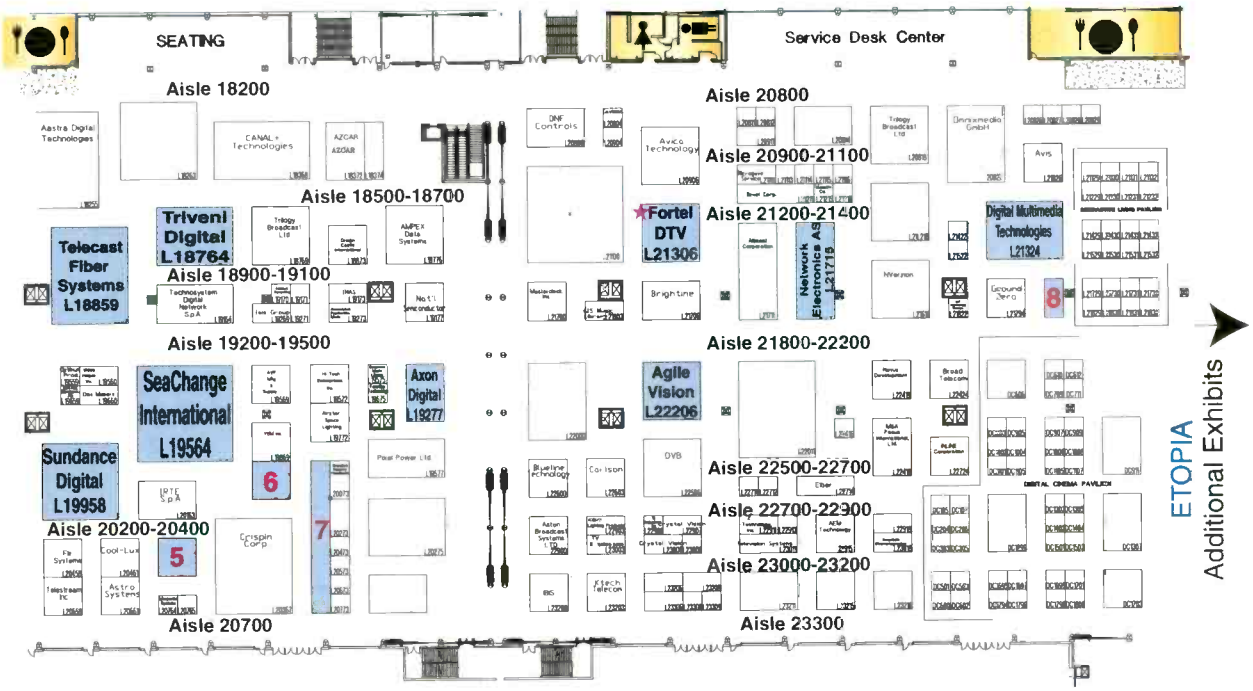


★ *See Thomson at Booth #L19524*

Map #	Company	Booth
1	Frezzi Energy	L20004
2	Broadcast Video Systems	L20007

Map #	Company	Booth
3	Systems Wireless	L20008
4	Broadcast Asia	L19647

South Hall, upper level



Map #	Company	Booth
5	Videoframe	L20377
6	Masstech Group	L20069

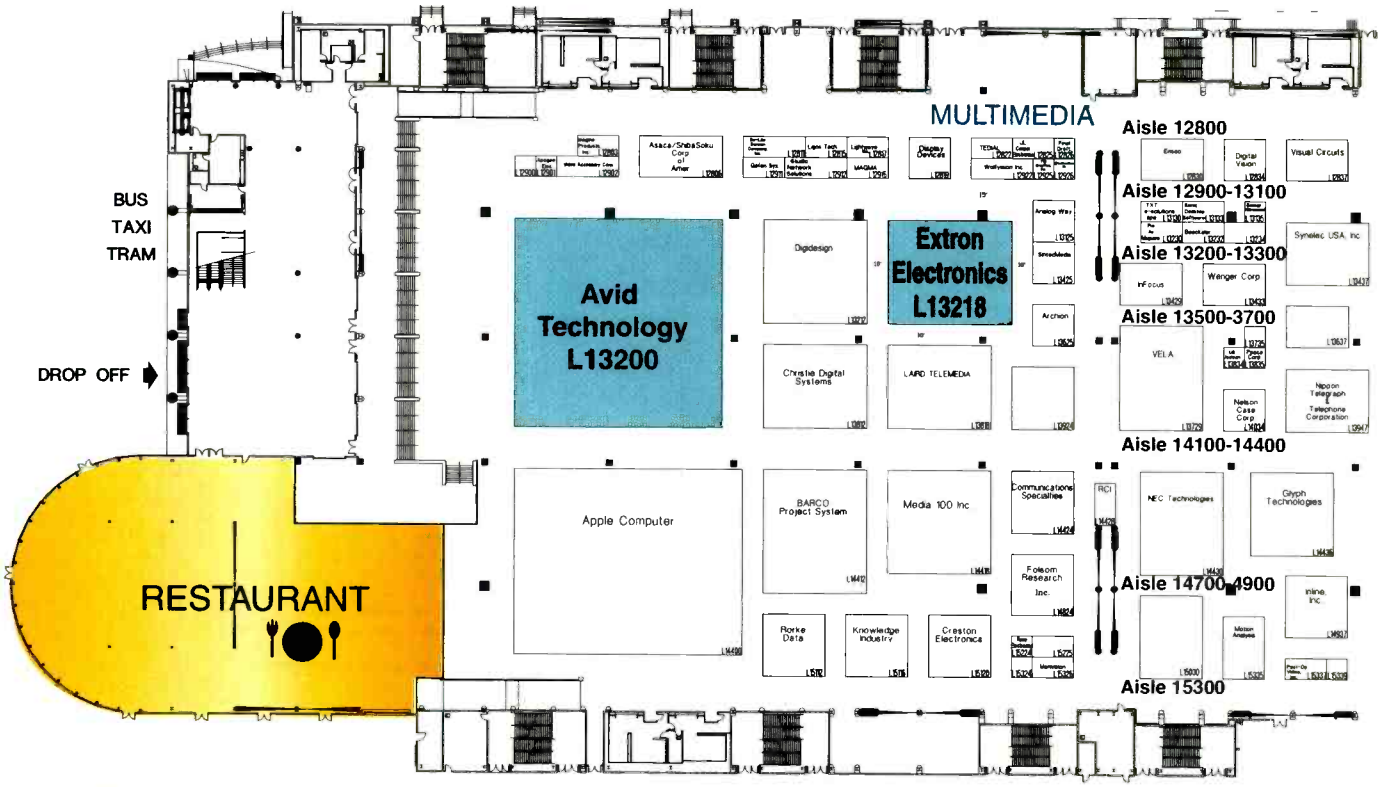
Map #	Company	Booth
7	B&H Photo	L20072
8	DK Audio	L21827

★ *See Fortel at Booth #L21306*

NAB Convention, April 7 - 11

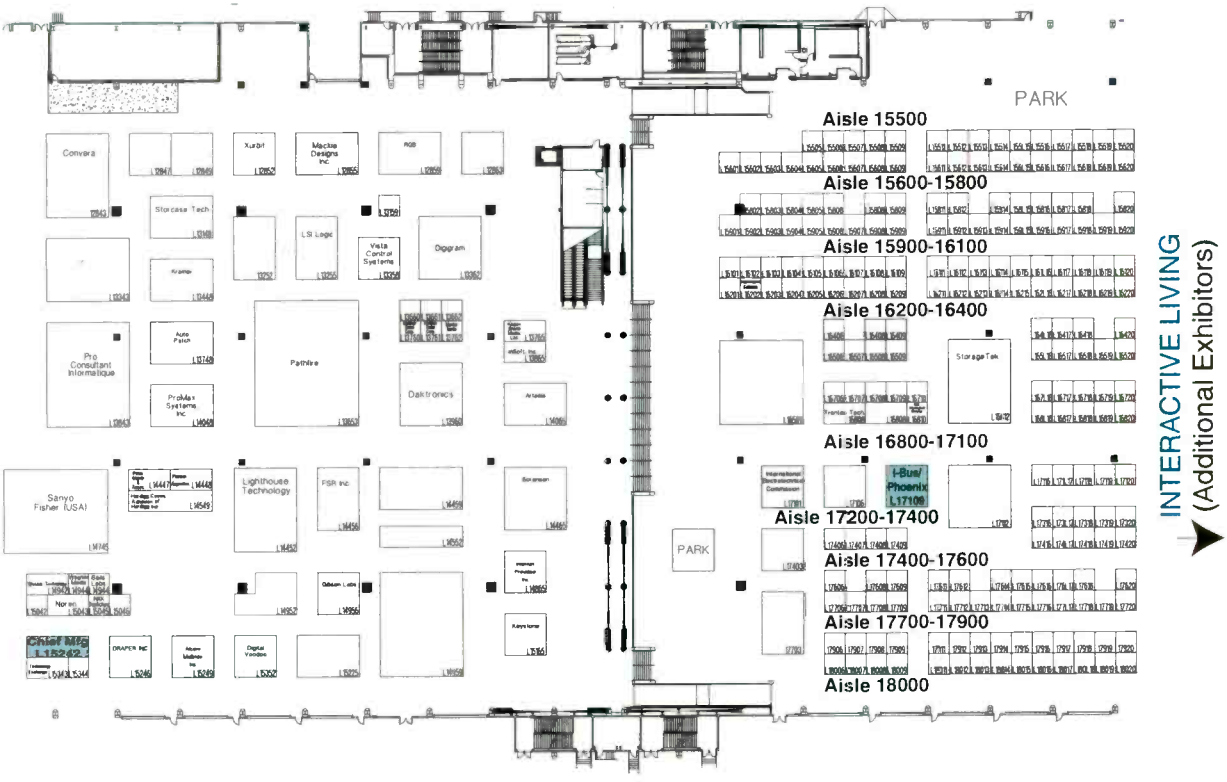
Exhibit Hours
Sun. (April 7) ..... 4 p.m. - 7 p.m.
Mon. - Wed. ..... 9 a.m. - 6 p.m.
Thurs. ..... 9 a.m. - 4 p.m.

Advertisers Points of Convenience



★ *See Grass Valley Group at Thomson Booth #L19524*

South Hall, lower level



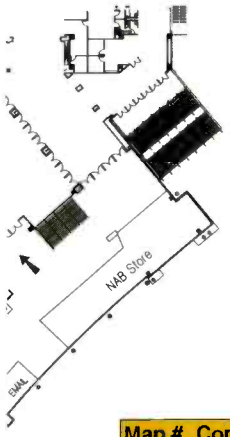
★ *See Radamec at Booth #L12233, page 8*

NAB Convention, April 7 - 11

Exhibit Hours
Mon. - Wed. ..... 9 a.m. - 6 p.m.
Thurs. ..... 9 a.m. - 4 p.m.

Sands Convention Center, Lower Level

Advertisers Points of Convenience



Map #	Company	Booth
1	Avalon	S1528
2	Genelec	S3459
3	Marshall Electronics	S3653
4	Opticomm	S4833
5	Radyne ComStream	S8020
6	Northrop Grumman	S9342
7	GMPCS Personal Comm.	S9944
8	Broadcast Engineering	S10068

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ABATEC Electronic AG	L19659	10
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Accom	S3904	14
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Ampex Data Systems	L18776	10
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Athens Technology Center	L 2367	6
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BBC Technology	S3952	14
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★ *See Pesa at Booth #L8449, page 9*
★ *See Thomson at Booth #L19524, page 10*

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Catch me... *if you can.*

64x64

128x128

256x256

512x512

Cheetah

Powerful, sleek, and extremely fast exemplifies the traits of a Cheetah. That's why PESA's new high definition router carries the same name. Designed for today's demand on future proofing return on investments, the Cheetah out performs all others.

Engineered for HDTV operations, Cheetah's multi-format digital routing switcher handles any signal from 3Mb/s up to 1.5Gb/s. Sizes range from 64X64 up to an impressive 512X512 in 40RU-without DA's. Both copper and fiber options are available plus an exclusive add-on DAC card for monitor grade video outputs The Cheetah is controlled from PESA's proven 3500 line of controllers or via an optional Ethernet matrix controller for networking capabilities.

So get ready to run, cause Cheetah is on the loose.

NAB 2002
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Booth L8449

PESA Switching Systems

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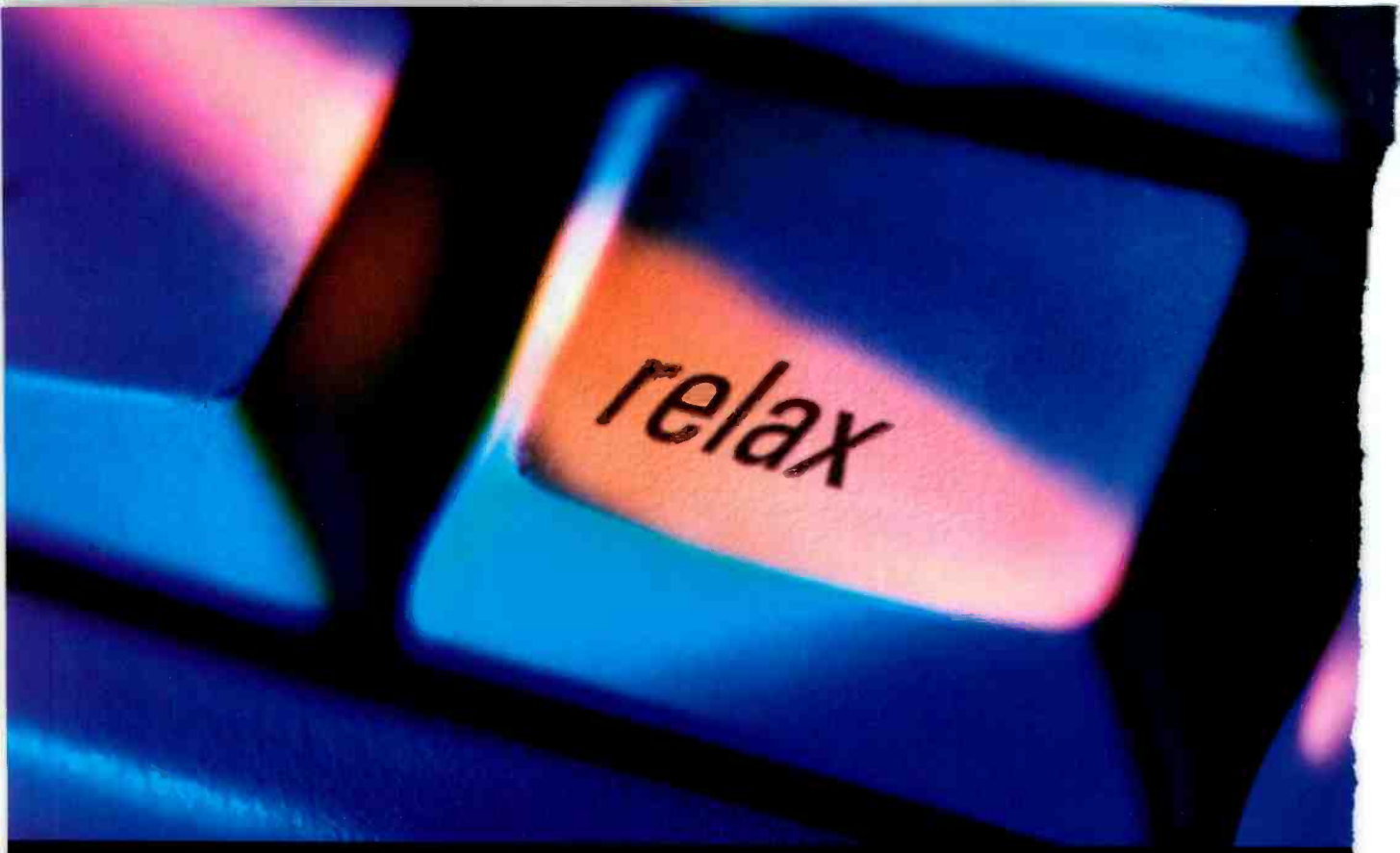

Automation Systems Are Not Created Equal

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You have enough to worry about these days without letting miscues, make-goods, down time, or operator errors disrupt your revenue stream.

As a pioneer in station automation, we've seen it all. That's why we build the most stable, high performance, real-time automation solutions in the industry. For a start, we don't use a general-purpose operating system that tries to be everything to everyone. Instead we use a robust, deterministic OS that knows a playout command when it sees one—making it a top priority for your business.

So when it comes to keeping your operation profitable, turn to the company that adds a great deal to the process—peace of mind.

Thomson takes the worry out of bro automation. With high-performance sy and on-going support, you're assured of event happening when it's supposed to.

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For more information and your nearest contact, please visit our website: www.thomsonbroadcast.com

CINE/HD CAMERA STABILIZING SYSTEM

Sachtler Artemis:

Offers an improved sled with a +/-90-degree rotation of the battery mount to allow fast and precise counterbalancing; features reduced weight of the spring arm and an optimized fit of the vest.

516-867-4900; fax: 516-623-6844; www.sachtler.com
Booth: L7140

TRIPOD SERIES

Miller Fluid Heads Sprinter:

Features include dual, side-action Sprint-Loks, fully variable mid-level spreader, rapid set-up transport clips, sprint-grip carry handle and reinforced 100 mm bowl.

973-857-8300; fax: 973-857-8188; www.miller.com
Booth: L18942

ON-BOARD BRICK BATTERY

Frezzi Energy Systems BP-14MH:

At 130 watt hours it provides 30 percent more runtime than the closest competitor; can handle the higher power requirements demanded by today's ENG crews; Frezzi's advanced Energy Gage is available on all BP-14MH batteries.

973-427-1160; fax: 973-427-0934; www.frezzi.com
Booth: L20004

3-CCD INTERLACED-SCAN CAMERA

Hitachi Denshi America HV-D30:

Compact, high-resolution camera that features robust signal-to-noise ratio, sophisticated color correction and high-performance DSP; features a third-generation DSP with 12-bit analog to digital (A/D) converter; outputs 30 frames per second and offers multi-step electronic shutter.

516-921-7200; fax: 516-496-3718; www.hdal.com
Booth: L6603

CAMERA ROBOTICS CONTROL PANEL

Telemetrics CP-D-3A:

Features a modular design that can be expanded and upgraded easily; basic panel includes a 3-axis joystick for pan, tilt and zoom functions; options include camera ROP control, iris master black control, and a rocker switch for variable speed control of the Televator Elevating Pedestal or camera track left and right.

201-848-9818; fax: 201-848-9819
www.telemetricsinc.com
Booth: L9853

CAMCORDER

JVC Professional Products Streamcorder:

Internet capable professional broadcast camera; dual-purpose camcorder features an optical image stabilizer and zoom through a wide-angle adapter; manually controllable with a 14:1 power zoom lens.

973-317-5000; fax: 973-317-5030; www.jvc.com/pro
Booth: L9729

BATTERY SYSTEM

IDX Technologies Endura:

Allows two E-50 direct mount batteries to be stacked together on a camera back; fits directly onto new cameras that have the wedge style V-Mount already built in; uses the Lithium Ion technology.

310-891-2800; fax: 310-891-3600; www.idxtek.com

Booth: L11349

TELE ZOOM LENS

Thales Angenieux ENG Tele 26x7.8 AIF.HR:

Combines the widest angle F7.8 mm to a 26x zoom ratio; focal range covers most applications from F7.8 mm to F203 mm, reaching F406 mm with the built-in range extender; features fast aperture of f/1.8.

+04 77 90 78 00; fax: +04 77 90 78 01; www.angenieux.com

Booth: L9332

MINI-DV CAMCORDER

Panasonic AG-DVX100:

Captures cinema-style, 24-frame progressive scanned images; equipped with three 1/3-inch progressive scan CCDs; offers a high sensitivity of F11 at 2000 lux.

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

Booth: L7214

CHARGER

PAG Quasar:

Compact 2-channel charger and battery management system; incorporates a 40W camera supply; available with either PAGlok connectors or Snap-On compatible connectors; detects cell chemistry, state of charge, capacity and condition.

818-760-8285; fax: 818-760-8805; www.pagusa.com

Booth: L11975

ENERGY STAR PARTNER

A4703 UL ISO 9001 Dialight Corporation

ETL

Everyone is switching to the L-864 flashing red beacon from Dialight, the best choice for marking obstacles that present hazards to aircraft. The extremely long life of Dialight's state-of-the-art, high-flux LED technology significantly reduces annual maintenance due to longer intervals between changes. And the system is backed by a five-year warranty. The light is designed to easily retrofit into existing incandescent systems but consumes 90% less energy.

When combined with Dialight's L-810 side lights, it provides a complete LED solution. As a solid-state device, it is resistant to shock and vibration and creates no measurable EMI or RFI. The unique design also assures optimum performance while minimizing ground-lighting effect. The L-864 beacon is ETL-certified to FAA specifications and also meets Transport Canada and ICAO Annex 14 standards.

Don't wait another night, call 1-800-835-2870, ext. 73;
fax: 1-800-327-4146; or visit www.dialight.com today.

Dialight
a Roxboro Group company

CHARGER

PAG L75 Li-Ion Time Battery:

Displays equipment run-time; choose between an extended cycle life or extended capacity when charged; incorporates a sophisticated three-level electronic protection system; display predicts remaining run-time.

818-760-8285; fax: 818-760-8805; www.pagusa.com
Booth: L11975

DIGITAL CAMERA

Ikegami Electronics HL-45A/45W:

Cutting-edge, high-performance digital camera with new-generation ASICs that support reductions in camera size, weight and power consumption; connects with existing TA/BS-OCP-40 and TA/BS/OCP-45 for wideband triax operation.

201-368-9171; fax: 201-569-1626; www.ikegami.com
Booth: L9711

HD LENS

Thales Angenieux OPTIMO 12x9.7:

The high-definition version of the OPTIMO 35 mm lens; features an HD adapter and the Cine 11.5x5.3 HD lens.

+04 77 90 78 00; fax: +04 77 90 78 01; www.angenieux.com
Booth: L9332

TOWER CAMERA

TRON-Tek TOWER CAM:

Designed as a cost-effective alternative to airborne video systems; features a ½-inch color video camera and a 1-inch format 16 to 160 mm lens; yields an overall zoom capacity of 32 to 320 mm; downlinked to the studio via S-band video link.

918-663-4877; 918-664-0309; www.tron-tek.com
Booth: L5353

CAMERA INTERCONNECTION SYSTEM

LEMO USA 3K.93C:

Hybrid fiber optic HDTV camera interconnection system that, by using fiber optics, allows transmission over longer distances and at higher levels of definition; has a compact design with two single-mode fiber contacts, two power contacts and two signal contacts.

707-578-8811; fax: 707-578-0869; www.lemousa.com
Booth: L11262

More Zoom.

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21X

22X

26X

33X

36X

40X

Now you can get closer to the action than ever before. With 40X and 26X High Resolution Series Tele Lenses. They deliver more zoom than any tele field lenses in the industry. And deliver more of the performance, reliability and features that are quickly making Angenieux the choice for high performance lenses.

Angenieux's 40 X 11 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.

Angenieux HR Series Tele Lenses feature more of the optical performance that Angenieux is renown for around the world. With precision crafted glass and advanced electron beam coatings for the highest levels of performance and clarity. And minimal flare and ghosting to produce vivid images with enhanced contrast and highly accurate color reproduction.

Angenieux's HR Series Tele Lenses also offer more of the reliability you've come to expect from Angenieux. Their high quality construction assures consistent operation on the road day after day. It's hard to believe such precision crafted lenses could be so tough.

Get more zoom - performance, reliability and features - with Angenieux HR Series Tele Lenses. More or less, only you can make the decision.

For more information call 973-812-3858, e-mail angenieux@tccus.com, or visit our web site at www.angenieux.com.

angēnieux

DTV marketplace

CHARGER

Anton/Bauer Titan Twin:

Companion to the Titan 70 camera/power supply; maintains input range of 90-250 VAC 50/60 Hz; allows charging of two batteries at once; chemistry independent; provides a charge routine specifically designed for the battery.

203-929-1100; fax: 203-929-9935; www.antonbauer.com
Booth: L7203, L19507

LENSES

Canon HD-EC:

Prime and zoom lenses featuring advanced focus rotation angle and improved markings; share a uniformed design concept to achieve a consistent "Canon look," color temperature and minimized focus breathing.

800-321-4388; www.canonbroadcast.com
Booth: L10600

TRIPOD

Bogen Photo Manfrotto 540ART Road Runner:

Composed of carbon fiber tubes to support ENG cameras weighing up to 33 lbs; features an integrated automatic mid-level spreader mechanism for quick setup and a multisurface system for all-terrain stability; 100 mm bowl and 75 mm bolt-on adapter to accommodate all popular video heads.

201-818-9500; fax: 201-818-9177; www.bogenphoto.com
Booth: L10144

ADAPTER

Aspen Electronics XL-7:

Control module for adapting 14.4 V batteries to supply Canon 7.2 V cameras and 12 V lights simultaneously; can be used with the XL bracket for mechanical stabilization for lightweight Canon cameras.

714-379-2515; fax: 714-379-2517; www.aspenelectronics.com
Booth: L9726

MPEG IMX CAMCORDER

Sony Electronics MSW-900:

Features a MPEG-I Frame structure at a bit rate of 50 Mbits/s and Power HAD; offers a high signal-to-noise ratio and high sensitivity for low-light levels; includes 12-bit A/D and advanced digital signal processing technology.

201-930-1000; fax: 201-930-4752; www.sony.com/professional
Booth: L18207, L515

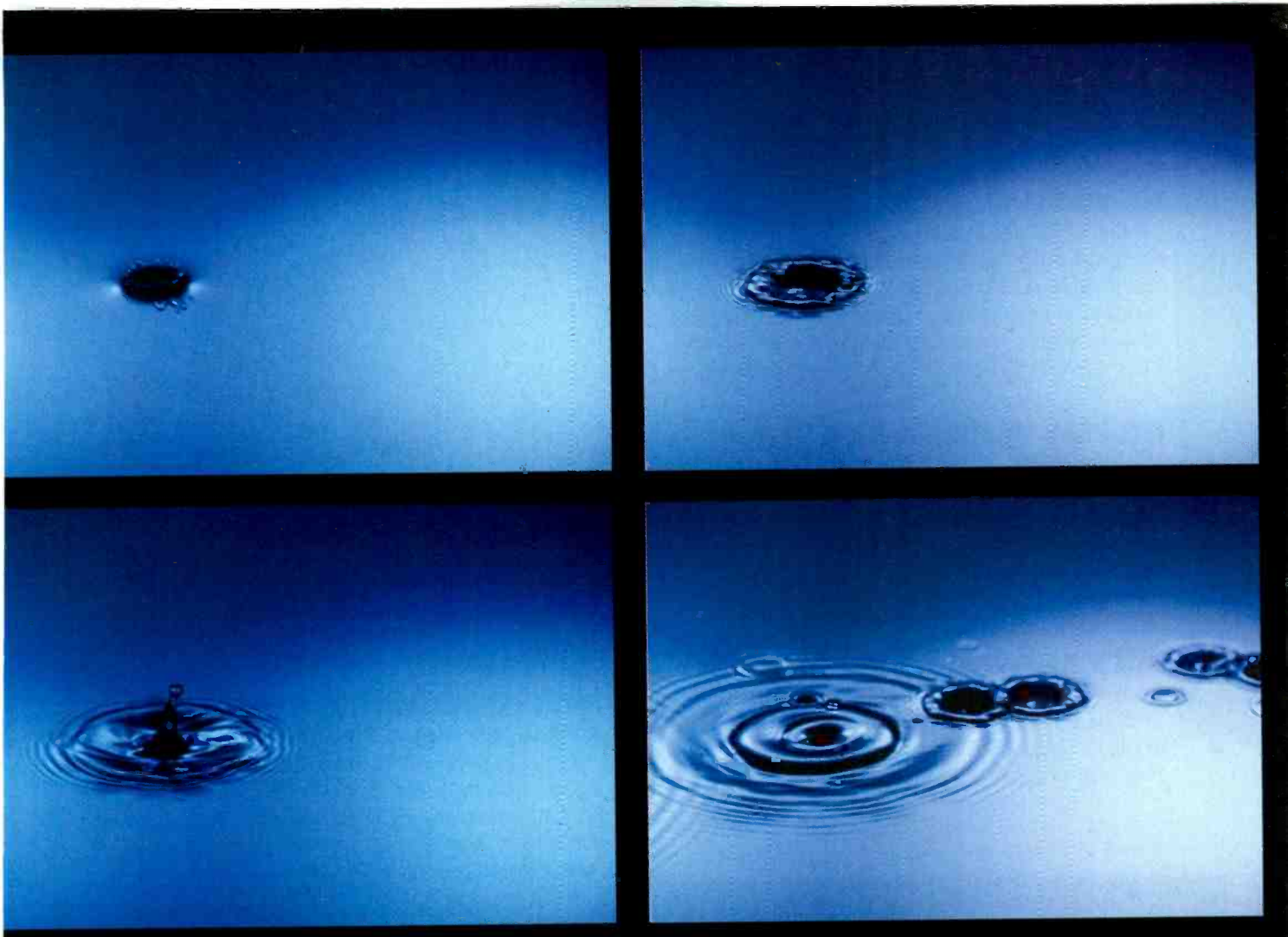
Graphics

CG/GRAPHIC SOFTWARE

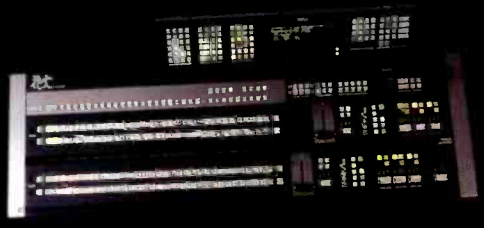
Broadcast Software Solutions CGXPress:

Character generation and graphics for 32-bit digital pcCodi; features a drag-and-drop interface; EAS, TV ratings and easy display of logos; available as software-only or turnkey systems.

800-273-4033; fax: 770-978-1717; www.broadcastsoftware.tv
Booth: L6423



Frame synchronization is only a drop in the bucket of everything we do.



[NEW HANABI OU32]

To fill that bucket with excitement, we are introducing six new versions of the popular **HD** and **SD HANABI SWITCHER/DVE** at **NAB 2002**. Three versions of the standard definition Hanabi switchers will have a choice of 16 SD, 24 SD, and 28 SD inputs with four still stores each and an additional three high definition versions 16 HD, 24 HD AND 28 HD inputs with four still stores each.

And for those of you who only know us for our frame synchronization – we happen to produce the most sophisticated and affordable **VIRTUAL STUDIO** in the market – as well as industry leading color correctors, switchers, graphics cards, signal processors, video mixers, and tape-less recorders, just to mention a few.

To see how else we are making a splash, stop by booth **#L10019** at **NAB 2002** and check out our website at **www.for-a.com**.

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Tel: +1 416-977-0343 Fax: +1 416-977-0657

SOFTWARE

Inscriber Technology RT-FX:

Delivers real-time animation and 3D effects with the innovative ability to combine streams of dynamic data with video and graphics; live broadcast productions such as sporting events or election coverage can produce stunning graphics while integrating statistics or other newswire information.

519-570-9111; fax: 519-570-9140; www.inscriber.com
Booth: S3937

DIGITAL PLAYBACK SYSTEM

5D Commander:

Post-production tool for preview, capture and playback; originally designed for playback of digital dailies; works with all formats from uncompressed SD to full-aperture 2K material in real time.

+44 20 7620 4800; fax: +44 20 7620 4815; www.five-d.com
Booth: S3908

PCI CARDS

Bluefish444 10-bit uncompressed PCI cards:

PCI cards available in 10-bit SD and HD uncompressed SDI I/O and output-only forms for Windows; used with applications such as Adobe Photoshop and Discreet's Combustion.

+03 9682 9136; fax: +03 9682 9466; www.bluefish444.com
Booth: L15352

WORKSTATION

SGI (Silicon Graphics) Fuel Visual Workstation:

Includes an MIPS R14000A processor, a VPro 3-D graphics system and a high-bandwidth design; features 48-bit RGBA; fuel supports up to 4 MB of cache and up to 4 GB of memory.

800-800-7441; www.sgi.com
Booth: S5418

LOGO GENERATOR

Miranda Technologies DLG series:

Configured as a basic logo inserter; gradually expands to include EAS insertion, input switching, AB mixing, still store, text insertion, audio storage and insertion, automation control and full master control panel capability.

514-333-1772; fax: 514-333-9828; www.miranda.com
Booth: L10611

VISUAL EFFECTS SYSTEMS SOFTWARE

Discreet combustion 2:

The latest version of Discreet's unified paint, animation and 3D composing software application for motion graphic designers, animators and visual effects artists; resolution-independent, vector paint, animation and compositing solution for multiformat work from the Web to video and HDTV to feature film.

415-547-2457; fax: 415-547-2222; www.discreet.com
Booth: S4409

GRAPHICS SYSTEMS

Chyron Aprisa four-channel 200SX:

Four-channel system with new SX graphics replay option; users can play back stills, text rolls, text crawls and animated flipbooks over a clip with audio and key.

631-845-2000; fax: 631-845-3888; www.chyron.com
Booth: L12200

See us at NAB Booth #L12500

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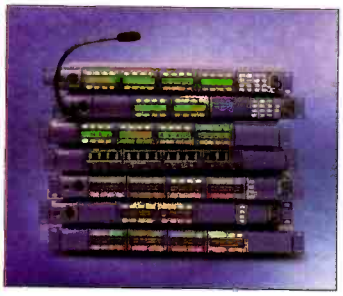

INTERCOM STATIONS

Clear-Com i-Stations:

1RU stations for Matrix Plus digital intercom systems; series of 35 stations featuring different combinations of display and non-display key modules, level-control modules, keypad modules and auxiliary input modules.

510-496-6624; fax: 510-496-6699; www.clearcom.com
Booth: L8463

WIRELESS INTERCOM

Telex Communications BTR800:

Features two intercom channels, stage announce with relay closure, wireless talkaround, 1440 frequencies and all metal beltpacks.

952-884-4051; 952-884-0043; www.telex.com
Booth: L8437

INTERCOM SYSTEM

Drake Electronics 4000 Series II:

Available in three frame sizes; all matrices have been designed to share the same core functionality, software, range of control panels and accessories; features include CD-quality audio; crosspoint, processor and PSU redundancy, and interfacing to ISDN and digital networks.

+44 1727 871200; fax: +44 1707 371266; www.drake-uk.com
Booth: L12565

Lighting

LED TOWER BEACON

Dialight LED tower beacon:

Designed to be resistant to lightning strikes and other static surges; guaranteed to meet current FCC light output specifications for five years; protection against electrical surges and voltage spikes exceeding 250 volts.

732-919-3119; fax: 732-751-5778; www.dialight.com
Booth: L1515

Microwave, fiber optic, telco

SDI/HDTV MULTIPLEXER

Telecast Fiber Systems Plus4:

Transports four channels of serial digital video on a single optical fiber; handles all standard digital formats from 19.4 Mbits/s up to uncompressed HDTV at 1.5 Gits/s; applications include connections in and between production and post-production facilities, and SDTV/HDTV traffic between metropolitan switching centers.

508-754-4858; fax: 508-752-1520; www.telecast-fiber.com
Booth: L18859

2-ANTENNA TRUE DIVERSITY RECEIVER

Avalon RF DX502/DX602:

Intended for low-weight mobile applications; the DX502 tuning frequency range is from 900 to 999MHz in steps of 1MHz; the DX602 tuning frequency range is from 2350 to 2483MHz in steps of 1Mhz; broadcasts quality FM video signals and two FM modulated audio sub-carriers; powered by an external battery or AC adapter.

619-401-1969; fax: 619-401-1971; www.avalonrf.com
Booth: S1528

WIRELESS CAMERA D-ENG SOLUTION

TANDBERG Television Voyager Lite:

Designed for wireless cameras; incorporates high-quality video encoding with an integrated DVB-T modulator/upconverter providing 2.4 GHz RF output; fits in a small pack and is carried on the cameraman's back.

+47 6711 6200; fax: +47 6711 6201; www.tandbergtv.com
Booth: S4555

MPEG-2 INTERFACE DTV CONVERTER

Nucomm GA-Link series:

Converts between SMPTE-ASI, DVB-ASI, DS3-G703 and Serial 9 D-F; parallel and serial formats include ECL, TTL and LVDS; features rate conversion and a multiplexer/demultiplexer.

908-852-3700; fax: 908-813-0399; www.nucomm.com
Booth: L6054

High Density Matrix

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The Datatek D-2800 Router

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

Serial Digital Video

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Fax: 908-232-6381

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NAB Booth # L6727

CONNECTORS

Kings Electronics Fibre-Cam Tri-Loc 7760 series:

Reduces assembly time and guarantees reliable strain relief; connectors/cable assemblies can be modified or repaired in the field; assures reliable performance over the lifetime of the product.

803-909-5048; 803-909-5092; www.kingselectronics.com
Booth: L9134

WIRELESS CAMERA MODULE

Broadcast Microwave Services Carry-Coder:

Module provides wireless digital transmission of audio and video signals; can be installed in a backpack or plugged directly into the back of most professional video cameras; also available in a package for helicopter applications.

800-669-9667; fax: 858-391-3049
www.bms-inc.com
Booth: L4912

MEDIA CONVERTER

Multidyne E-FMX-150:

Supports full auto-negotiation for twisted pair and fiber optic media; operates at 1300/1550 nm wavelength over one single-mode fiber optic cable; supports up to 25 km and up to 50 km distances with two models.

800-4TV-Test; fax: 516-671-3362; www.multidyne.tv
Booth: L5349

PORTABLE MICROWAVE RADIO

Microwave Radio Communications STRATA:

User-configurable and remote controllable; incorporates a modular design for a high degree of flexibility; designed for analog portable and outside broadcasting applications.

978-671-5700; fax: 978-671-5800; www.mrcbroadcast.com
Booth L6613

FIBER OPTIC TRANSMISSION SYSTEM

Communications Specialties Pure Digital Fiberlink 3440 series:

Transmission of video and four channels of audio over one fiber; compatible with NTSC, PAL or SECAM standards; available in single-mode or multimode version.

631-273-0404; www.commspecial.com
Booth: L14424

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DTV marketplace

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Opticomm FDV-38000:

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858-450-0143; fax: 858-450-0155; www.opticomm.com
Booth: S4833

OPTICAL TRANSPORT PLATFORM

Network Electronics Flashlink:

Transports up to 40 channels of uncompressed SDI, HD-SDI, SDH/SONET and GigE over a single fiber; converts analog and digital video and audio as well as data from an electrical signal to an optical wavelength, including audio embedding and de-embedding.

+47 33 48 99 99; fax: +47 33 48 99 99; www.network-electronics.com
Booth: L21715

New media, streaming products

MPEG-2 ENCODER

Standard Communications L1000:

Features encoding delay of less than 100 msec in either 4:2:2 or 4:2:0 formats; dissipates less than 20W of power on AC or battery operation; switchable between DVB-T or DVB-S modulation; suitable for SNG, ENG and action sports.

310-532-5300; fax: 310-532-0397; www.standardcomm.com
Booth: S8133

INTERNET ENCODER

Thomson/Grass Valley Group Aqua:

Designed to provide high streaming throughput; features one-pass encoding, which allows users to pre-process, capture and clean content, and render it into multiple streaming formats.

530-478-3000; fax: 530-478-3755; www.grassvalleygroup.com
Booth: L19524

MPEG-2 ENCODER

Vela Argus LC:

Provides real-time 4:2:0 multiplexing of transport, program and system streams from analog video and audio inputs; available with optional variable bit-rate encoding and spectrum multi-stream encoding.

727-507-5300; fax: 727-507-5310; www.vela.com
Booth: L15030

WEB SUPERVISION CENTER

Thales Broadcast & Multimedia LAZULITE:

Offers remote management and control of all broadband applications and equipment throughout a network using a single and integrated management system; powered by Thales' Open Supervisor software and allows access for multiple users.

413-569-0116; fax: 413-569-0679; www.thales-bm.com
Booth: L8700

See us at NAB2002
Booth #L11443

up to 16x

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Evertz offers a cost-effective, modular multiviewer/analyzer solution - the industry's most feature-rich - effectively increasing your signal monitoring capacity and confidence sixteen-fold! By cascading up to four 7765AVM Quattro™ cards with a 7765QVM module, up to sixteen video inputs are simultaneously analyzed, displayed and monitored within one 3RU frame. In addition user configurable video, audio and data status information along with user-defined fault condition alerts for each input is displayed on the video output.

The 7765AVM Quattro™ and 7765QVM are members of the Evertz VistaLINK™ family of products. Using VistaLINK™ technology, Evertz is the answer to your central and remote multi-channel monitoring and reporting needs. VistaLINK™ offers centralized monitoring and control of remote facilities via SNMP with automated alarms, reporting, logging and more...

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www.evertz.com

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MULTIMEDIA ACCESS CONCENTRATOR

Miranda Media Networks MAC 500:

Designed for telco-grade applications; brings together video, audio and data streams with MPEG-2 video compression for transport across broadband networks; supports bit rates from 800 kbits/s to 15 Mbits/s.

514-335-3015; fax: 514-335-1614
www.mirandanetworks.com
Booth: L10611

STREAMING MEDIA SERVICE

BT Broadcast Services Webcasting service:

Live or pre-recorded video is ingested for encoding and delivery to the Internet; can be converted into various formats; customer benefits include choice of content delivery network and synchronized multimedia services with interactive elements.

814-235-8638; fax: 814-235-8609
www.broadcast.bt.com
Booth: L12233

WEB BUILDER

Miranda Technologies iControl Web Builder:

Creates custom representations of user installations and facilities; monitor and control Miranda's audio and video equipment and signals from a standard Web browser over standard IP networks.

514-333-1772; fax: 514-333-9828
www.miranda.com
Booth: L10611

Nonlinear editors

PROFESSIONAL EDITOR

Pinnacle Systems silver:

Bridges analog and digital domains; includes a scaleable MPEG-2 compression (5 to 50 MBytes/s); includes real-time workflow, InTime processing and open network capability.

650-526-1600; www.pinnaclesys.com
Booth: L10623


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www.ava.com
An EMC Company

ONLINE EDITOR

Quantel Version 9 for Editbox:

Boosts performance in primary editing, audio management and multi-layer compositing; features tail-free desk editing; new in, out and viewer "tuck" marking; includes folded view editing for faster shot reordering.

+44 01635 48222; fax: +44 01635 815815; www.quantel.com
Booth: L8424

MEDIA ENGINE

Laird Telemedia Dvora:

Professional, real-time turnkey hardware systems, integrated and optimized for your video edit software of choice by Avid, Adobe, AIST, Canopus, DPS, Matrox or Pinnacle; Exact Pentium processor compatibility; all aluminum nonmagnetic silver cabinet with advanced air handling system; full tower and rackmounts available.

800-898-0759; fax: 845-339-0231; www.lairdtelemedia.com
Booth: L13818

NONLINEAR EDITOR PLUG-IN

Inscriber Technology TitleMotion Pro:

Plug-in for Inscriber TitleMotion to add functionality with new 3D text and effects; animated textures over time, animated kerning over time and the ability to apply 3D effects to text and graphic objects over time; graphics plug-in for leading Windows-based nonlinear editors.

519-570-9111; fax: 519-570-9140; www.inscriber.com
Booth: S3937

NONLINEAR EDITING SYSTEM

Leitch dpsVelocity 8.0:

New version of the dpsVelocity dual-stream real-time nonlinear editing system with real-time Webstreaming directly from the timeline; available as a fully integrated turnkey system or as hardware/software bundle for installation in a Windows 2000 computer; includes multi-camera editing, real-time garbage mattes, interface enhancements and multiple timeline support.

757-548-2300; www.dps.com
Booth: L19511

NONLINEAR EDITOR

Avid NewsCutter v3:

Features interoperability with iNews products, new Web publishing features and XP model support for DV 50.

978-640-6789; fax: 978-640-1366; www.avid.com
Booth: L13200

NONLINEAR EDITOR

Accom Affinity NLE:

Features Dimension 8.2 software; offers 30 new features including enhancements to the key frame editor, improved EDL support and improved processing speed.

650-328-3818; fax: 650-327-2511; www.accom.com
Booth: S3904

DV EDITING STUDIO

Avid Xpress DV v3:

Offers more than 100 customizable real-time effects, such as dissolves, titles or color effects; features eight video tracks with unlimited nesting for multi-layered compositions, low-cost DVD burner support, and five times faster MPEG encoding.

978-640-6789; fax: 978-640-1366; www.avid.com
Booth: L13200

NONLINEAR EDITOR

BOXX HDBOXX:

Editor offers variable frame rate support for Panasonic's AJ-HDC27V HD Cinema camera; features 10-bit and eight-bit YUV and eight-bit RGB support; system supports all HD and SD formats, including 16:9 aspect ratios and 2K film resolution.

512-835-0400; fax: 512-835-0434; www.boxxtech.com
Booth: S2329

NONLINEAR EDITNG SYSTEM

Matrox DigiSuite MAX:

Delivers maximum editing power and creative freedom with more real-time features; analog and digital inputs and outputs is supported to enable users to work in their formats of choice; users deliver in record time on tape, CD and DVD.

514-822-6000; 514-822-6292; www.matrox.com
Booth: S4427

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Available in kit form complete with 503, 505, 510 or 516 head, Probag and carrying strap.

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www.bogenphoto.com

EDITING SYSTEM

Pinnacle Systems blue:

Delivers editing support for every video format; allows users to mix formats within the same timeline and mix format editing without compromise; eliminats transcoding and the degrading effects of recompression; features real-time primary color correction.

650-526-1600; www.pinnaclesys.com
Booth: L10623

Production switchers, video effects, keyers

SD/HD NOISE REDUCER

Teranex StarFilm:

Incorporates advanced algorithms for grain removal, dirt concealment and noise reduction for SD and HD material; allows the user to work with either NTSC or PAL material, or HD 1080p 23-, 24- or 25-frame film-based material in the same platform.

407-858-6000; fax: 407-858-6001; www.teranex.com
Booth: L5847

IMAGE CONVERTER/VIDEO PROCESSOR

Miranda Technologies ARC-101i:

Converts SDI signals from 4:3 to 16:9 and 16:9 to 4:3; features advanced 3D de-interlacing with edge detection; includes a built-in noise reducer and detail enhancer and programmable picture positions.

514-333-1772; fax: 514-333-9828; www.miranda.com
Booth: L10611

MATTE EXTRACTION TOOLS

Ultimatte matte extraction tools:

Designed for Adobe, Avid, Discreet and other effects and NLE products; provide an intuitive UI design filled with features such as separate shadow channel, smart matte sizing, image decompression and dynamic screen correction.

818-993-8007; fax: 818-993-3762; www.ultimatte.com
Booth: S3914

DTV UPCONVERTER

Teranex Xantus-one:

Offers a cost-effective upgrade path to HDTV in a 3RU unit; features include colorspace conversion, 3:2 telecine, detail enhancement, scene change detection and aspect ratio conversion.

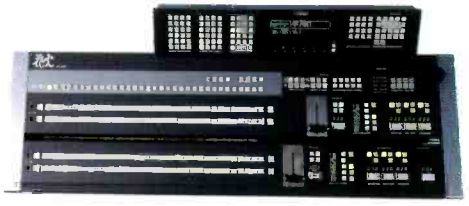
407-858-6000; fax: 407-858-6001; www.teranex.com
Booth: L5847

PIP VIDEO INSERTER

Keywest Technology Big VooDoo:

Affordable broadcast-quality picture-in-picture inserter with digital comb filter and full-time base correction; delivers an easy way to overlay a foreground video image on background video, graphics or text; gives users control over the size and placement of foreground video.

913-492-4666; 913-895-7496; www.keywesttechnology.com
Booth: L11416



HD/SD SWITCHERS

FOR-A Corporation of America Hanabi:

Three new versions of the HVS-3000S: the HVS-3000S16, the HVS-3000S24 and the HVS-3000S28; three new versions of the HVS-3000HD: the HVS-3000HD16, the HVS-3000HD24 and the HVS-3000HD28; 3RU high and is suited for remote trucks and live applications.

352-371-1505; fax: 352-378-5320; www.for-a.com
Booth: L10019

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Behind the scenes 24/7/365: Leading broadcast organizations around the world rely on proven Ciprico storage and system solutions to quickly and efficiently manage expanding volumes of digital media.

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CIPRICO

NAB, S5733

DIGITAL COMPONENT KEYER

FOR-A Corporation of America DSK-50:

Digital IO provides high signal quality with no deterioration; compact enough to carry for productions when additional key layers are required; can be controlled either locally or remotely; accepts two serial digital component inputs; input can be synchronized to either external reference or main line input.

352-371-1505; fax: 352-378-5320; www.for-a.com
Booth: L10019

POST-PRODUCTION SWITCHER

Snell & Wilcox HD 2524:

Features 24-input, 2.5M/E HD production switcher; can receive more inputs by assignment using external router support; includes 1.5 Gbit/s true HD serial digital operation; features five keyers (two on each M/E and one DSK).

408-260-1000; fax: 408-260-2800; www.snellwilcox.com
Booth: L9837

Satellite equipment

HIGH-SPEED DATA TERMINAL

GMPCS Personal Communications TT Capsat Mobile Messenger:

Offers rates up to 64 kbits/s; fully automatic tracking antenna with different moving options; 10-32V DC power supply, transceiver and handset cradle plus cables; standard Mini-M voice, fax and data operation at 2.4 kbits/s.

954-973-3100; fax: 954-973-4800; www.gmpcs-us.com
Booth: S9943

SATELLITE SERVICES

Intelsat broadcast video services:

Global satellite system provides broadcasters with dedicated television capacity for applications including satellite news gathering and special event and studio-to-studio transmission.

202-944-6864; fax: 202-944-7982; www.intelsat.com
Booth: S9033

ANTENNA

Comtech Antenna Systems quick deployable antenna:

Antenna offered in either 1.2 meter or 1.8 meter apertures; features easy assembly; case with transmit and receive systems provides a stable base for the Elevation over Azimuth mount.

407-892-6111; fax: 407-892-0994; www.comtechantenna.com
Booth: S9319

ADVANCED MODULATOR

Scientific-Atlanta PowerVu D9390:

DVB-compliant, QPSK-, 8PSK- and 16QAM-capable modulator designed for single-channel or multichannel satellite transmission; programmer can increase bit rate and add more Mbytes/s.

770-236-6190; 770-236-6464; www.scientificatlanta.com
Booth: S4522

Storage

DIGITAL PORTABLE RECORDER

Sony Electronics DNW-A25WS:

Enables playback of pictures in 16:9 aspect ratio on an LCD monitor without squeezing the images to handle content in widescreen mode; maintains output capability of the standard 4:3 aspect ratio; includes double deck editing and playback of Betacam and Betacam SP format recordings.

201-930-1000; fax: 201-930-4752; www.sony.com/professional
Booth: L18207, L515

DIGITAL VIDEO REPLAY SERVERS

Panasonic iDVR-100 and iDVR-200:

Internet-enabled HD MPEG server with built-in DVD-RAM drives; can play back both 24-frame and 60-frame progressive HD images plus stereo or optional 5.1 channel surround sound; plays approximately 30 minutes of MPEG-2 HD encoded video.

800-528-8601; www.panasonic.com/broadcast
Booth: L7214

MULTIFORMAT SERVER

Panasonic AJ-YA152:

Facilitates serial digital input and output of both DVCPRO50 and DVCPRO; supports embedded audio and is compatible with AES/EBU audio; capable of writing and reading VBI signals and LTC I/O.

800-528-8601; www.panasonic.com/broadcast
Booth: L7214

DISK RECORDER

Doremi Labs V1-MP2.HD:

Uses MPEG-2 4:2:2 or 4:2:0 compression (up to 300 Mbits/s) for recording and playback of high-definition video; ideal as a playback device for digital cinema and as a drop-in replacement for any high-definition tape machine.

818-562-1101; 818-562-1109; www.doremilabs.com
Booth: L12539

MULTI-ACCESS VIDEO AND AUDIO SERVER

Sony Electronics VSR-2000A:

Supports 24 Mbits/s MP@HL high-definition video with up to eight channels of PCM audio; enables a single VSR-2000A to store and play back more than 20 hours of HD video material.

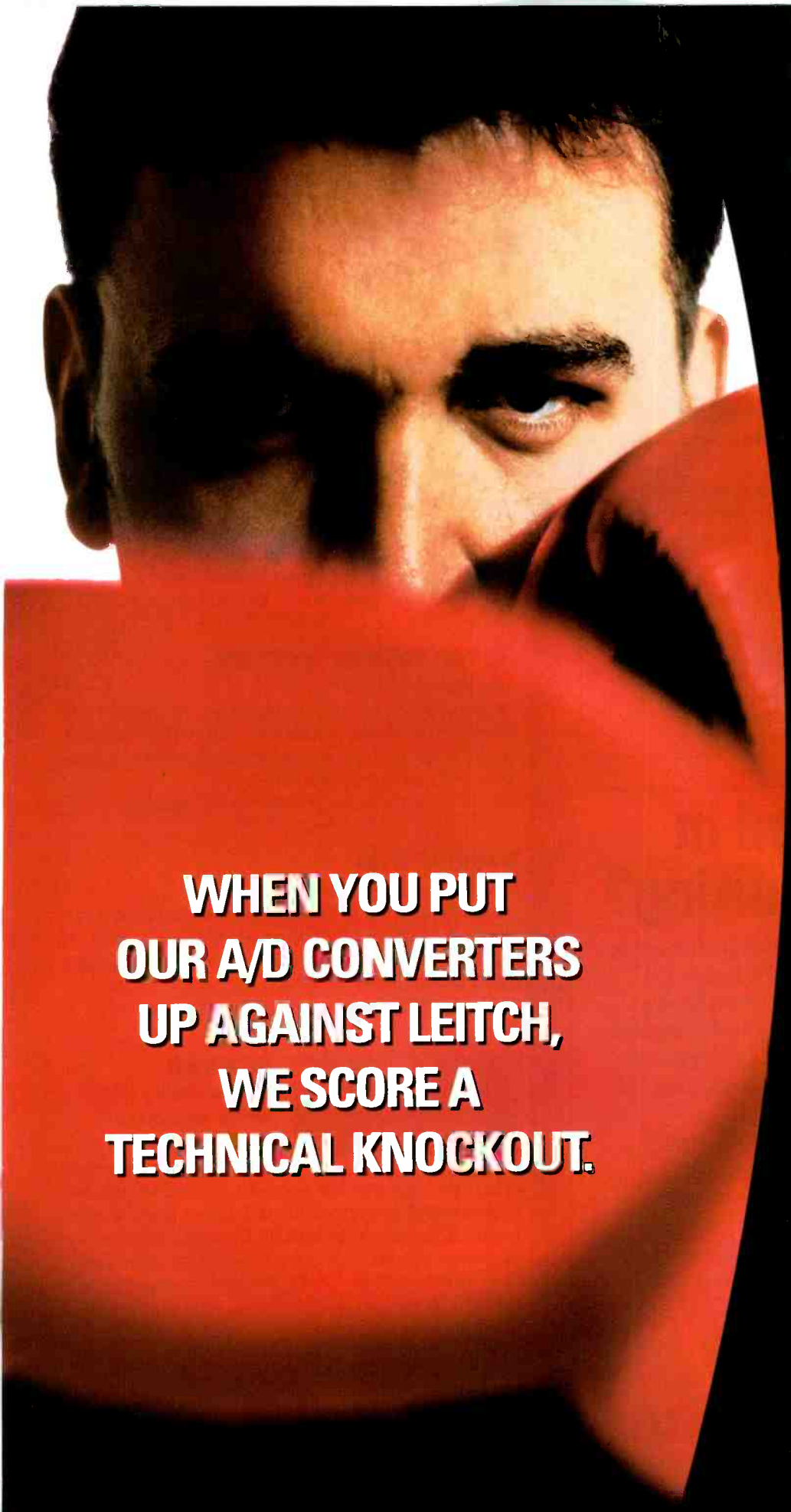
201-930-1000; fax: 201-930-4752; www.sony.com/professional
Booth: L18207, L515

SERVER

SGI (Silicon Graphics) Media Server:

Facilitates simultaneous ingest, data network-based file transfers to the server; features a versatile solution for centralcasting; server can interface with browsing and asset management systems – streamlining the process of repurposing content for the Web.

800-800-7441; www.sgi.com
Booth: S5418



WHEN YOU PUT OUR A/D CONVERTERS UP AGAINST LEITCH, WE SCORE A TECHNICAL KNOCKOUT.

It's no contest. The patented comb-filter technology in our Integrity 400 Series produces a cleaner, more accurate output with unmatched noise immunity. In fact, an independent PQA 200 test ranks the FS-412 above the DPS 575 and other leading products. Fortel DTV converters are more integrated to save valuable rack space. And they offer incredible ease of use and affordability. Come by Booth #21306 at NAB for a side-by-side comparison, or call 1-800-530-5542 for a demo. You'll be knocked out by our quality and value.

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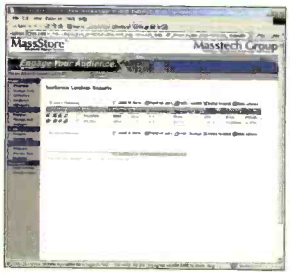
www.forteldtv.com

DTV marketplace



STORAGE SYSTEM

Masstech Group MassStore:

An end-to-end advanced near-line, archive and asset management hardware and system software; provides 1000 to 100,000+ hours of nonlinear audio/video storage; supports long-form and short-form programming.

905-886-1833; fax: 905-886-2155; www.masstechgroup.com.
Booth: L20069

MEDIA STORAGE

Ciprico DiMeda 2400:

NAS performance levels exceeding 75 Mbits/s aggregate bandwidth is delivered through a single node; features fault-tolerant dual-node architecture.

763-551-4000; fax: 763-551-4002; www.ciprico.com
Booth: S5733

NETWORKING SYSTEM

Avid Unity MediaNet:

Networking system offers support for the Avid|DS HD system; increases the number of editors that can work on the same project in real time; decreases file duplications and bandwidth limitations.

978-640-6789; fax: 978-640-1366; www.avid.com
Booth: L13200

STUDIO VTR

Panasonic AJ-HD 1600 VTR:

Records for up to 124 minutes on a single cassette; can play back all DV-based cassettes; offers eight 16-bit PCM audio channels to accommodate 5.1 surround sound plus stereo sound mixes.

800-528-8601; www.panasonic.com/broadcast
Booth: L7214

SERVER

Omneon Video Networks Networked Content Server:

Maximizes transport of video over high-speed IP networks; channel density has been leveraged through additional interface ports; uses the Extended File System and multiple Directors (servers); configurations provide fault tolerant systems for redundancy.

408-585-5000; fax: 408-585-5099; www.omneon.com
Booth: S20402

Keep your cool with MT Production (MTP), the new compact digital console dedicated to large-scale multitrack mixing for television and music.

Designed to meet the needs of the world's leading production facilities, MTP incorporates powerful DSP processing, to allow instant response to any changes the production demands.

Beneath the proven and familiar control surface, a host of production features provide secure, relaxed operation, even under demanding operational conditions.

- Massive I/O capability - 192 inputs to mix within a small footprint, 48 fader frame
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- Instant recall of all channel parameters and signal routing streamlines operation and allows fast turn-around
- Unrivalled SSL quality, support and service

MTP - the perfect solution to the challenges of television and music production.

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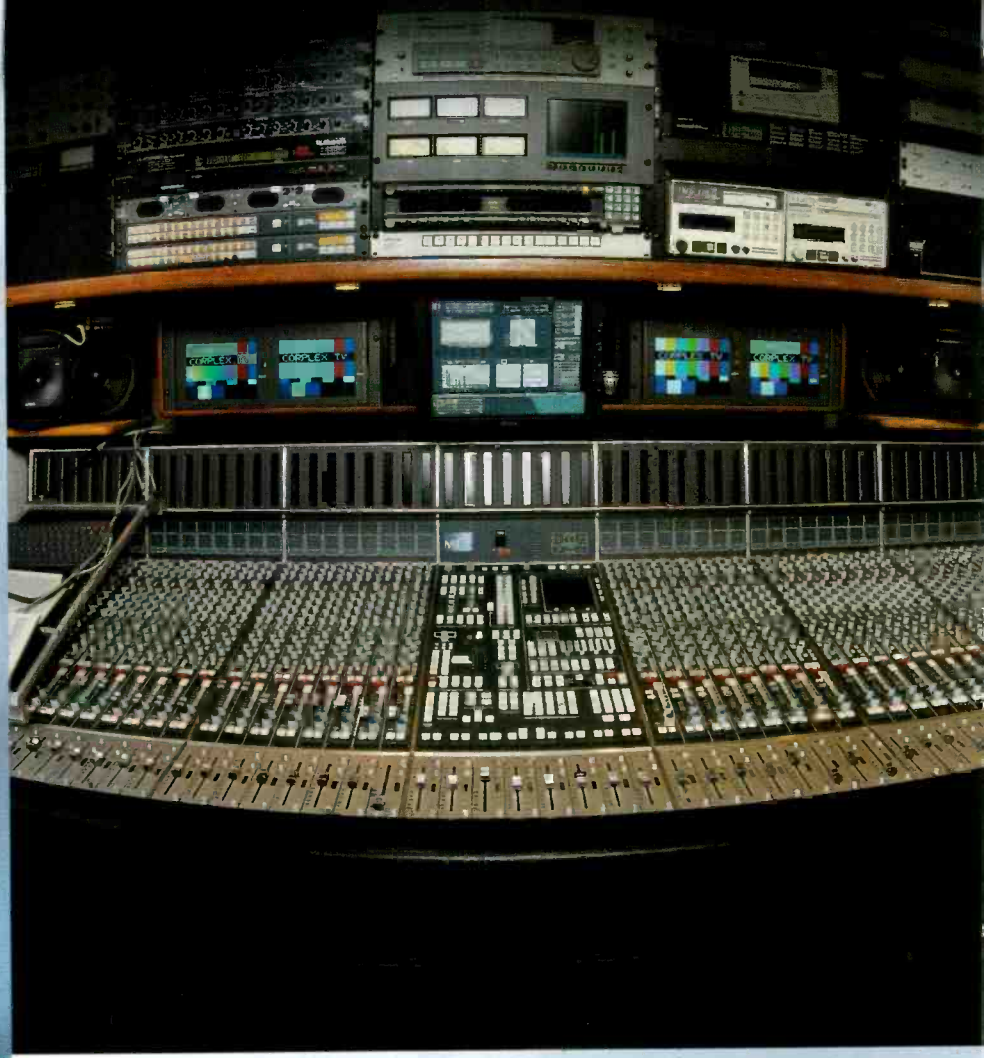

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"The latest addition to our fleet is 'Sterling', a state-of-the-art, 53-foot Expando truck featuring the space-efficient mobile configuration of MT Production. As we consistently use the same freelance engineers, the ability to save and recall their mixes is imperative. When we cover a series of similar events, the automation can save a complete board snapshot that can be recalled in an instant. Future events become a breeze. This saves hours of preparation time and improves the quality of the mix. MTP Mobile provides the seamless integration of the best digital console technology with a sound that simply cannot be matched."

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CORPLEX.TV, NORTHFIELD, ILLINOIS

MT+ Production

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DTV marketplace

MEDIACLUSTER

SeaChange International BMC 16XX series:

Contains 16 drives per cluster node to scale to more than 8200 hours of online storage with up to 56 inputs and outputs; ensures 100 percent fault-resilience from a single media file.

978-897-0100; fax: 978-897-0132; www.schange.com
Booth: L19564

VIDEO SERVER

SeaChange International Broadcast MediaServers:

Stand-alone video servers use RAID5 storage to scale to 490 hours of storage; handle 4:2:2/4:2:0 MPEG-2 and MPEG-1 media files.

978-897-0100; fax: 978-897-0132; www.schange.com
Booth: L19564

MAGNETIC MEDIA PRODUCTS

Maxell Professional Media Magnet:

Media family includes digital products such as Digital Betacam, Betacam SP, Betacam SX, DVCPRO, HD CAM, D-5, D-2 and D-3.

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Studio, facility support, systems integration

TECHNICAL SUPPORT

Sony Electronics e-Services:

Offers customers integrated audio-visual and information technology consulting with comprehensive on-site and online service and support, remote equipment monitoring and training.

201-930-1000; fax: 201-930-4752; www.sony.com/professional
Booth: L18207, L515

WALL MOUNT

Chief Manufacturing 2000 series:

Series includes pitch-adjustable wall mount, static mount-portrait/landscape and static wall mount; low-profile flat-panel display mounts with Q-Latch.

952-894-6280; fax: 952-894-6918; www.chiefmfg.com
Booth: L15242

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AZCAR systems integration services:

Experienced in design and construction of production facilities, program origination centers and SD and HD mobile units, as well as broadcast stations; Distributed Broadcasting solution reduces capital and operating costs for centralization.

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Booth: L18372

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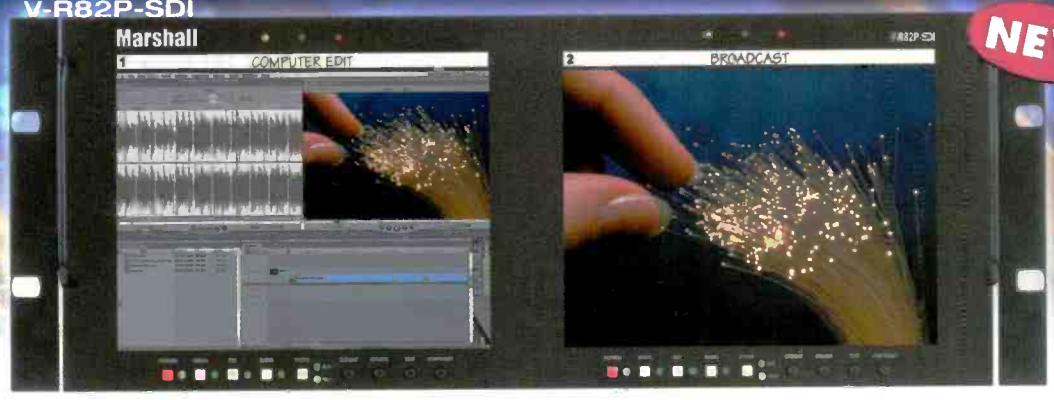

NEW

All our Rackmount LCD's have a low profile, low heat dissipation and the ability to tilt up or down 90 degrees while mounted in the rack. Portable and lightweight, these units are perfect for any mobile or remote monitoring application.

One word...unique. Dual 8.4" Rack Mounted Full Color Active Matrix LCD Panel with Composite Video, SDI and Scalable VGA inputs.

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- Ultra bright 350 candle luminance
- Switchable between 4:3 and 16:9 ratios
- Allows 90 degrees of tilt while mounted in rack
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- Built-in scaler accepts following resolutions 640x480, 800x600, 1024x768, 1152x864 and 1280x1024
- Low power consumption and heat dissipation for mobile applications
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- Unit weighs approximately 6 lbs.

V-R25P

Ten hi-res 2.5" LCD monitors in 3U rack space

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Four 4" LCD monitors in a 2U rack space!

V-R53P

Each monitor has 2 composite and 1 VGA input

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Each monitor has SDI with built-in 10bit D/A convertor plus S-Video and composite inputs plus ratio switch

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Masterclock TC0100:

Generates 30 fps SMPTE and 25 fps EBU time codes; internal precision crystal oscillator provides accuracy of +/-1 minute per year; all functions can be controlled via RS-232.

800-940-2248; fax: 636-724-3776; www.masterclock.com
Booth: L21700

AUDIO MONITOR

Wohler Technologies VAMP-1:

Composite video and two channel analog audio monitor offers the ability to monitor both audio and video from a single analog source; contained in a 2U unit; monitors video in either NTSC or PAL.

650-589-5676; fax: 650-589-1355; www.wohler.com
Booth L11257

MONITORING SOFTWARE

Thomson/Grass Valley Group Netcentral:

Software monitors the health of SNMP-compliant devices; warns users via e-mail pager, phone or GUI.

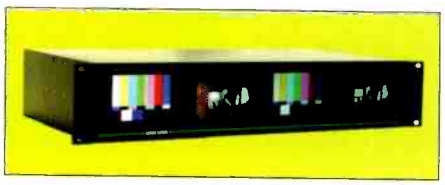
530-478-3000; fax: 530-478-3755; www.grassvalleygroup.com
Booth: L19524

ROTARY PHASE CONVERTER

Kay Industries Phasemaster MA:

General-purpose rotary phase converter provides true three-phase power at its output terminals with each phase shifted 120°; features automatic controls for remote monitoring, surge protectors, transformers and outdoor enclosures for weather protection.

219-236-6220; fax: 219-289-5932; www.kayindustries.com
Booth: L3001



VIDEO MONITOR SYSTEM

Ward-Beck Systems VMS4:

Low-cost system provides four-color LCD video screens in two rack units of space; available with analog inputs or serial digital inputs.

866-771-2556; fax: 503-222-9651; www.ward-beck.com
Booth: L2815

STATUS MONITORING AND CONFIGURATION TOOL

Thomson Multimedia Broadlinx:

Designed for Media Networking and Control broadcast products; provides secure monitoring through any Web browser connected to the Internet or a facility's intranet; provides the means for multiple users; standard on all Trinix routing switchers.

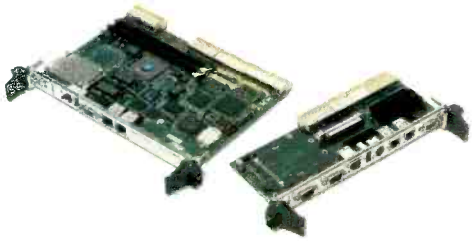
818-729-7700; fax: 818-729-7710; www.thomsonbroadcast.com
Booth: L19524

SIGNAL MONITORING SYSTEM

Videoframe VTECS:

Event logging stores signal problems in a database of log messages; flexible configuration allows each customer to decide which parameters to monitor; offers high-speed data connection via Ethernet; features video, audio and GPI signal interfaces.

530-477-2000; www.videoframesystems.com
Booth: L20377



SINGLE-BOARD COMPUTERS

I-Bus/Phoenix IBC 2800 series:

Includes the IBC 2801 CompactPCI system master and the IBC 2802 CompactPCI peripheral master; delivers symmetric multi-processing performance with dual low voltage Pentium III processors; fully CPSB PICMG 2.16 compatible to support Ethernet switched fabric backplane architectures.

858-503-3000; fax: 858-503-3005; www.ibus.com
Booth: L17109

VIDEO CAPTURE CARD

AJA Video KONA:

Kona-SD is a 10-bit uncompressed SDI video capture and output card with QuickTime compatibility; the Kona-HD is a high-definition video capture and output card; both capture and output video with one channel I/O; features a robust audio system with AES inputs for six channel asynchronous audio at 32 to 96 kHz.

530-274-2048; fax: 530-274-9442; www.aja.com
Booth: L12257

SERIAL D1 TO RGB MODULE CONVERTER CARD

Faraday Technology SDI-002:

Interface card accepts D1 serial digits and provides all the necessary filtered analog signals required for eight-bit monitoring on a PCB mounting module; separate mixed syncs; auto 625/525 operation; reclocked SD outputs available.

+44 1782 661501; fax: +44 1782 630101; www.faradaytech.co.uk
Booth: L19675

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* when compared to selected conventional full power systems. See your Andrew Broadcast Specialist for details.

** ships in 2-4 weeks

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Andrew Broadcast and ESA Systems
1-800-DIAL-4RF · www.andrew.com

DIGITAL CONSOLE

Logitek Electronic Systems Numix Selector Wedge:

Advanced control system for the company's Audio Engine, a digital mixer/router, used for control, tailback and source selection; features a large LCD panel with full color graphics, improved intercom functions and programmable buttons for executing custom commands.

713-664-4470; fax: 713-664-4479; www.logitekaudio.com

Booth: L2937

PRODUCTION AFTERBURNER

Evertz HD9155:

Designed to facilitate the creation of offline videotapes from field-acquired HD masters; downconverts the HD input video to SDI and analog standard-definition video; can be easily configured using 9150 Configware software utility supplied with the unit.

905-335-3700; fax: 905-335-3573; www.evertz.com

Booth: L11443

EDITING CONSOLES

Forecast Consoles ImageMaster series:

Pre-engineered line of consoles can be used in linear, nonlinear, multimedia and graphics applications.

631-253-9000; fax: 631-253-0277

www.forecast-consoles.com

Booth: L12265

MASTER DISPLAY MODULE

Eyeheight MD-2:

Accepts data from any module in the system and uses icons burnt into the SDI picture to warn an operator of a potential problem; can handle up to 50 discrete channels and is configurable to individual customer requirements.

+44 1923 256 000; fax: +44 1923 256 100; www.eyeheight.com

Booth: L18263

UNDER-MONITOR DISPLAY

Image Video RDU-1519:

Seventeen-inch display with four channels of audio metering; 0.9" deep; available with 19" rack mounting hardware or a variety of hinged mounting adapters for mounting in front of monitor controls; single and dual display available; analog video VU bargraph meter features 17 segments of resolution; adjustable 0 dB reference point.

416-750-8872; fax: 416-750-8015; www.imagevideo.com

Booth: L4927

HIGH-CAPACITY TAPE STORAGE CABINET

Winsted Model T2802:

Moves laterally on ADA-recognized anti-tip racks with a patent anti-tip bracket; five-cabinet system holds up to 2940 ¾-inch Umatic or 3500 large Betacam tapes in their cases; the individual shelves are adjustable on 1-1/2-inch increments.

952-944-9050; fax: 952-944-1546; www.winsted.com

Booth: L19520

SDI MONITORING CARD

Evertz Quattro 7765AVM-4:

Increases signal monitoring capacity and confidence by analyzing and displaying video, audio and data status information and fault condition alerts for four video inputs simultaneously in a 2x2-matrix format; up to seven Quattro processors in one 3RU frame.

905-335-3700; fax: 905-335-3573; www.evertz.com

Booth: L11443

V-CHIP ENCODER

Broadcast Video Systems VC-1:

Enables broadcasters to insert program content data without a full captioning system; inserts data into line 21 of a composite NTSC video source; control via desktop or rack-mounted remote panel, or through RS-232/RS-422.

905-764-1584; fax: 905-764-7438; www.bvs.com

Booth: L20007

SYSTEMS INTEGRATION SERVICES

A.F. Associates consultation services:

Firm engineers and builds advanced systems for centralcasting, video-over-IP, asset management and storage area networks, including a scalable solution for multichannel broadcasting.

201-767-1200; fax: 201-784-8637; www.afassoc.com

Booth: L9116

BROADCAST SYSTEMS

BBC Technology Broadcast Solutions:

Division offers communication, consultancy and broadcast engineering experience; New Media Solutions division provides consultation services for operators and content producers of new platforms.

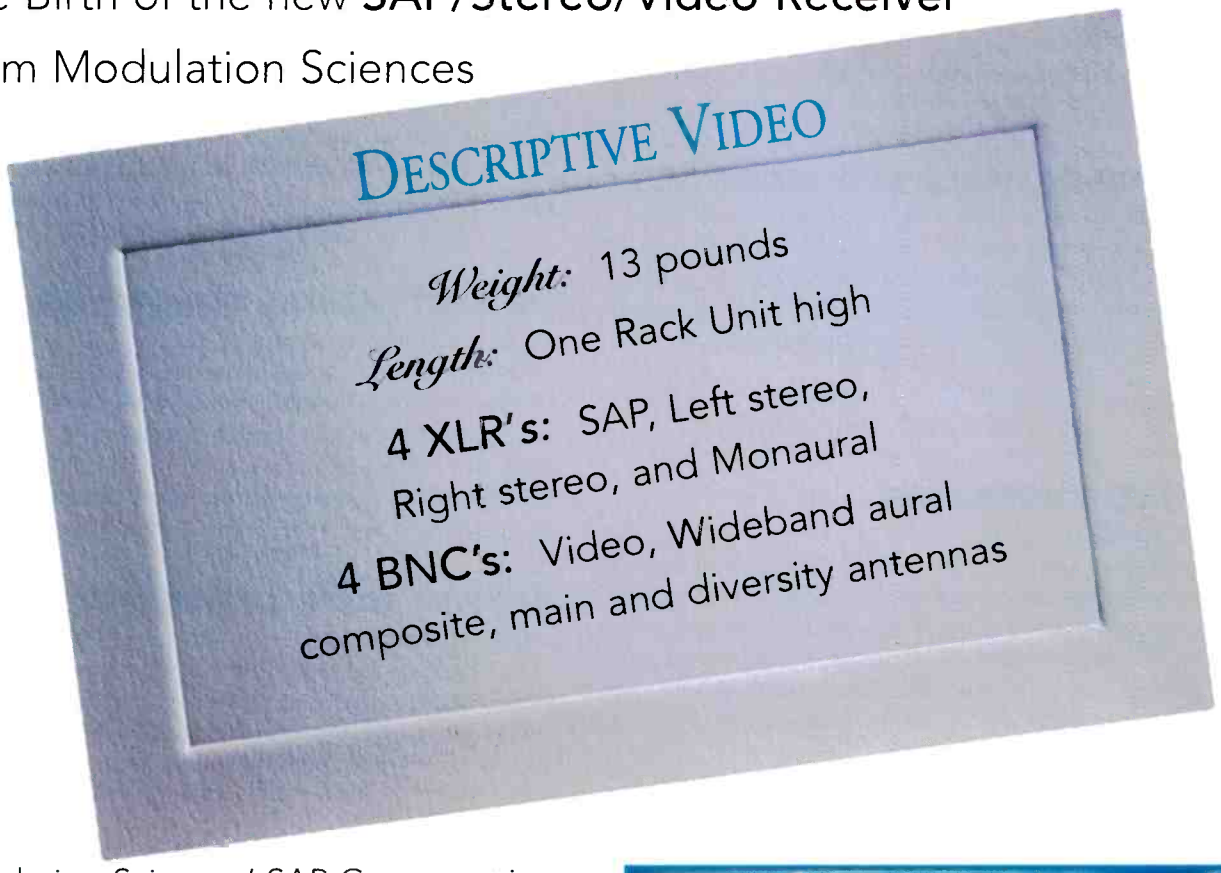
+44 208 6249468; www.bbctechnology.com

Booth: S3952

DESCRIPTIVE VIDEO

Announcing

the Birth of the new **SAP/Stereo/Video Receiver**
from Modulation Sciences



Modulation Sciences' SAP Generator is proud to announce the birth of a son, the **msi 189 SAP/Stereo/Video Receiver**.

All outputs are available ***simultaneously*** and all are balanced line level.

This is an exciting time for the Modulation Sciences SAP family of products as they will be called to duty when the FCC implements *Descriptive Video* for the sight impaired in early 2002.

Are you SAP ready?

Please contact Modulation Sciences for more information on their SAP family of products.

msi modulation sciences inc.

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Toll Free: (800) 826-2603
Voice: (732) 302-3090
Fax: (732) 302-0206
E-mail: sales@modsci.com
www.modsci.com

LCD MONITOR

Marshall Electronics V-R82P-SDI:

Rack-mountable LCD monitor features two 8.4-inch active matrix LCD panels; panel contains composite video, SDI and XGA inputs and a three-color tally system; panels have an integral scaler that accepts several resolutions.

310-336-0606; fax: 310-333-0688; www.mars-cam.com

Booth: S3669

HD/SD-CAPABLE LCD MONITORS

Panasonic BT-LH1800 and BT-LH1500:

Wide-viewing monitors feature LCD display technology; are NTSC/PAL selectable and standard inputs are composite BNC and S-video; three optional input boards are available.

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

Booth: L7214

TBCs, frame syncs

SYNC GENERATOR

DK Audio PT 5201:

Compact VariTime sync generator includes all basic features for sync, timing and test signals in one half-rack sized box; configuration is based on a Windows interface making it easy to manage all the timing, test signals and audio features on one screen; modification from factory preset can be saved as a file on a PC hard disk or uploaded to the PT5201 as a setup.

+45 4453 0255; fax: +45 4485 0250; www.dk-audio.com

Booth: L21827

STANDARD CONVERTER

Snell & Wilcox Alchemist Platinum:

Upgrade features high-definition (2 x HD-SDI) and standard-definition (2 x SDI) outputs; includes a 12-bit 4:4:4 internal processor; has a signal-to-noise ratio less than 72 dB; features a proprietary 46-point interpolation, a CleanCut interpolation, and Genlock, 2 x SDI references.

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

Booth: L9837

SIGNAL GENERATOR

HORITA BSG-50:

Multiple-output blackburst, sync pulse and audio tone generator; six user-configurable BNC video/pulse outputs; sync signals may be set individually as composite sync, composite blanking, H drive or V drive; also features a separate buffer for each output.

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

Booth: L11961

AV SYNCHRONIZER

Fortel DTV FS-414A:

Provides superior analog decoding and digital synchronizing technology; modular design for compact installation, with remote control via Ethernet and is NTSC and PAL switchable; has audio embedding, including video legalizer and color corrector.

770-806-0234; fax: 770-806-0244; www.fortelDTV.com

Booth: L21306

FRAME RATE CONVERTER

Panasonic AJ-FRC27:

Converts variable frame rate progressive scan footage captured by Panasonic's AJ-HDC72 HD Cinema camera; is equipped with both HD-SDI and analog composite outputs; features a front-panel VTR-type control panel.

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

Booth: L7214

HD TEST SIGNAL GENERATOR

Ensemble Designs Avenue 7405:

Provides four HD serial digital outputs and genlocks to tri-level sync or composite video; offers a wide variety of test signals that are user selectable; supports 1080i, 1080p, 720p and 1080sf; modules can be updated with current software as new formats and test signals are added.

530-478-1830; fax: 530-478-1832; www.endes.com

Booth: L18351

ASPECT RATIO CONVERTER

Leitch ARC-6001:

Dual standard (525/626) serial digital 270 Mbits/s aspect ratio converter supported in the Genesis platform; allows conversion from ratios such as 4:3, 14:9, 16:9, and 21:9 to 4:3, 14:9, 16:9, and 21:9 and will perform picture aspect ratio conversion on a video signal under GPI control or automatically.

800-231-9673; fax: 757-548-0019; www.leitch.com

Booth: L19511

SINGLE-MODULE APPLICATIONS

Leitch NEO Prism:

Provides synchronization, processing, and multiplexing and demultiplexing of both video and audio signals on a single module; includes composite video encoder synchronizers, video decoder synchronizer products, audio/video routing and distribution for signal transfer, and Diamond Audio compression.

800-231-9673; fax: 757-548-0019; www.leitch.com

Booth: L19511

UNIVERSAL SYNCHRONIZER

Pixel Instruments VS5200:

Features a 10-bit frame synchronizer; includes a built-in TBC with auto mode select; transcodes from any selected input to all outputs simultaneously; has a wide range output timing and digital proc amp.

408-871-1975; fax: 408-871-1976; www.pixelinstruments.com

Booth: L20744

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TBC/VIDEO SYNCHRONIZER

Prime Image Model Digital 50 III:

Includes full proc amp control on all inputs; features freeze control for either field or a frame, and full-time or selectable composite color bar generator.

408-867-6519; fax: 408-926-7294 www.primeimageinc.com
Booth: L12253

TIME CODE GENERATOR

Adrienne Electronics AEC-BOX-8:

LTC generator with video sync input; generates DF/NDF play speed LTC locked to the video input (if present).

702-896-1858; fax: 702-896-3034; www.adrielec.com
Booth: L5950

CONVERSION EQUIPMENT

Axon Digital Design Synapse:

Allows for embedding and de-embedding in frame synchronizers, video A/D and D/A converters; features a minimum of four relocked outputs, the ability to swap channels in embedded audio and a jitter-trap in its cards with SDI I/O.

+31 13 511 6666; fax: +31 13 511 4151; www.axon.tv
Booth: L19277

MODULAR CONVERTER

Cobalt Digital Model 4035:

4:2:2 serial digital input to analog component, composite, S-video and two SDI outputs; features auto NTSC/PAL detection and configuration, external configuration switches and a built-in color bar generator.

217-344-1243; fax: 217-344-1245; www.cobaltdigital.com
Booth: L12070

DECODER

Ross Video ADC-8032A:

NTSC/PAL to 4:2:2 decoder employs Faroudja decoding technology and advanced signal processing; handles all types of signals, including satellite and microwave feeds; features five-line adaptive comb filter.

613-652-4886; fax: 613-652-4425; www.rossvideo.com
Booth: L11429

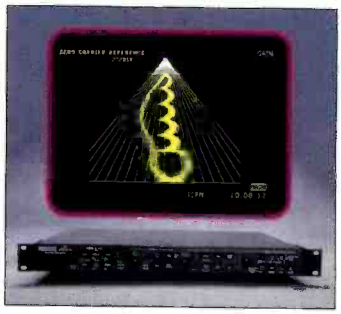
Test and measurement

OPTICAL NETWORK TESTER

Acterna Optical Network Management System (ONMS):

Offers operators significant commercial advantage through increased productivity, reduced network down time and easier, faster network provisioning; monitors the physical and optical layers of the fiber network from a single, stand-alone Remote Test Unit; Web-enabled.

301-353-1550; fax: 301-353-9080; www.acterna.com
Booth: S8863



AUTOMATED VIDEO MONITOR

Magni Systems AVM-510A:

Waveform monitor and vectorscope with four-channel audio level mastering and automated measurement screens; includes Incidental Carrier Phase Modulation, Differential Gain and Differential Phase monitoring features.

503-615-1900; fax: 503-615-1999; www.magnisystems.com
Booth: L10853

COLOR BAR GENERATOR

ESE ES-229:

Allows for aligning monitors, tape leader or for checking the signal fidelity of a color system; generates RS-170A full-field bars or black burst via a BNC composite output and one S-video output; front panel dip switches allow selection of auto-black, color bars/black, interlace/progressive, NTSC pedestal on/off, Chroma on/off and PAL mode.

310-322-2136; fax: 310-322-8127; www.ese-web.com
Booth: L5327

MONITORING SOLUTION

Pixelmetrix DVStation-Q:

Features four hot-swappable port version of DVStation for remote applications; compact, rack-mountable device is only 2RU high; includes two hot-swappable redundant power supplies.

954-472-5445; fax: 954-472-6989; www.pixelmetrix.com
Booth: L10643

DIGI SCOPE

Hamlet Video Digi Scope:

Provides the same high level of functionality and ease of integration but without the integral screen, displaying on any external monitor (SDI, component YUV or RGB, composite or SVGA) wherever the measurement display is required.

+44 1494 793 763; fax: +44 1494 791 283; www.hamlet.co.uk
Booth: L12500

The Omneon Networked Content Server System

Infrastructure For Digital Media – More Advanced at Lowest Cost

More Scalable: 2 Gbits/sec Fibre Channel storage supports up to 96 real-time channels for content acquisition and play-to-air

More Bandwidth: Multiple Gigabit Ethernet ports provide unprecedented bandwidth to support archival, editing and media access over IP networks

More Applications: Omneon is supported by the major broadcast applications providers – giving you best-in-class solutions for your specific needs

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OMNEON VIDEONETWORKS

www.Omneon.com • 1.408.585.5158 in US • 1.44.1256.884450 in Europe, Africa, & Middle East

HANDHELD MPEG TESTER

Tektronix AD920:

Battery-powered unit identifies faults and reduces downtime; ensures reliability in networks that distribute video, audio and data in digital formats; designed for broadcast installation, maintenance and field service.

800-835-9433; www.tektronix.com
Booth: L8411

MPEG RECORDER/PLAYER

Tektronix MTX100:

Captures and plays out MPEG-2 data streams at the high data rates needed to verify and troubleshoot designs for high-performance consumer and professional video products and systems.

800-835-9433; www.tektronix.com
Booth: L8411

HD ON-SCREEN MONITOR

Videotek VTM-420HD/SD:

Monitors and measures picture, waveform, vector and audio on a single high-resolution XGA monitor; adds 601 processing to the existing inputs, Ethernet connectivity, closed-caption monitoring, auto-detect of HD or SDI, and expandability of up to 24 inputs.

610-327-2292; fax: 610-327-9295; www.videotek.com
Booth: L10631

MULTIFORMAT ON-SCREEN MONITOR

Videotek VTM-150:

Offers a VGA monitor output for the simultaneous viewing of all the information needed for sophisticated monitoring and measuring of waveform, vector, audio and other information superimposed over black or picture.

610-327-2292; fax: 610-327-9295; www.videotek.com
Booth: L10631

TERRESTRIAL MONITORING SYSTEM

Sencore TMS1780:

Offers both 8-VSB RF and MPEG-2 transport stream monitoring and video/audio decoding in one package; inputs allow users to analyze both the input to the DTV transmitter and the RF output.

605-339-0100; www.sencore.com
Booth: L20035

SDI MONITOR

Leader Instruments LV 5700:

Rasterizer; XGA TFT color LCD tilt panel; total digital processing; 20 HD+SD-SDI 525/625; Ethernet; digital audio de-embedded displays surround; bargraphs; hex readout all data; AC/DC operation standard; optional auto-HD eye.

800-645-5104; fax: 714-527-7490; www.leaderusa.com
Booth: L6145

TRANSPORT STREAMER

Sencore TS1692:

Offers up to four inputs and four outputs; user can specify ASI, SMPTE 310M, DVB-Parallel, DHEI or any two combinations; allows up to 200 Mbits/s to or from the storage hard drive; plays transport streams continuously.

605-339-0100; www.sencore.com
Booth: L20035

TV transmitters, antennas, RF products

SAP/STEREO/VIDEO RECEIVER

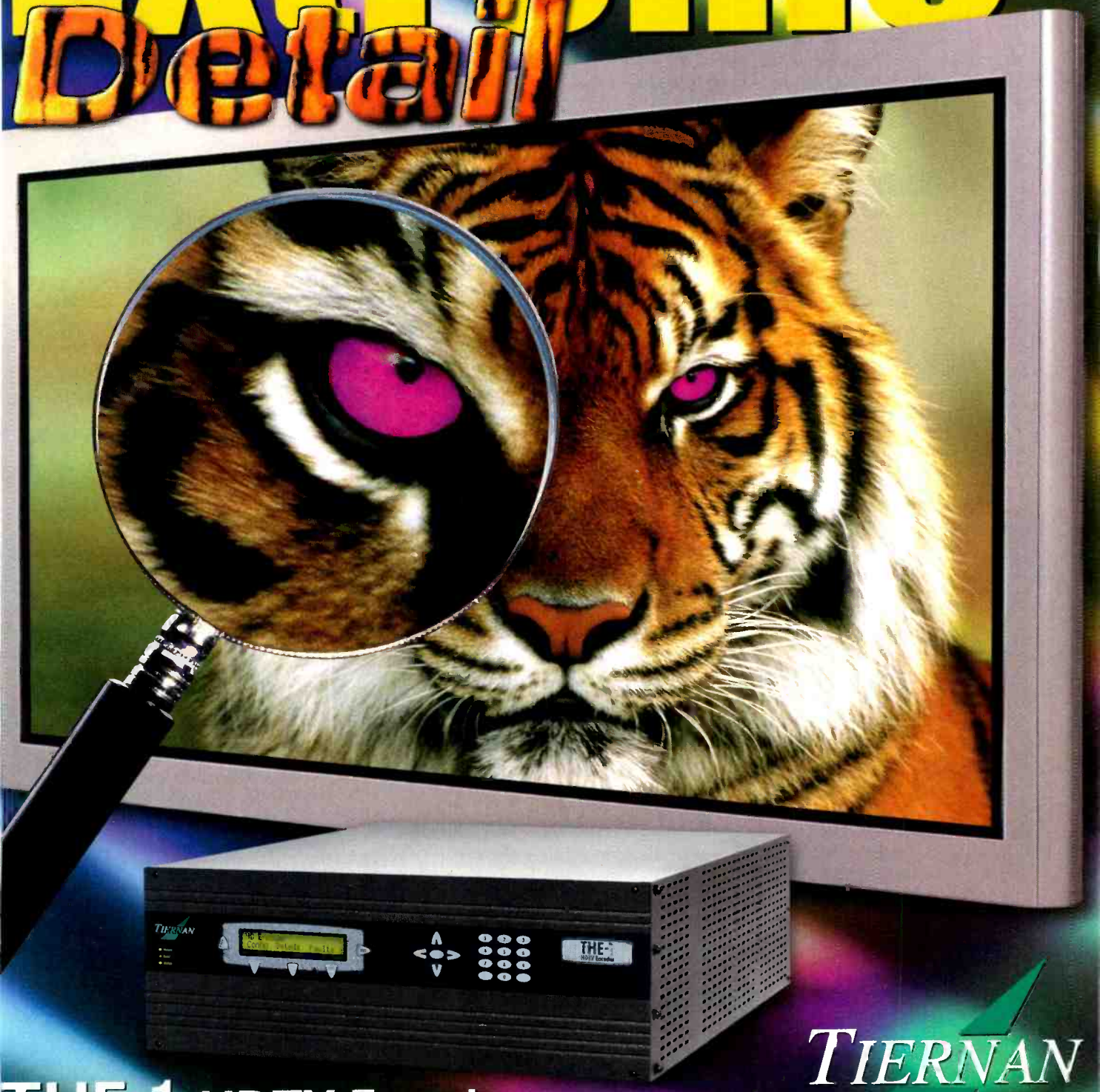
Modulation Sciences msi 189:

Provides simultaneous all-mode reception for SAP, stereo and monaural audio via balanced, line-level KLR connectors; features a stable synthesized tuner; uses dual antennas inputs; operating channel is selected by jumpers inside the receiver.

800-826-2603; fax: 732-302-2060; www.modsci.com
Booth: L5210

THE-1 for

Extreme Detail



TIERNAN

THE-1 HDTV Encoder

- Professional ATSC/MPEG-2 Modular Media Delivery Platform
- 4:2:0 and Studio Quality 4:2:2 Video Processing
- Transport Stream Rates Exceeding 100 Mbps for Demanding Applications

www.tiernan.com

Tiernan USA	858-587-0252
Tiernan UK	44-1420-544-200
Singapore	65-325-1951
Latin America	561-988-1210
East Coast USA	631-979-4950

www.radynecomstream.com

DIGITAL ENCODER

Motorola, Broadband Communications Sector SE-1000:

Compact MPEG-2 encoder with front panel controls; ATSC and DVB compliant; designed to optimize for low-bit-rate applications.

215-323-1880; fax: 215-323-0245; www.motorola.com/broadband

Booth: S5412

RF SYSTEMS

Teracom Components RF systems:

RF systems for TV and DTV; complete range of components, including filters, combiners, antennas, connectors, rigid line and engineering software.

207-627-7474; fax: 207-627-7473; www.teracom-c.com

Booth: L1515

HDTV ENCODER

Radyne ComStream/Tiernan THE-1:

Supports both broadcast and distribution applications; provides compliant ATSC or MPEG-2 transport streams as well as stand-alone PSIP support with programmable parameters; when operating under the MPEG-2 profile transport stream, data rates of up to 108 Mbits/s are available.

602-437-9620; 602-437-4811; www.radynecomstream.com

Booth: S8020

CONSTANT EFFICIENCY AMPLIFIER

Northrop Grumman Electron Devices L-4200 series:

Next generation of high-power broadcast tubes for the UHF television industry; operates at peak powers up to 130 kW; offers a 50 percent improvement in efficiency compared with a standard IOT when operated in digital service.

570-326-3561; fax: 570-326-2903; www.littonedd.com

Booth: L6256

CONNECTORS

Andrew RingFlare:

Connectors now available for LDF5-50B, 7/8" HELIAX coaxial cable; fewer parts than standard connectors to simplify attachment; connectors feature unique expandable spring clamping ring, which automatically flares the cable's outer conductor as the connector is tightened.

708-349-3300; fax: 708-873-8574; www.andrew.com

Booth: L9111, S8433

BROADBAND ANTENNA

Radio Frequency Systems Broadband Omnislot UHF Antenna:

Covers up to 120 MHz and powers up to 120 kW TPO; ideal for stacked arrangements; extends the capability of stacked broadband solutions when mounted on top of a broadband UHF panel array.

203-630-3311; fax: 203-239-9260; www.rfsworld.com

Booth: L9337

UHF ATSC TRANSMITTERS

Harris Ranger series:

Specifically developed with medium- and small-market broadcasters in mind; available in 460W or 900W power output ratings; offer functionality not previously available in a low-power transmitters; can be outfitted with Harris' CD-Eye 8-VSB monitoring software and real-time adaptive correction.

513-459-3400; fax: 513-701-5323; www.harris.com

Booth: L5414

TV TRANSMITTER

EMCEE Broadcast Products TTU1000CQ:

1000W UHF, portable, worldwide agile TV transmitter with instantaneous front panel tuning and multiple frequency conversion; color standards NTSC, PAL, SECAM; transmission systems M/N, B/G, D/K, K1, I; fully broadband from 470 through 806 MHz; LDMOS circuitry; frequency agile synthesizer.

570-443-9575; fax: 570-443-9257; www.emceebrd.com

Booth: L6522

INDUCTIVE OUTPUT TUBES

Eimac K2D150W and K2100W:

IOT has a peak power output of 150 kW with 37 kW average power for DTV service; provides 100 kW peak-of-sync output (visual only) or common mode output of 84 kW peak-of-sync visual combined with 8.4 kW aural.

650-594-4004; fax: 650-952-9988; www.eimac.com

Booth: L6517

DUALBAND ANTENNA

Dielectric Communications TUV-M and TUV-L:

New additions for the low- and mid-band (Channels 2-6) VHF broadcaster who has a UHF DTV channel with limited tower capacity or aperture; super-turnstile antenna for VHF service.

207-655-8152; fax: 207-655-7120; www.dielectric.com

Booth: L2915, L8442

VHF TRANSMITTER

Rohde & Schwarz NM 7010:

1 kW VHF transmitter: medium-power transmitters in the range of 500W to 2 kW; features a digital exciter, a MOSFET amplifier, power supply and air cooling; includes a channel and harmonic filter.

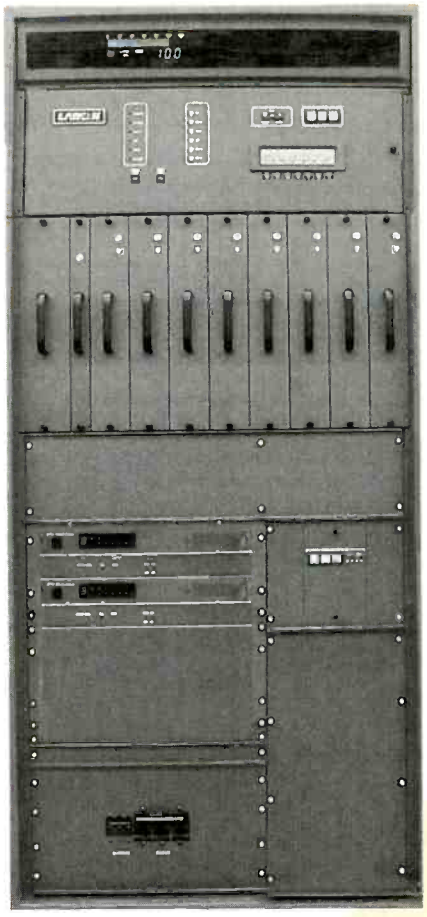
410-910-7832; fax: 410-910-7801; www.rhodeschwarz.com

Booth: L5510

NEW

MAGNUM

A Smart Digital Choice
Solid-State UHF Transmitter



MAGNUM *2.5kW Transmitter*
34" W x 44" D x 72" H

Scalable

- Scalable from 2.5 kW to 5 kW, 10 kW and 20 kW.

Hi-Performance

- Features LARCAN's new 2XW PA circuitry (2X the power output density), with LDMOS technology.
- Redundant amplifiers and power supplies.
- Broadband stripline combiners; a reliable and maintenance free technology.

Flexible and Reliable

- "Hot-pluggable" Broadband RF modules can be used on any UHF channel. Absolutely no tuning required.
- Built-in capability for remote monitoring and control.
- Air cooling distribution system; integrated with the more cost-effective "Pull-Thru" method.
- Small footprint; only 44" deep (10kW system is 92" wide).

Serviceable

- "Hot-pluggable" PA modules. Ensures easy accessibility and field repair.
- Simplified monitoring that quickly and accurately locates out-of-tolerance conditions.
- Built-in diagnostics.
- Perform daytime maintenance without removing the transmitter from on-air service.

Smart Digital Solutions 1 Watt to 100 kW

1 **MX Series, VHF and UHF**

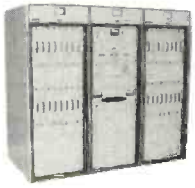
- Frequency Agile, Digital Compatible.

2 **DTV-Lite™ Solid-State UHF/VHF**

- Jump-start solutions for your DTV transition.

3 **Hi-Power MD Series, Solid-State VHF**

- Built on our industry leading M Series platform.
- Existing analog systems can be easily converted to digital on-site.



LANDMARK

4 **Hi-Power IOT Transmitters**

- LDMOS high-gain, broadband drivers.
- Diagnostics with fiber optic interconnects.
- Soft Start
- Redundant control system.

At NAB Booth L9122

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www.larcan.com

SLOT ANTENNA

Jampro Antennas/RF Systems JTW:

High-power traveling wave UHF slot antenna for DTV applications; horizontal, elliptical or circular polarization; top- or side-mounted; standard and custom directional patterns; beam tilt and null fill available; smooth elevation pattern.

916-383-1177; fax: 916-383-1182; www.jampro.com
Booth: L6127

POWER MONITOR

Bird Electronic BPM series:

Series comprises true average-responding sensors that attach to a multifunction power meter or directly to a PC via an RS-232 cable; true average responses with a minimum of 10 dB operating headroom for stable and accurate power indications.

440-248-1200; fax: 440-248-5426; www.bird-electronic.com
Booth: L1742

DIGITAL SOLID-STATE UHF TRANSMITTER

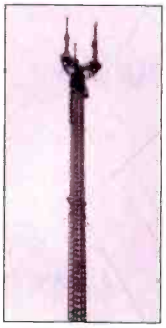
Larcan MAGNUM:

Scalable on site from 2.5 kW to 20 kW; "hot pluggable" broadband RF modules for any frequency, no tuning required; patented 2X power PA circuitry, LDMOS technology; remote monitoring and control; redundant amplifiers and power supplies; built-in diagnostics; flexible air cooling distribution system.

905-564-9222; fax: 905-564-9244; www.larcan.com
Booth: L9122

COMMUNITY BROADCAST FACILITY

SpectraSite Broadcast Group community broadcast facility:



Allows multiple broadcasters to use a common transmission site in order to shorten project timelines and preserve capital; SpectraSite obtains the site, gets zoning approval, and builds and manages the facility.

888-468-0112; www.spectrasite.com
Booth: L6841

TRANSMITTER

Ai (formerly Acrodyne Industries) Quantum QEXD1:

Remote parameter monitoring available; alternative to going low power in NTSC or DTV, QEXD1 offers a budget-conscious version of high-power Quantum in a single-cabinet, single tube system.

410-568-2105; fax: 410-568-1546; www.acrodyne.com
Booth: L8457

LOW-POWER TRANSMITTER

Thales Broadcast & Multimedia Affinity:

Designed to be frequency-agile; available from 10W to 400W average output power; fully compatible with the DVB-T and ATSC standards; features an advanced embedded software for alignment and system management.

413-569-0116; fax: 413-569-0679; www.thales-bm.com
Booth: L8700

BROADCAST KYLSTRONS

Marconi EEV klystrons:

Range of EEV klystrons fits most transmitter types; extends from the older unpulsed tubes to modern wideband types; includes the latest Energy Saving Collector klystrons.

914-592-6050; fax: 914-592-5148; www.marconitech.com
Booth: L11118, L1628

DIGITAL TRANSMITTER

Thales Broadcast & Multimedia DCX Millennium:

An enhanced version of Thales' DCX; offers a dual DSP system that continuously analyzes the transmitter's power output, a wide range of VSWR foldback and ultra-linear 8-VSB average power detection.

413-569-0116; fax: 413-569-0679; www.thales-bm.com
Booth: L8700

TRANSMITTER

Ai (formerly Acrodyne Industries) Quantum Convertible:

Transmitter features Quantum technology without the IOT, cavity and related power supplies; can be configured from 250W to 1 kW average DTV power; available with wraparound correction.

610-917-1300; fax: 610-917-8148; www.acrodyne.com
Booth: L8457

VHF TRANSMITTER

Axcera Innovator DT VHF:

VHF version of the Innovator DT solid-state transmitter; updated with MOSFET transistors; works with DT2B ATSC modulator for high efficiency; uses ADE linear and non-linear adaptive correction.

724-873-8100; fax: 724-873-8105
www.axcera.com
Booth: L9353

Video routing

DIGITAL ROUTING SWITCHER

Utah Scientific UTAH-400:

Expands seamlessly from 64x64 to 1000x1000 and beyond; product line includes HD and SD digital video switchers and a digital audio switcher; all SD switchers are fully upgradable to HD operation by means of an I/O board exchange.

801-575-8801; fax: 801-537-3099; www.utahscientific.com
Booth: L15254

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Signal Provider

Sencore provides a variety of instruments for delivering signal, to playing out a stream, to receiving and decoding it.

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- NEW! TSS3030 Transport Stream Server
- NEW! TS1691 Transport Streamer
- NEW! TS1692 Transport Streamer
- AT984A Receiver/Decoder

DTV Design

From IC's to complete DTV transmitters, Sencore provides reliable test signals and complete signal analysis equipment. These instruments have become industry standards.

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- NEW! TS1692 Transport Streamer
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Sencore is a major test equipment contributor in video, audio, data delivery over digital cable and terrestrial delivery.

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- SL754D Channelizer
- DSL757 Inspector (MMDS Wireless)
- NEW! Modem Analyzers
- AT1506 Portable 8VSB Analyzer

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Sencore instruments are designed to provide conformance testing to ensure that the digital signal meets ATSC specifications.

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- NEW! TS1692 Transport Streamer
- ATSC Test Patterns
- ATSC987 8VSB Modulator

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Retail

Sencore set the standard in the retail industry for providing an easy-to-use, reliable signal source for the Consumer Electronics Industry.

They include:

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- HDTV996 HDTV Player/Recorder
- ATSC987 8VSB Modulator
- NEW! VOP920 Video Output Player

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Sencore's Installation Too Suite provides you everything you need for residential and commercial installations.

They include:

- CP290/291/288 Color Analyzer
- SP295 Audio Analyzer
- SL754D RF Signal Level Meter
- VP300 Video Generator
- On-Line Calibration Library

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Today's new DTV products require new methods of testing and troubleshooting. Sencore has new and exciting products to support the service industry.

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www.sencore.com 1-800-SENCORE(736-2673) Direct 1(605)339-0100 Fax 1(605)339-0432

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Folsom Research PresentationMASTER:

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916-859-2505; fax: 916-859-2515; www.folsom.com
Booth: L14824

CONTROLLER SYSTEM

PESA Switching Systems 3500Plus:

Available as a single or dual controller; includes one RS-422 and two RS-232 ports for remote communications; compatible with all existing RCP series control panels; supports "truck link" applications.

800-328-1008; fax: 631-845-5023; www.pesa.com
Booth: L8449

SWITCHER

Extron Electronics ISS 408:

Provides seamless, glitch-free switching between inputs; fully configurable for all video types; offers eight inputs, dual outputs and a built-in scaler; has 33 scaled output rates including HD.

714-491-1500; fax: 714-491-1517; www.extron.com
Booth: L13218

MASTER CONTROL SWITCHER

Quartz QMC:

Includes an internal, dual-channel 10-bit built-in DVE; controllable through the automation system; offers cleaner signal path; features HD signal chassis; allows any combination of panel applications to interoperate.

888-638-8745; www.quartzus.com
Booth: L22419

MASTER CONTROL SWITCHER

Leitch Opus:

Includes 8:4:4 video processing, which provides 2X oversampling of the video signal; features full program and preset bus transitions, including mix, vee, fade-out and cut-fade as standard; can be configured in a multi-panel, multi-frame network and has optional two-channel effects and also key borders.

800-231-9673; fax: 757-548-0019; www.leitch.com
Booth: L19511

DIGITAL VIDEO ROUTER

Sigma Electronics ADX:

Offers return loss of -15 dB min. 5 MHz to 270 MHz, data rate of 400 Mbits/s, overshoot of 10 percent maximum and BNC connectors.

717-569-2681; fax: 717-569-4056; www.sigmaelectronics.com
Booth: L10669

HIGH-DEFINITION SERIAL DIGITAL VIDEO ROUTING SWITCHER

Datatek D3000:

Accommodates all data rates from 3 Mbits/s to 1.5 Gbits/s in a compact rack mounting frame; fully equipped for 128x128 HD serial digital video; two outputs per destination are included, reducing the need for distribution amplifiers; the D3000 can be used for both HD and SDI.

908-654-8100; fax: 908-232-6381; www.datateknj.com
Booth: L6727

SD/HD VIDEO ROUTER

Thomson Multimedia Trinix 512x512:

Fits into a small 32RU chassis footprint without the need for external wiring or distribution amplifiers; expanding from 256x256 to 512x512 or from SD to HD in 32 I/O increments required just plugging in additional circuit modules.

818-729-7700; fax: 818-729-7710; www.thomsonbroadcast.com
Booth: L19524

ROUTING MATRIX

Thomson/Grass Valley Group Concerto series:

Compact router features FlexFram platform; allows users to mix formats within a single frame; users can change a 32x32 system to a 64x64 configuration with a single card, and take advantage of an optional TDM backbone for audio data.

530-478-3000; fax: 530-478-3755; www.grassvalleygroup.com
Booth: L19524

ROUTING SYSTEM

ParkerVision XSWITCH:

Provides complete system control and redundancy for the PVTV News line of live production automation systems; gradually switches to live production from traditional live news operations; consolidates all switching and routing requirements.

800-532-8034; 904-731-0958; www.parkervision.com
Booth: L5503

MULTIFORMAT ROUTING SWITCHER

PESA Switching Systems Cheetah:

Handles any signal from 3 Mbits/s up to 1.5 Gbits/s; features four standard frame sizes; build I/O modules in groups of 16; single or dual outputs are available.

800-328-1008; fax: 631-845-5023; www.pesa.com
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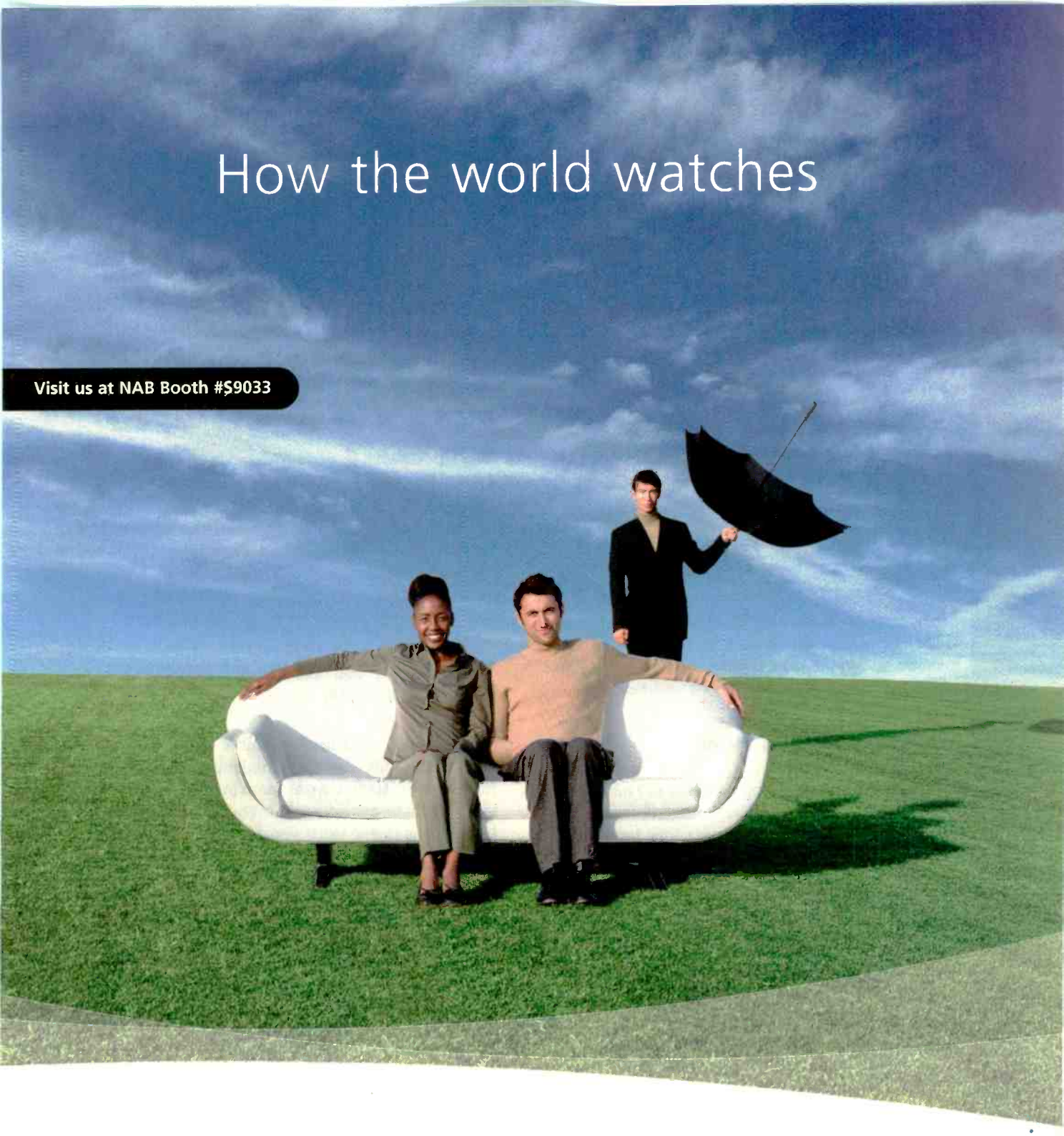

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Ross Video Talia series:

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613-652-4886; fax: 613-652-4425; www.rossvideo.com
Booth: L11429

ROUTER GATEWAY

Leitch CCS:

Shallow, 1RU protocol translator that provides Ethernet and/or SNMP connectivity to any Leitch routing system over most standard LAN, MAN or WAN connections; applications include Ethernet connectivity to a Leitch router system for RouterMAPPER, RouterWORKS, Ethernet-based control panels and Leitch's CCS.

800-231-9673; fax: 757-548-0019; www.leitch.com
Booth: L19511

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Chyron Pro-Bel Mistral:

Features built-in analog and digital signal conversion for video and audio; different formats can be mixed and matched within the same frames; supports up to 128x128.

631-845-2000; fax: 631-845-3888; www.chyron.com
Booth: L12200

ROUTING SWITCHER

Crystal Vision SW808:

SDI 8x8 crosspoint routing switcher; 100 mm x 266 mm module; DVB-ASI compatible; timing information is provided by either SDI or analog references; inputs and outputs can be named for ease of use.

+44 1223 506515; fax: +44 1223 506514; www.crystalvision.tv
Booth: L23006

ROUTING CONTROL SOFTWARE

Sierra Video Systems G.R.I.P.:

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Wire, cable, connectors

DIGITAL COAX CABLE

Belden Electronics 1505F:

New version of the 1505A RG-59 precision digital video coax for use in patch panels and jumpers; features a stranded center conductor and a double braid shield; mates with all 1505A BNC connectors.

765-983-5200; fax: 765-983-5294; www.belden.com
Booth: L6445

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Switchcraft SWC MVP AND SWC VAP:

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773-792-2700; fax: 773-792-2129; www.switchcraft.com
Booth: L5649

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Extron Electronics BNC-6 RC:

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714-491-1500; fax: 714-491-1517; www.extron.com
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Gepco VS10230:

Thin-profile, extra-flexible remote video snake that utilizes Gepco's high- definition miniature 23 AWG coax; ideal for remote production applications in standard or HD digital video formats; provides a convenient and rugged way of transmitting digital video signals within a single cable.

847-795-9555; fax: 847-795-8770; www.gepco.com
Booth: L4929

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Trompeter Electronics 250:

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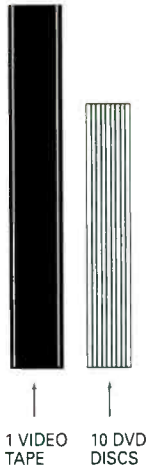

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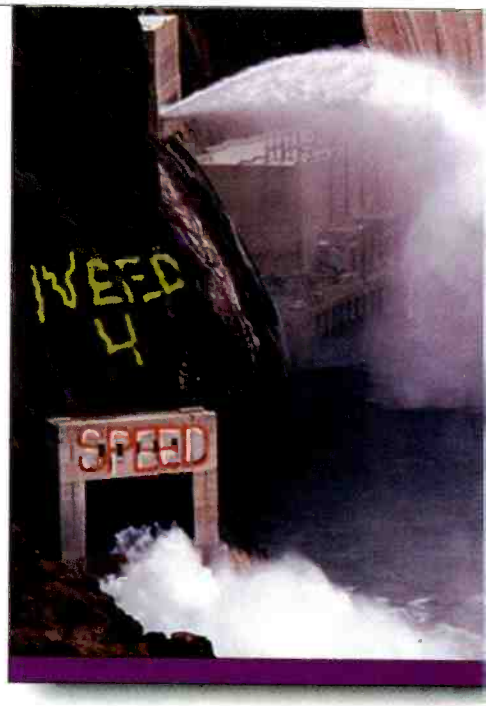

With NAB getting bigger every year, how about a little help finding the shortest route between points?

This year, *Broadcast Engineering* is offering two tracking options that will help ensure that you see what you want to see, AND help save your feet. The first is our new, easier-to-use map of the NAB halls. The other is this year's FASTtrack section. To navigate the new NAB, just pick a category from the list at left and turn to that page to find the manufacturers that have what you want, arranged geographically for the quickest trip around the floor.

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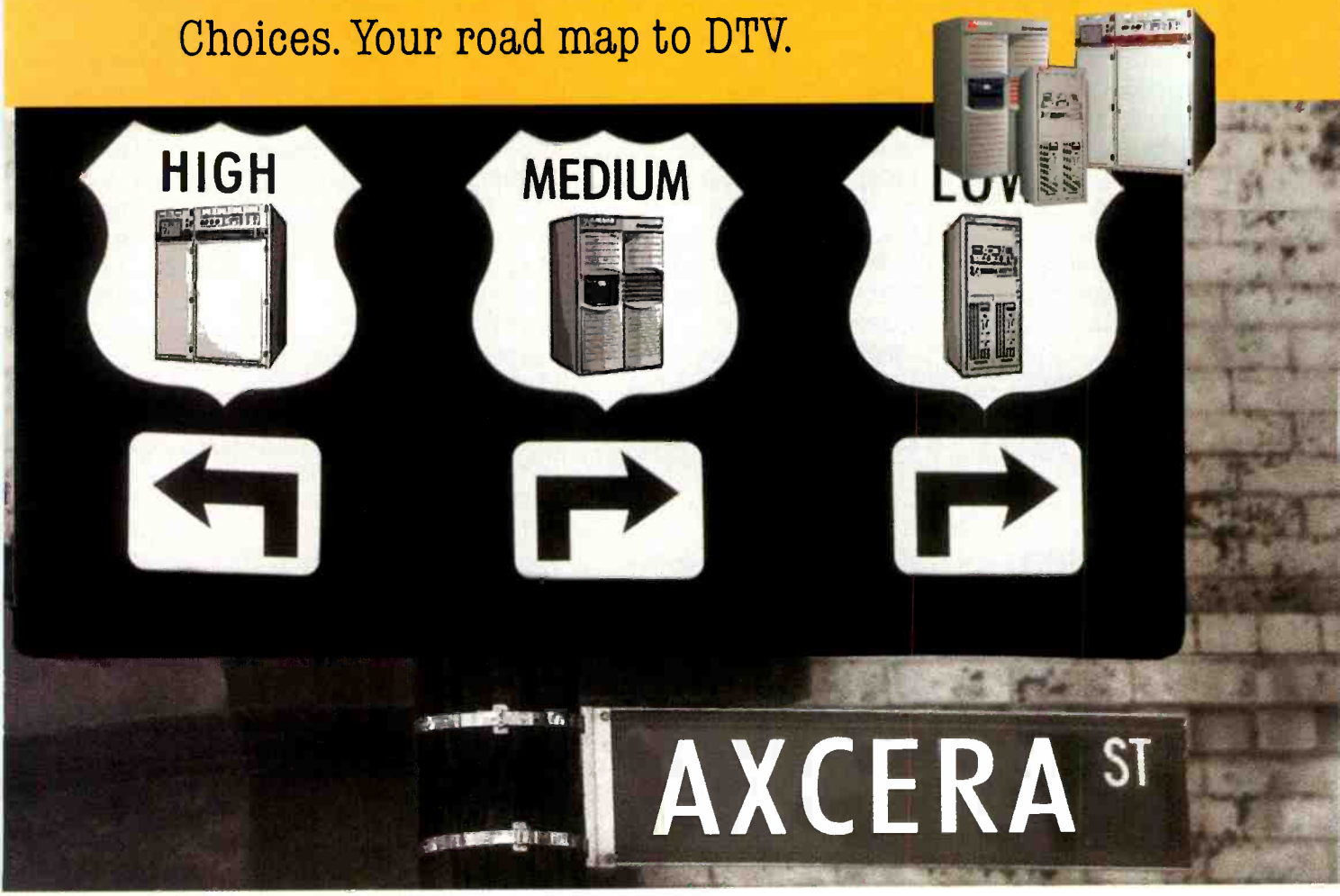

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Avica Technology L6149
Snell & Wilcox L9837
Band Pro Film/Video L11068
ARRI L11437
Digital Vision L12834
Video Accessory L12902
Cool-Lux L20461
Telestream L20658
5D S3908
Orad Hi-Tec Systems S3944
Discreet S4409
Scientific-Atlanta S4522

Graphics, animation products

da Vinci L6103
Broadcast Software Solutions L6423
SAV Systemes Audiofrequence Videonique L6556
Mathematical Technologies L7209
Sierra Video Systems L8937
Stardrive Solutions L9363
FOR-A Corporation of America L10019
Weather Central L10172
Baron Services L10177
Burst Electronics L11668
First Art L11777
In-sync L11778
Chyron L12200
Avid Technology L13200
Digital Voodoo L15352
Boxx Technologies S2329
Artbeats Digital Film S2433
Accom S3904
Ultimatte S3914
Inscriber Technology S3937
Discreet S4409
Princeton Video Image S4533
SGI S5418
vizrt S7167

Intercom, IFB products

Sierra Automated Systems L1722
Klotz Digital America L1942
JK Audio L2552
Comrex L2643
Location Sound L3232
Beyerdynamic L5235
Multidyne Video & Fiber Optic Systems L5349
Telex L8437
Clear-Com Intercom Systems L8463
Herman Electronics L9071
Systems Wireless L9723
Television Engineering ... L12545
Nelson Case L14034
Systems Wireless L20008
Broadata Communications/ Physical Optics S1252
TAI Audio S2823

Lighting equipment

Sabre Communications ... L5035
K5600 ..... L5256
GAM Products L5304
Allen Osborne Associates L5309
Theatre Service & Supply L8709
Aspen Electronics L9726
Innovision Optics L9863
Bogen Photo L10144
ARRI L11437
Thermodyne International L11649
Dedotec L11652
Westcott (F.J. Westcott Co.) L11677
ProSource/BMI L11968
Videssence L11980
Alcorn McBride L15249
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Cool-Lux L20461
Lighttech Group S2847
Dialight S9766

Microphones, accessories

Tannoy/TGI North America L2055
Audio-Technica L2115
Sanken Microphones/ A.I.D. L2131
Neutrik Montreal L2167
AKG Acoustics L2271
Independent Audio L2462
Aeta Audio L2463
BSW-Broadcast Supply Worldwide L2525
Azden L2562
Sennheiser Electronic L2923
Location Sound L3232
RDL Radio Design Labs .. L3327
Wireworks L4835
Beyerdynamic L5235
Allen Osborne Associates L5309
Neutrik L5838
Herman Electronics L9071
Systems Wireless L9723
Bogen Photo L10144
Lemo L11262
Whirlwind L11616
Thermodyne International L11649
ProSource/BMI L11968
Audio Accessories L12274
Systems Wireless L20008
TAI Audio S2823
Marshall Electronics S3669

Microwave, fiber optic, telco equipment

Winemiller Communications L1051
TANDBERG Television L1409
Miteq/MCL L1634
Diversified Marketing L2455
Rycote Microphone Windshields L2655
MUSICAM L3205
TC Electronic L3343
Broadcast Microwave Services L4912
TRON-Tek L5353
RF Technology L5834
Nucomm L6054
NEC L6439
Belden Electronics Division L6445
Hitachi Denshi America ... L6603
Microwave Radio Communications L6613
Thales Broadcast & Multimedia L8700
Andrew L9111
N Systems (NSI) L9500
Ikegami L9711
ADC/Nvision L9849
Canon L10600
Fiber Options L11043
Evertz L11443
Thermodyne International L11649
Communications Specialties L14424
Telecast Fiber Systems . L18859
Thomson Multimedia L19524
Allen Avionics L19549
Camplex L20020
Network Electronics L21715
Broadata Communications/ Physical Optics S1252
Miteq/MCL S4049
TANDBERG Television S4555
Force S4560
Coherent Communications S4660
Opticomm S4833
Andrew S8423
Miteq/MCL S9622

New media, streaming products, CD-ROM

Prophet Systems Innovations L2404
Symetrix L2444
Diversified Marketing L2455
Sonifex L2466
Broadcast Electronics L2705
Cartworks/dbm Systems . L2957
TC Electronic L3343
Rohde & Schwarz L5510
Digital Vision AB L6652
Thales Broadcast & Multimedia L8700
Sierra Video Systems L8937
Equator Technologies L9507
JVC Professional Products Company L9729
Sigma Electronics L10649
Omnibus Systems L11423
In-sync L11778
Imagine Products L12803
XOrbit Software L12852
Digigram L13362
MSoft L13865
Alcorn McBride L15249
Monivision L15326
Digital Voodoo L15352
I-Bus/Phoenix L17109
AZCAR L18372
Triveni Digital L18764
Leitch L19511
Grass Valley Group L19524
Florical Systems L19552
Masstech Group L20069
Telestream L20658
DVB L22506
Adtec Digital S3633
Orad Hi-Tec Systems S3944
Discreet S4409
Princeton Video Image S4533
Logic Innovations S5140
SGI S5418
Exatel Visual Systems S6272
Concurrent Computer S6351
VBrick Systems S6369
Antex Electronics S6719
Canopus S6844
Blue Order S6963
vizrt S7167
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Superior Electric L3215
Location Sound L3232
Control Concepts/Liebert L5230
Herman Electronics L9071
Aspen Electronics L9726
Superior Electric L10620
IDX Technology L11349
ProSource/BMI L11968
PAG L11975
Staco Energy Products .. L12061
Audio Accessories L12274
Nelson Case L14034
Pioneer Magnetics L14448
I-Bus/Phoenix L17109
Frezzi Energy Systems, Div of Frezzolini L20004
Exeltech S4935

Production switchers, video effects, keyers

Comprehensive Video Group L5651
da Vinci L6103
NEC L6439
SAV Systemes Audiofrequence Videonique L6556
Mathematical Technologies L7209
Panasonic Broadcast L7214
Sierra Video Systems L8937
Ikegami L9711
Snell & Wilcox L9837
FOR-A Corporation of America L10019
Miranda Technologies L10611
Keywest Technology L11416
Ross Video L11429
Evertz L11443
First Art L11777
RGB Spectrum L12859
Extron Electronics L13218
Folsom Research L14824
Bluefish444 ..... L15352
Sony Electronics L18207
AZCAR L18372
Grass Valley Group L19524
Thomson Multimedia L19524
Hi-Tech Enterprises L19572
Broadcast Video Systems L20007
Astro Systems L20661
Bexel L21211
AgileVision L22206
Crystal Vision L23006
Accom S3904
Discreet S4409
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Recording media

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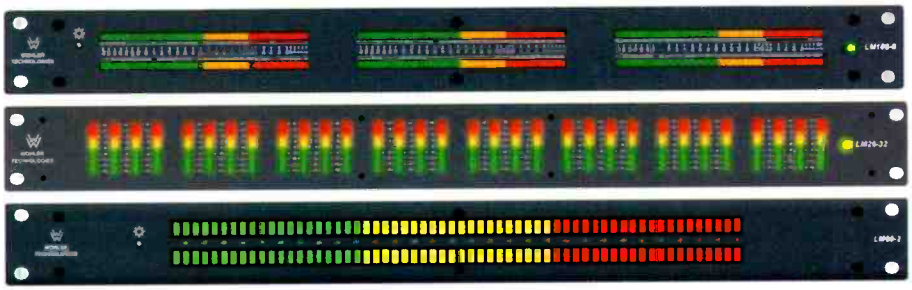

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Doremi Labs L5556
Panasonic Broadcast L7214
Professional Label L8509
Maxell Corporation of America L8964
Tentel L9877
MATCO L12249
MSoft L13865
Sony Electronics L18207
Videomagnetics L19238
Crispin L20367
Bexel L21211
Global Media Resource ... S2527
Pioneer Electronics S3320
Exatel Visual Systems S6272

Satellite equipment, services

Winemiller Communications L1051
Marconi L1628
Miteq/MCL L1634
Smarts Broadcast Systems L2951
RF Technology L5834
Microwave Radio Communications L6613
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Comtech Antenna Systems S9319
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Industrial Logic S9663
GMPCS Personal Communications S9944

Studio, facility support products

BAF Satellite & Technology L1237
Mager Systems L2030
Ergo 2000 ..... L2169
Eventide L2335
Symetrix L2444
Wheatstone L2515
Ward-Beck Systems L2815
RDL Radio Design Labs .. L3327
B&H Photo-Video-Pro Audio L3354
Image Video L4927
ESE L5227
Harris L5414
Fast Forward Video L5553
Digital Vision AB L6652
RTI-Research Technology International L7147
Panasonic Broadcast L7214
BUF Technology L8408
Professional Label L8509
Zandar Technologies L8674
Theatre Service & Supply L8709
Ikegami L9711
Bogen Photo L10144
Boland Communications L10777
Wohler Technologies L11257
Lemo L11262
Thermodyne International L11649
Egripment L11660
HORITA L11961
Broadcast Store L12045
AJA Video L12257
Forecast Consoles L12265
Radamec L12268
Da-Lite Screen Company L12811
RGB Spectrum L12859
Gefen Systems L12911
Digigram L13362
Vela L13729
Christie Digital Systems L13812
International Cellulose ... L16202
Sony Electronics L18207
Winsted L19520
Thomson Multimedia L19524
Dolby Laboratories L19535
Chapman/Leonard Studio Equipment L19548
Allen Avionics L19549
SeaChange International L19564
Broadcast Video Systems L20007
B&H Photo-Video-Pro Audio L20072
Omneon Video Networks L20402
Cool-Lux L20461
Amco Engineering L20616
Telestream L20658
DNF Controls L20800
Masterclock L21700
Network Electronics L21715
Solutions Custom Furnishings S2860
Peerless Industries S3509
Marshall Electronics S3669
Heartland Video Systems S4555
Avitech International S5156
ScheduAll by VizuAll S6032

TBCs, frame syncs, conversion equipment

TANDBERG Television L1409
Sonifex L2466
Multidyne Video & Fiber Optic Systems L5349
Teranex L5847
Adrienne Electronics L5950
SAV Systemes Audiofrequence
Videonique L6556
Hotronic L8608
Sierra Video Systems L8937
Zaxcom L9052
Snell & Wilcox L9837
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AJA Video L12257
Data Check L12272
Digital Vision L12834
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Extron Electronics L13218
Communications Specialties L14424
Folsom Research L14824
Ensemble Designs L18351
Axon Digital Design L19277
Leitch L19511
Grass Valley Group L19524
Hi-Tech Enterprises L19572
Faraday Technology L19675
Visual Matrix L20002
Telestream L20658
Pixel Instruments L20744
Bexel L21211
Fortel DTV L21306
Inline L22724
Crystal Vision L23006
Heartland Video Systems S4555
TANDBERG Television S4555

Test and measurement equipment

TANDBERG Television L1409
TerraSonde L2103
Potomac Instruments L2724
Ward-Beck Systems L2815
Logitek Electronic Systems L2937
Prism Media Products L3123
Sound Devices L3355
Modulation Sciences L5210
ESE L5227
Multidyne Video & Fiber Optic Systems L5349
Rohde & Schwarz L5510
Neutrik L5838
Leader Instruments L6145
Tektronix L8411
Hotronic L8608
Snell & Wilcox L9837
Tentel L9877
Videotek L10631
Pixelmetrix L10643
Magni Systems L10853
Wohler Technologies L11257
Keywest Technology L11416
Evertz L11443
Whirlwind L11616
Burst Electronics L11668
HORITA L11961
Data Check L12272
Audio Accessories L12274
Hamlet L12500
Extron Electronics L13218
Nelson Case L14034
Eyeheight L18263
Ensemble Designs L18351
Triveni Digital L18764
Visual Matrix L20002
Sencore L20035
Videoframe L20377
Amco Engineering L20616
Astro Systems L20661
Bexel L21211
DVB L22506
Z Technology L22911
Ktech Telecom L23203
SyntheSys Research S3024
Heartland Video Systems S4555
TANDBERG Television S4555
Acterna S8863

TV transmitters, feedline, antennas, towers, services

Marconi L1628
Teracom Components L1714
Armstrong Transmitter L1730
Bext L2023
Radiacion Y Microondas (Rymsa) L2135
Magnum Towers L2331
Utility Tower L2736
Dielectric Communications L2915
Shively Labs L3004
UNIMAR L3321
MYAT L4907
Rohn Industries L4915
Sabre Communications L5035
TRON-Tek L5353
Harris L5414
Rohde & Schwarz L5510
RF Technology L5834
Richland Towers L6108
Jampro Antennas/RF Systems L6127
Northrop Grumman L6256
NEC L6439
CPI/EIMAC L6517
EMCEE Broadcast Products L6522
Microwave Radio Communications L6613
SpectraSite Broadcast Group L6841
Dielectric Communications L8442
Acrodyne Industries L8457
Kathrein, Scala Division L8668
Thales Broadcast & Multimedia L8700
Kline Towers L9049
Andrew L9111
Larcan Broadcast L9122
Radio Frequency Systems L9337
RFS Broadcast L9337
Axcera L9353
ADC/Nvision L9849
Radian Communications Services L10253
Marconi L11118
Advanced Designs L12035
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Ktech Telecom L23203
Avalon RF S1528
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Heartland Video Systems S4555
Opticomm S4833
Radyne ComStream S8020
Andrew S8423
Comtech Antenna Systems S9319
Northrop Grumman S9342

Video editing systems

ESE L5227
Mathematical Technologies L7209
Editware L8368
Quantel L8424
Ikegami L9711
FOR-A Corporation of America L10019

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Pixel Power L19577
Astro Systems L20661
Boxx Technologies S2329
Accom S3904
Discreet S4409
Matrox S4427
Adobe Systems S6927

Video routing

Ward-Beck Systems L2815
RDL Radio Design Labs .. L3327
Image Video L4927
Multidyne Video & Fiber Optic Systems L5349
ParkerVision L5503
Fast Forward Video L5553
Comprehensive Video Group L5651
Adrienne Electronics L5950
SAV Systemes Audiofrequence Videonique L6556
Datatek L6727
BUF Technology L8408
PESA Switching Systems L8449
Hotronic L8608
Sierra Video Systems L8937
ADC/Nvision L9849
FOR-A Corporation of America L10019
Miranda Technologies L10611
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Chyron L12200
Video Accessory L12902
Gefen Systems L12911
Extron Electronics L13218
Vela L13729
Communications Specialties L14424
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Video International Development L19055
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Scientific-Atlanta S4522
Heartland Video Systems S4555
Force S4560
Logic Innovations S5140
Teleglobe Communications S8419

Weather/data services

Allen Osborne Associates L5309
RF Technology L5834
Weather Central L10172
Baron Services L10177
Advanced Designs L12035
AccuWeather L12233
Triveni Digital L18764
Pixel Power L19577
SGI S5418
Ciprico S5733
Irdeto Access S7623

Wire, cable, connectors

TASCAM L2630
Wireworks L4835
Gepco L4929
Sabre Communications ... L5035
Multidyne Video & Fiber Optic Systems L5349
Switchcraft L5649
Neutrik L5838
Belden Electronics Division L6445
Hitachi Denshi America ... L6603
Trompeter Electronics L6731
Patchamp L8809
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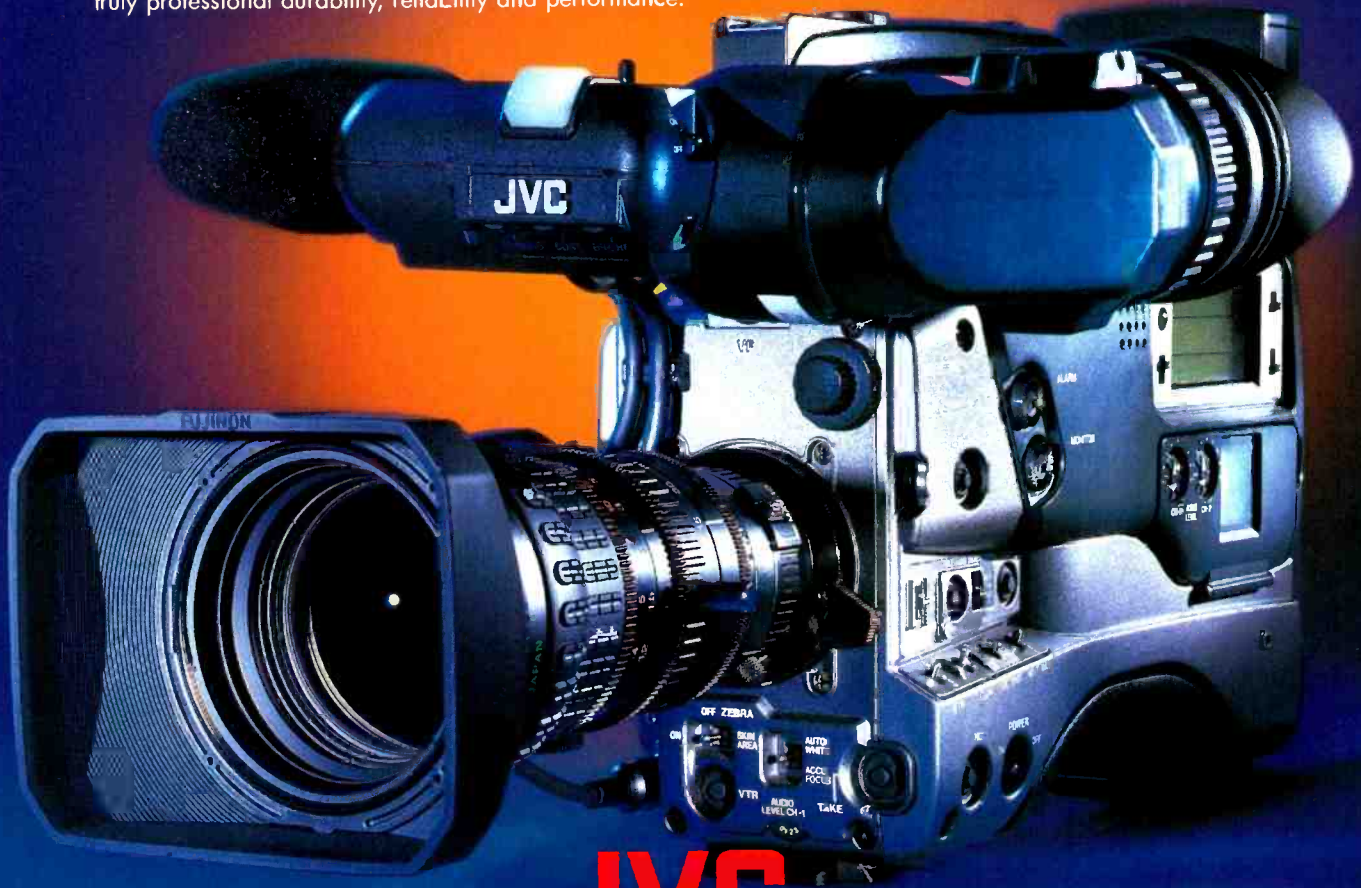

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Path 1's Cx1000
IP gateway

BY HENRY SARIOWAN AND DOUGLAS A. PALMER

Broadcasters have embraced the Internet in many ways, such as providing content and streaming media via their Web sites, and transferring video files to connect their enterprise information systems together. The last step in this move to the new technology – using IP networks to distribute live, broadcast-quality video streams – is already happening. Path 1 has participated in numerous domestic and international video-over-IP trials in the past 12 months. And the company expects to launch service offerings in early 2002.

The last step in this move to the new technology – using IP networks to distribute video streams – is already happening.

CNN multicast trial

Recently, CNN orchestrated a 90-day field trial to test the viability of long-haul, video-over-IP multicasting. Path 1 Network Technologies participated in the trial, along with Leitch Technology, BellSouth, CoreExpress, Cisco Systems, Pixelmetrix and TANDBERG Television. Each participant provided a technology or service integral to building a video-exchange service using IP multicast.

Trial configuration

There were four sites involved in the trial: Atlanta's CNN Center, the Los Angeles and Washington, DC, CNN News Bureaus, and the St. Louis CoreExpress facilities.

DS-3 or 100 Mbits/s Ethernet/IP links connected these sites to a CoreExpress core network as well as to Sprint's ISP network. MPEG-2 4:2:2 video streams with data rates ranging from 8 to 31 Mbits/s (CBR) were sent between these sites. Path 1 provided the video-over-IP gateways that performed the conversion from SDI MPEG-2 transport streams to IP streams and back. Video streams were continuously monitored for quality.

The long-haul network supported various forms of QoS methods and mechanisms that had to be effectively managed to ensure acceptable broadcast-quality transmissions. These methods and mechanisms included over-provisioning, priority queuing and dynamic assignment.

Over-provisioning simply allocated enough pipe and switch-processing bandwidth to accommodate all possible application scenarios, in addition to existing data traffic. Priority queuing used existing priority standards, such as Type-of-Service (TOS) in DiffServ, to rank queued data packets. Dynamic assignment used dynamic routing assignment stndards such as MPLS and RSVP to allcate bandwidth, on demand, through all legs of the route. The network bandwidth-management solution, requiring both priority and dynamic-assignment QoS approaches, was critical in making the video-over-IP test successful for CNN.

The Path 1 Cx1000 IP gateways sat at each end of the network cloud and served as the principle mechanism for pumping video streams into the network and receiving them. On the source end, the gateways accepted SDI video input, converted it to IP packets and dispatched the packets into the network cloud. At the far end, another Cx1000 reassembled the SDI data stream with precise synchronization and passed it to the broadcaster's receiving equipment. In addition, they had to be rapidly configurable to suit the needs of the transport stream and network.

Implementation of QoS and/or MPLS in the trial network guaranteed the performance of the network to a high degree in the presence of other traffic. However, video data packets still experienced some degree of latency, jitter, packet loss and packet reorder while traveling through the multi-hop network environment. Receiving equipment, such as MPEG-2 decoders and video servers, proved highly intolerant to errors. So the gateway at the receive end had to correct these data-channel characteristics before reconstructing the digital video signal. Specific adaptation by the Cx1000 included corrections for jitter, packet loss and recovery.

Thus, the gateways played a critical role in ensuring that the video sent over the IP networks was received and reconstructed according to the stringent requirements of the broadcasters.

On Sept. 11, distribution of broadcast video over IP became a reality when a test system was pressed into service by CNN to deliver news coverage from Washington, DC, to Atlanta. The field test proved that IP networks could be used as a reliable, high-quality method for exchanging live and taped news material among CNN-affiliated stations. BE

Henry Sariowan, Ph.D, is vice president of systems, and Douglas Palmer, Ph.D, is chief scientist and founder of Path 1 Network Technologies.

Videotek's ShARC

aspect ratio converters

BY MARK J. EVERETT

Before Super Bowl XXXVI, Fox Sports was issued a technological challenge for the broadcast: deliver high-quality coverage in both 16:9 and 4:3 aspect ratios — in essence, one show, two formats. Fox turned to Videotek for the solution: its new ShARC aspect ratio converter.

Fox's approach was straightforward: produce the Super Bowl in 16:9 and run it through an aspect ratio converter. Fox's production people initially were concerned that converting it might compromise their work. So the production team rehearsed by producing games in 16:9 but broadcasting in 4:3. Fox integrated the converters into their digital trucks, wiring them directly into the device's SDI inputs and outputs.

To cover Super Bowl XXXVI in both 16:9 and 4:3 aspect ratios, Fox shot in 16:9 and converted to 4:3 using Videotek's ShARC 102 aspect ratio converter. Photo by www.visual-technology.com.

By shooting in 16:9 and protecting for 4:3, Fox created elements such as the graphics and the "Fox Box" (the strip that contains the score) so that all the pertinent information remained within the 4:3 screen while extending all the way to the edges of the 16:9 screen.

The fixed-mode, aspect ratio converter was optimized for a single conversion. The unit converted the 16:9 video signal to 4:3 by horizontally stretching the central 75 percent of the input picture, with no vertical processing involved and no need for black bands at the top and bottom of the final picture.

Fox's approach was straightforward: produce the Super Bowl in 16:9 and run it through an aspect ratio converter.

Since vertical processing is absent in the converter, there is no degradation in vertical performance, and the circuit has a delay of only eight microseconds. The device has a wide and flat frequency response — 5.5 MHz (4.25 MHz after conversion) with a passband ripple of 0.1 dB. It exhibits very low levels of measurable conversion artifacts such as aliasing, banding and ripples. There are two operation modes: convert and bypass. Bypass delays unconverted video by the same amount as converted video so no timing changes occur when switching. The ShARC passes embedded audio and auxiliary data with the appropriate compensating delay to preserve lip sync or audio-video timing. EDH generation can be switched on or off. The system has one input and two outputs and can be configured to provide 12 channels in 2RU of rack space.

The video input accepts an SDI 270 Mbit signal to SMPTE 259M and EBU 3267 standards. It offers cable equalization of more than 200 meters for Belden 8281 or equivalent cable, and features an auto 525/625-line selection. The output is SDI 270 Mbit to SMPTE 259M and EBU 3267 standards with EDH. Picture processing is 10-bit with a 10-bit data path in the horizontal and vertical blanking intervals to accommodate embedded audio and data.

The GPI input level for active state requires a ground connection. For inactive, it requires a high impedance or +5 volts. GPI input current is less than 50μA. The local control is set by DIP switches. The remote control has two RS-422/485 serial ports — one connected to the front-panel frame, and one that can be linked to the rear of the frame instead of GPI signals. Frame panel control is available from an active front panel or a remote panel.

Over the next 10 years, as more content becomes available in DTV and the number of homes with 16:9 equipment continues to grow, the preparation that Fox has taken for Super Bowl XXXVI will continue to push the network further ahead of the curve. The Videotek ShARC 102 aspect ratio converter helped Fox make a visually compelling 16:9 and 4:3 production. BE

Mark J. Everett is vice president of advanced technology at Videotek. Additional reporting by freelance writer J. B. Duke.

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Divio's NW701
DV Codec IC

BY STEVE MUSALLAM

As the video world migrates from analog to digital, some users assume that "going digital" will solve any problems caused by incompatible formats and interface protocols. Unfortunately, that's not the case. Many digital video formats and protocols are incompatible with each other. Examples of incompatible formats include the ITU-R 601/656 raw digitized format, MPEG-1 and MPEG-2 formats, and the IEC-16884 DV format. Examples of incompatible interfaces include the ANSI/SMPTE 259M serial digital interface and the IEEE-1394 serial interface.

Each of these standards has its proper place in the video world. For example, DV is an intra-frame standard in which each video frame is identified and coded, while MPEG is an inter-frame format in which one or more reference frames must be decoded before a given B or P frame can be displayed. Thus DV is better suited to tape-based acquisition and frame-accurate editing, and is steadily replacing Betacam SP as the *de facto* standard in these areas. For distribution and broadcasting, MPEG-2 is the format of choice.

It makes sense to use different standards for different projects. It also makes sense to use them at different points in the same overall process. But getting incompatible digital devices (and perhaps older analog gear) to work together in a single system can ruin an engineer's day.

To help manufacturers build devices that can successfully connect incompatible video components, Divio has developed a technology that helps bridge the gap between standards. Divio's NW701 is a single-chip codec that converts ITU-R BT.601-2 to and from 28.8 Mbit DV in real time.

Getting incompatible digital devices to work together in a single system can ruin an engineer's day.

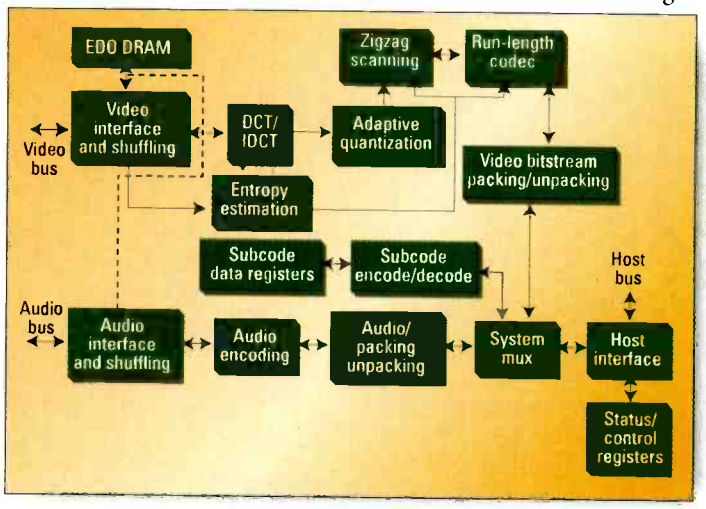


Figure 1. This block diagram shows the internal functions of the NW701 DV codec chip.

The integrated circuit (IC) is available in a 160-pin, low-profile, quad flat package (LQFP) that can be mounted on the front or back of a printed circuit board. The codec built into the chip is fully "Blue Book" compliant and provides seamless connections to various video and audio encoders and decoders.

The chip supports recording at bit rates below DV's standard 3.6 MBytes/s, including 3, 2.4, 1.8, 1.5 and 1 MBytes/s rates. The lower data rates permit recording to standard computer peripherals such as IDE and EIDE hard drives, and also allow faster previews during editing sessions.

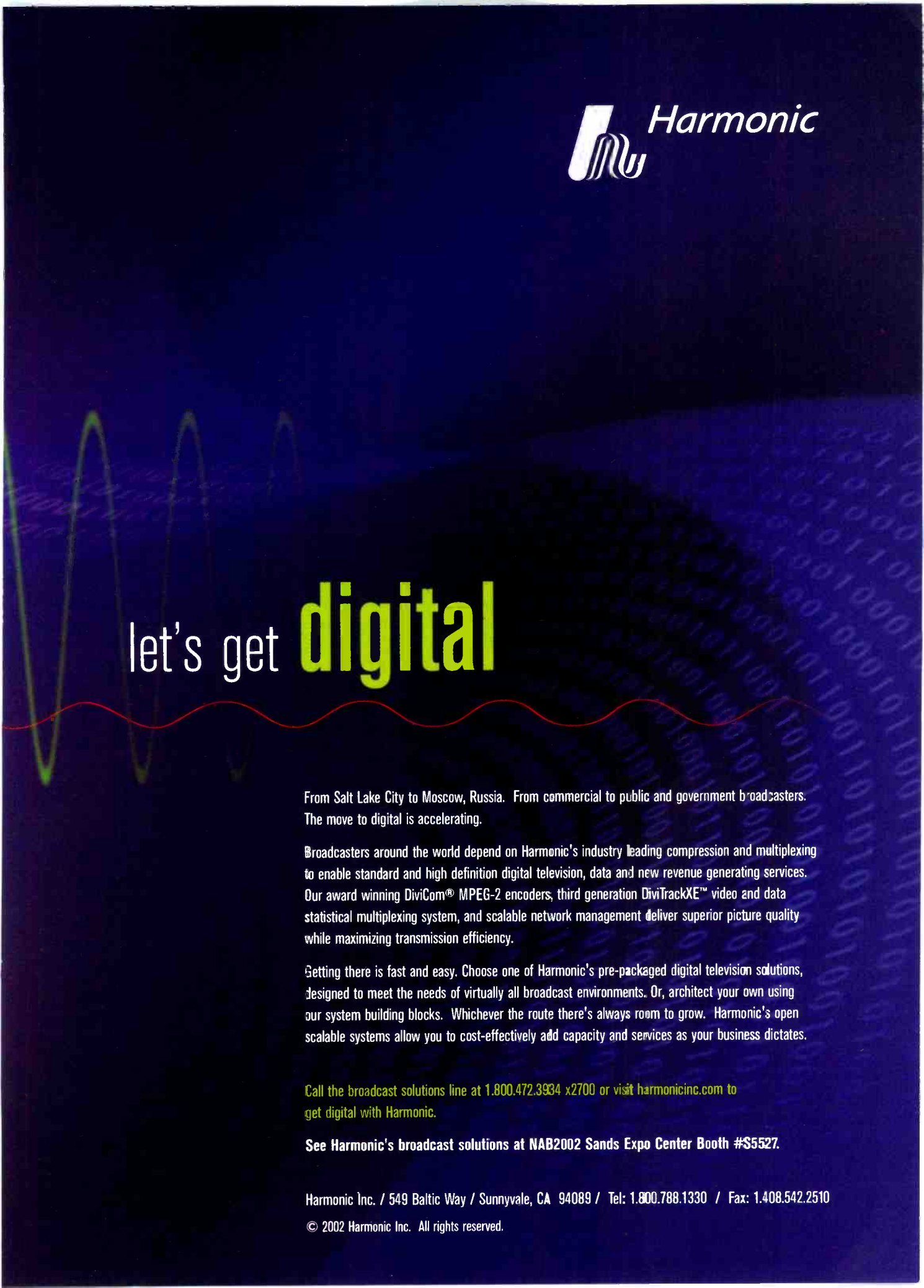
The IC's video bus has an ITU-R-656 (8-bit) mode with an optional handshake mode that can temporarily stall a video stream (in non-streaming mode) to allow external FIFO logic to catch up. The 16-bit asynchronous host bus uses a Motorola 68K-like interface with multiplexed address and data bits for register and DV FIFO access operations. Figure 1 shows a block diagram of the NW701.

It is a simple fact that one standard does not fit all needs. DV is a flexible, useful video and audio encoding format, with specific fields of use and specific applications. On the other hand, there is a plethora of video out there that is stored in other digital and analog formats. The NW701 codec not only helps to bridge digital formats, but also provides baseline connectivity to close the gap between old analog gear and new DV equipment. BE

Steve Musallam is director of marketing at Divio of Sunnyvale, CA.

IN ADDITION

For more information on the functions of Divio's NW701 codec, go to www.broadcastengineering.com and click on Applied Technologies.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Telestream's FlipFactory TrafficManager

BY DAVID HEPPE

Today broadcasters are under increasing pressure to reduce costs and streamline their operations. Many are achieving these goals by moving to digital operations and by implementing asset management and automation systems.

But how does a TV station sort through the maze of asset management solutions available today? One approach is to implement such solutions at the point of ingest, where stations receive more and more commercials, promos and even news from a variety of digital media delivery services.

Typically, TV station personnel dub media to tape or use valuable router ports and media server encoder channels to redistribute the media throughout their facilities. They must also manage and move tapes received from other content providers, as well as promos created in their own edit suites.

How can a TV station improve this resource-intensive, manual process of media receipt, associating metadata, tracking, quality assurance, reformatting and transfer to on-air playout servers? The challenge is automatically formatting the media for each destination device.

How does a TV station sort through the maze of asset management solutions available today?

Telestream of Nevada City, CA, recently introduced new technology that addresses these problems. Based on Telestream's FlipFactory media transcoding engine, the FlipFactory TrafficManager software application automates the entire process of media receipt, notification, tracking, previewing and reformatting for digital delivery to destination devices throughout the facility.

TrafficManager is a practical solution to a specific business need. It allows multiple users to locate and access digital assets and metadata simultaneously across a LAN or WAN. It protects and extends current infrastructure investments and streamlines existing workflows by easily integrating with leading automation, indexing and asset management systems.

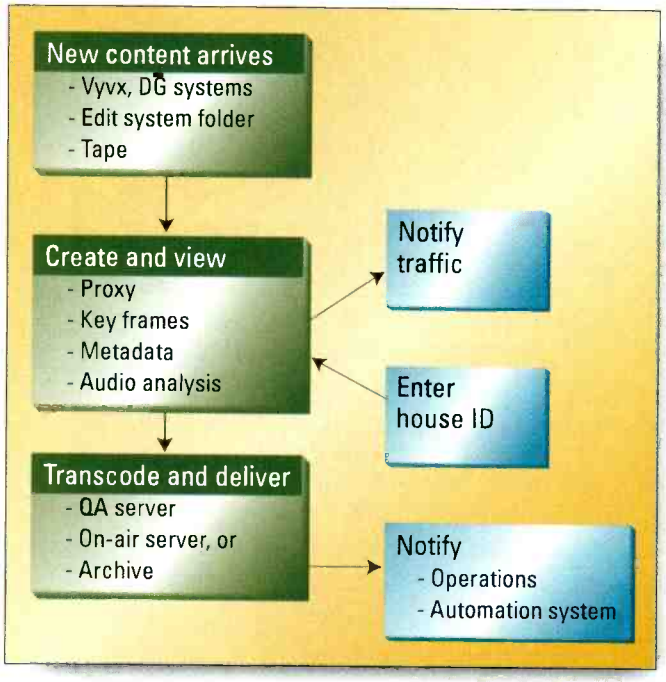

Figure 1. Telestream's FlipFactory TrafficManager automates the process of media receipt, notification, tracking, previewing and reformatting for digital delivery to destination devices.

The application is configured on a Windows 2000 gateway server. It monitors edge servers for the arrival of new content from a variety of digital media delivery services such as Vyvx and DG Systems. It also monitors local servers for receipt of new content such as promos, news and material from the station's own edit suites.

TrafficManager notifies operators as soon as new media arrives. It automatically transcodes the incoming content into a low-resolution proxy format, such as RealVideo or QuickTime, that multiple users can access quickly and view simultaneously from PCs located anywhere in the facility. This allows operators to access metadata, key frames and audio analysis, and to extract or enter new metadata such as house ID.

The application also automatically transcodes media into the required formats and bit rates and delivers them, with their associated metadata, to a variety of digital devices in the facility, including broadcast servers for quality assurance, on-air servers, edit suites, storage systems and streaming servers for use on the Web.

Flexible, software-based asset management solutions like Telestream's FlipFactory TrafficManager provide a practical solution for broadcasters transitioning to digital operations. They ease the workflow process and cut costs by improving the way stations move and manage their media – digitally, from source to destination. BE

David Heppe is vice president of marketing and business development for Telestream.

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Quartz's Q256 router at CHUM Television

BY BRUCE COWAN

CHUM Television, a Canadian media company and content provider, recently acquired licenses to add five new national specialty channels to its lineup, which already includes popular offerings such as Citytv, MuchMusic, Bravo, Space, Star, MuchMoreMusic and CP24.

The new channels were to be integrated into the CHUMCity building in Toronto and would increase the total complement of channels to 12. As a result, CHUM found itself with multiple analog facilities and several digital facilities. A decision was made to upgrade the existing master control rooms and streamline the overall operation.

In re-architecting, CHUM had two main goals – put all its services under automation and run everything from a new digital master control suite. In that way, the station could streamline management and eliminate the analog switchers on flagship channels like Citytv. This would enable CHUM to finally put the channels under automation and give them a richer on-air look with more graphic capability and more sophisticated pushbacks. This look was difficult to achieve with the aging analog systems. Lastly, CHUM planned to move all commercial and interstitial content to servers under automation.

The target was to be able to deliver a dozen digital channels from the CHUMCity building in Toronto, with capacity to support up to twenty independent services. This led to the need for a new router.

We looked at 256x256 serial digital routers at NAB2001. This would evolve into our main router handling all services originating from Toronto. Knowing that high definition was on our horizon, we primarily looked at routers with that capability. It turns out, however, that in most cases you pay a premium to get that capability. The reality was that most of our channels were SD and would remain SD.

I started looking at large SD-only routers and was introduced to Quartz Electronics by their Canadian vendor, Major Tech. Consequently, I ordered a 256x256 SDI router along with a 128x32 analog router and 64-port data router. This switching system will form the core of our combined master control rooms.

CHUM had two main goals – put all its services under automation and run everything from a new digital master control suite.

The Quartz Q256 SDI router delivers large-scale 256x256 routing capabilities in a single compact 16RU frame, and is field-expandable to 1024x1024 by combining additional router frames. The router easily upgrades via interchangeable I/O cards to provide support for high definition broadcast.

One of my primary concerns was reliability. Quartz's router features the full redundancy of critical controllers and power supplies one expects in a mission-critical system. Built-in monitoring and diagnostic features help to ensure performance. In addition, the design of the router facilitates easy maintenance and recovery.

CHUM had specific interfacing requirements for the router. The initial application was based on the five new channels. They were to originate from a common master control room. The Q256 interfaces directly with the Grass Valley 2100 master control switchers we had already purchased, enabling us to easily feed an array of sources into the 2100. Accompanying the Q256 are two Quartz SC1000 system controllers – the brains behind the box. The Q256 is a small box, so you get many cables in a tight space.

I have had many products come into our building that simply do not work the way they are promoted and turn out to be very disappointing. I can probably count on my fingers the number of products that have been 99 percent satisfactory right out of the box. Our Quartz router is one of them. BE

CHUM Television selected Quartz's Q256 router to serve as the core of its new digital master control suite.

Bruce Cowan is director of broadcast technology for CHUM Television.

Florical's ShareCasting system

BY MARIO CUSSON

Groupe TVA is the largest private French-language network in North America. The network originates 10 channels in French and one in English, and its broadcasts cover most of Canada. But it wasn't always that way. Less than two years ago, Groupe TVA was broadcasting only two channels from its main site — one from a cart machine and the other from a video server. It also had five remote sites doing their own commercial insertion with the network's program feed.

At NAB in April 2000, the network decided to purchase Florical Systems' broadcast automation solution. Installation began in June, and by August the network had four channels on the air from its main broadcast facility in Montreal. In less than a year from the initial decision, the network had added five remote sites and began broadcasting a total of 11 channels on the air. Now, the network's Montreal central site originates a 24-hour news channel, a 24-hour shopping channel, East and West Coast network feeds, a Montreal feed, and five regional feeds to remote facilities around eastern Canada.

When Groupe TVA began evaluating the opportunity to run a centralcasting operation, it quickly realized that manual control of each broadcast channel was not an option. Each channel had to be fully automated, with the operator performing quality-control functions. So the network began the process of evaluating all the broadcast automation players. Florical responded with a proven system that had the capabilities to meet all of the network's needs. The network's management was able to visit an existing Florical installation and see the system work.

Some centralcasting models either have all the control at a central site or everything done at the local station by remote control. Groupe TVA wanted a flexible system that could do both. Specifically, the network needed a system that could share broadcast origination and share control between a central site and the local station. The system design, which Florical now calls ShareCasting, gives the network's regional TV stations part-time local origination, local ingest to the central server, local control capability and local backup systems.

The network needed to have the system operational as soon as possible so it focused on getting its central site in Montreal up and capable of supporting the remote sites. Because it installed standard Florical products like AirBoss and SpotCacher, it was able to get the first channels on air quickly. The Florical personnel provided excellent training and support, and the network's operators quickly learned the system operation.

Groupe TVA quickly realized that manual control of each broadcast channel was not an option.

The on-air operation is controlled by multiple AirBoss systems for all program and interstitial playback. The master control in Montreal typically manages the broadcast of each remote site with content that can be shared or content that is unique to each site. When remote sites originate live news or other content, they can push a button at the remote site so interstitials play out of Montreal. To make the shared origination happen accurately across the remote sites, the AirBoss systems adjust for varying signal-path delay between the central broadcast servers and the remote switchers to give the network the frame-accurate presentation it requires.

A key component of the network's broadcast operation is its media-management system. Much of the content is ingested at the network's central site, but it can also ingest program and commercial content in MPEG format from the remote sites. Media management is handled by the Florical SpotCacher system. It automatically moves programs and interstitials to the Avalon/ATL archive or to the video server for broadcast. SpotCacher provides dynamically updated lists of material that is missing from the video servers and needed for air. The SpotCacher system automatically purges material from the video servers and the Avalon/ATL archive based on purge lists generated by the traffic department or by expiration dates.

Media preparation functions, such as ingest of material to video servers, are provided by MediaFiler workstations. There are multiple workstations at the central site in Montreal and one at each of the five remote sites. Each workstation also has MediaTimer, used to time program material and enter the timing data into the media database for playback to air. The workstations also also have schedule editing and database entry/modification capability.

This large project is now complete, the operation is going well and the return on investment (ROI) is on target. In general, Groupe TVA has found that the Florical automation products work well and are very stable. BE

Mario Cusson is a project manager for broadcast engineering for Groupe TVA.

Data archive systems

BY JOHN LUFF

Last month this column focused on automation software. In the second installment of four related to automation and asset management, this month we consider data archive systems. Prior to the time our industry began to store media in computers we often call video servers, the only archiving done involved storing a second copy of a master on a shelf, or perhaps a backup on removable media. Today with the increasing interest in tapeless facilities, it is ironic that we consider backing up the video stored in a server on another kind of tape.

The motivation to use archive systems comes from two issues. Server storage cannot be infinitely expanded, without infinite money, power and space. Also, the risk of having only one copy in a server leads to the natural impulse to make a backup. Archive systems can provide salve to both.

Modern archives offer high volumetric storage density and format media to allow random access to individual files. In addition to tape-based media, we now have DVD-ROM being used as a record medium.

When planning for an archive it is important to consider the purpose first. The intent may be to minimize the size of a server by using the archive as a "near-line" extension of the server's storage. Or it may be more important to have backup copies of content. If the media will be stored outside of the robot locally you should consider if the storage conditions need to be kept near the ideal temperature and humidity to sustain long-term stability of the recordings. It is critical to ensure that any backups are on a media that will be supported long into the future. Media should be cycled regularly and the bit error rate monitored. When the rate begins to climb, the archive should be capable of cloning the content to ensure it will be available when needed.

It is equally critical to look hard at software needed to make the process seamless. Does the automation system you have support connection to an archive? Most major suppliers of automation and servers do, but not all. Also, not all archive types are supported by all vendors.

The archive is normally controlled by a software package that handles the transactions between the server and automation software. If content requested by automation isn't on the server, the software finds it and moves it to the server. The software also keeps a database of the content and its location, which might be a physical bin in the robot. The cost of archive management software is a considerable portion of the cost of the hardware. The media is not inexpensive either, but is a one-time cost instead of the recurring cost of a license. Unfortunately, you cannot opt out of the license after a few years as the fee is payable as long as the software is in use.

Robot size and speed are critical criteria. The size may be measured in square feet, but usually is measured in the number of bins. Most manufacturers offer varying sizes of cabinets, with a couple of dozen to literally thousands of tapes available. The number of transports is also scalable.

Planning for the archive must also include questions of transfer rate. A request for a large file may take several times the length of the media to transfer through the gateway (often a stand-alone computer connected to the archive as a SCSI device). Many archives are considerably slower than this, particularly DVD. While DVD playback speeds may be sufficient for many archive purposes, DVD writing speed is considerably slower and not suitable for some applications.

Access time is similarly important. You must carefully think through the bottlenecks in the system to ensure the combined effect of transfer rate and access time does not collide with the volume of expected transfers.

Not all archive types are supported by all vendors.

One way to mitigate some of the transfer issues is to connect the archive to a library server. When a media request is made the archive transfers the media to the library server. The media is then transferred to the air server at much higher speeds. This leaves the load on the air and backup servers lower, as the transactions happen during shorter time periods, though the technical complexity is somewhat higher.

Next month we will consider newsroom automation systems, and in May conclude this series with media asset management issues. **BE**

John Luff is vice president of business development for AZCAR.

IN ADDITION

See the expanded version of this article online at www.broadcastengineering.com for more on early data management systems.

SEND Send questions and comments to: john_luff@primediabusiness.com

...continued from page 22.

sense to have all receiving antennas pointing in the same direction in one market. Collocating people with common interests permits each member or partner to fund its individual operations by itself while letting a cooperative manage the shared items. This lets the station focus on its equipment and relieves it of responsibilities such as building maintenance and the like. Also, operators report that it is easier to get funding for projects like these than going it alone.

Financing anything, by any means, requires a credit check. If your organization has a history of late pays or bad credit, it makes it all the more difficult to get what you need when you need it.

You should consider several financing options, including one or more of the following: using free cash flow, refinancing the facility, financing the equipment or leasing it. It is most important to keep in mind that the primary value of equipment is its use, not its ownership. Over 30 percent of all capital equipment in the United States is acquired through leasing. According to one source, eight out of 10 companies lease their equipment.

There is one aspect to leasing that is sure to get your accountant's attention: it conserves valuable bank line capacity. Leasing is a positive way of conserving working capital, especially in challenging economic conditions where preserving liquidity is the pragmatic course of action. By using a leasing company, you still get the equipment, and you can still use the bank lines for other purposes such as expansion, real estate purchases, leasehold improvements or acquisitions. Lease financing also allows you to acquire more and/or higher end equipment at the same financial exposure.

Financial service companies like Arrow Capital can create customized equipment leasing programs to allow broadcasters to increase revenue and grow market share.

Also, leasing offers some rather interesting tax advantages. If structured properly, leasing can provide a 100 percent tax write-off. It can also offer you the option of deducting 100 percent of the lease payment as a pre-tax business expense. Be sure to consult your CPA in these matters.

In addition to this, it is easy to measure monthly payments for equipment leases. Thus, it is easy to establish whether or not a particular asset is producing the appropriate revenue to pay for itself and producing a profit for the company. In the leasing agreement, you can include clauses that will allow you to retire equipment that is sitting idle and not generating income.

In many cases, the leasing company assumes and manages the risk of ownership of the leased equipment. At the end of the stated lease term, the leasing company is responsible for the disposition of the asset, relieving you of burden and expense. Some lease structures allow you to keep the equipment, if you want, by purchasing it for a nominal fee – in some instances, as little as one dollar.

You can structure leases to keep pace with technology by including upgrade clauses or adding equipment clauses. And you can achieve this while satisfying the financial aspects of your business by using lease structures that allow you to customize a program that addresses your requirements for cash flow, budget and transaction structure.

Certain types of leases help you better manage the balance sheet and improve your overall financial picture by conserving operating capital and freeing up working capital and bank credit lines. Some leases can be structured for no down payment – 100 percent financing. You can also match the term of the lease to the useful life of the equipment. Many lessees choose to structure their leases to include repairs and maintenance, if needed.

There are many other advantages to leasing that you should consider when contemplating equipment acquisition or facility improvements. But you should make sure you have someone on your side who will ensure that the particular spins you require are written into the lease. Also, it is very important to have someone who knows how to shop the exigencies of your lease. Some lenders won't even talk to you if your lease is under a million dollars. You must consult an accountant.

Companies like Sony offer some rather creative funding: nothing down and pay nothing for a year or more.

There is one important point that bears repeating: the primary value of equipment is its use, not its ownership. And leasing may be the best way to get the equipment you need to use. BE

Larry Bloomfield is a consultant in the broadcast industry. The author wishes to thank the following organizations for their assistance in preparing this report: Acrodyne Industries (www.acrodyne.com), Arrow Capital (www.arrowcapital.net), Balboa Capitol (www.balboacapital.com), GE Capital Commercial Equipment Financing (www.gecapital.com), Harris Broadcast Financial (www.secure-eleasing.com/broadcast/home.html), RAF Consulting (www.RAF-Consulting.com), SC Research International (www.SCRI.com), Thomson Multimedia (www.thomsonbroadcast.com) and Tyco Capital/CIT Financial Group (www.tycocapital.com).

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HDTV and tough love

BY PAUL MCGOLDRICK

Making massive changes in technology is not easy on consumers. The move from vinyl to CD, for example, was slow – probably because people had a huge collection of discs and everything still worked. If the music industry had pulled the plug on vinyl at the same time as introducing CDs, change might have been faster, but the ire of the consumer would have been raised. I had more mental problems moving from reel-to-reel tape to cassettes because the quality was so much poorer, but the general public loved the enclosed tape system – as did Dolby.

The absorption rate of VHS was really quite fast. Apart from that little frisky fight with Beta the consumer was being offered something completely new in the domestic world. The ability to record a program when you wanted to was a welcome relief from always having to be at home when your favorite show was on. But did you see a shift to S-VHS? No, the consumer didn't get the message, video stores didn't stock S-VHS tapes and the receiver manufacturers didn't make products with Y/C inputs until much later.

The move to DVD has been staggeringly fast. It is not perhaps a quality issue to most consumers. Many are still hooking up their DVD players using the composite output. Others have gone to Y/C or component, but the majority of users love the added value of outtakes, the story of the making of the movie and the ability to jump chapters. Few of them get annoyed at the lip sync problems that will occur if you stop a disk for a bathroom break. It seems that optical storage has become synonymous with the digital age, and we all know how good digital always is, don't we?

In the UK, when it was decided to go color in the 1960s, it was also decided to go from VHF to UHF, with 625 lines, for the new services. The duplication in monochrome on the down-converted 405-line VHF network was a gift to those who couldn't afford a new receiver. But many families, like my own, had no problem converting because – as was extremely commonplace in the UK – our TV was rented. In the early, unreliable days of television, that was a sensible thing to do. Line output transformers in the receivers in my house seemed to average a nine-month life! And if the technician who came out couldn't repair a receiver on the spot then it was immediately swapped out. The conversion to color, and UHF, was surprisingly fast for much of the population.

The adoption of NTSC was achieved by using a back-compatible system that provoked jealousy.

In the United States, the adoption of NTSC was achieved by using a back-compatible system that provoked jealousy. You might be watching a program in monochrome, but we might be watching in color. Guess where the neighbors wanted to drop in to visit.

We don't have the same luxury with DTV and HDTV. There is little or no peer pressure to jump on the digital video bandwagon. Some of us watch DTV anyway, from the satellite or cable, but the change to accepting completely new equipment for HDTV is a big jump.

I have said time and time again that the reason people will adopt a new technology is content. For audiocassettes it was the convenience of playing things you wanted to hear in a vehicle. For DVD it has been the additional content over and above that on the VHS tape. For faster adoption of HDTV it will also be content. If *Monday Night Football* was available only on HDTV then the number of receivers sold would multiply by a factor of ten overnight. We shouldn't miss an opportunity to spell out the quality and vividness of HDTV.

The decision of NBC to cover the Winter Olympics in HDTV was an opportunity to plug the technology in a massively positive way. But the way the company decided to go about it was incredibly silly. HDNet's Channel 199 on DirecTV was chosen as the champion for the programming, but the decision was made that coverage would be from the previous day's events. So, if you wanted to watch HDTV you had to bear up to the fact that the gold in every event would be discussed around the water cooler before you saw it – and you avoided newspapers and the news for a couple of weeks.

I loved the quote from Jack Sander, the chairman of the NBC Affiliate Board: "We support and applaud NBC for this innovative effort... we believe this allows for the growth of high-definition television while protecting the core Olympics, NBC and local stations throughout the country." The only thing this decision did was to protect the affiliates. HDTV is not an easy change for consumers. It can be made easier by denying them programming that they can otherwise get elsewhere. Call it tough love. **BE**

Paul McGoldrick is a freelance industry consultant based on the West Coast.

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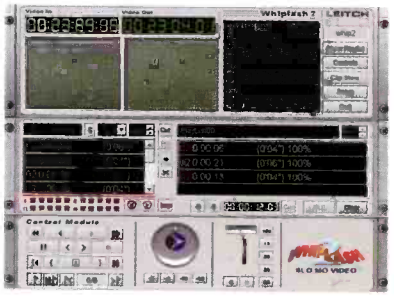
Trash the tape!

Get WHIPLASH SLO MO VIDEO

- *All the advantages of DISK vs. TAPE*
- *Simultaneous record and playback*
- *Instant access to replays*
- *User-friendly operation*
- *One operator for five channels*
- *Lower maintenance cost*
- *No heads to replace*
- *Less space required*

Easily integrated into any production environment and providing instant advantages, Whiplash2™ allows you to gradually transition to disk by replacing one aging slow-motion VTR at a time.



Whiplash2 is designed for the fast-paced environment of live sports. Now you can record an entire sporting event from different camera angles without interruption, while executing simultaneous slow motion replay on demand.

And you can even use Whiplash2 to provide limited playback of pre-recorded clips such as bumpers, promos and commercials on a stadium videoboard.

At last, network-quality slow motion is not limited to those with network-sized budgets. So isn't it time to trash the tape? **Put Whiplash2 on the job today.**

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