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— Craig Reeves, Audio Engineer

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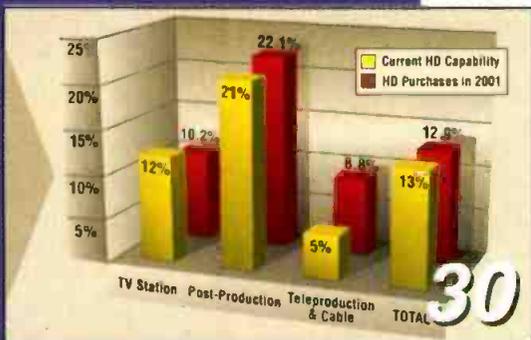
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“There’s nothing better..”

“DVCPRO50 clearly builds on DVCPRO25, which has been an excellent workhorse format for us. We knew how reliable DVCPRO50 would be. It’s cost-effective and the quality is excellent—there’s nothing better for our needs.”

- Dale Kelly, senior vice president, Pappas Telecasting



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FREEZE FRAME

A look at the technology that shaped this industry.

Camera technology

Ikegami has a long history of providing key technology in its broadcast cameras. But do you know what the "HL" in the model nomenclature originally meant? Enter by e-mail. Title your entry "Freezeframe-February" in the subject field and send it to: editor@intertec.com. Correct answers received by April 1st, 2001, will be eligible for a drawing of *Broadcast Engineering* T-shirts.

BROADCAST
engineering

WHAT'S AHEAD: 1979-2



ON THE COVER: HD VISION's high-definition linear online edit suite incorporates a wide range of design features that allow for ease of operation. Photo credit: Michael Penn Smith.

If you don't sound good, you don't LOOK good.

For desktop video production, presentations or multimedia authoring, sounding good means using the best audio mixer you can plug into: The VLZ[®] PRO compact line from Mackie Designs.

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Jumping into the stream

A January report from DFC Intelligence (www.dbpwebcasttrack.com) shows that video streaming on the Internet grew by 215 percent in 2000. More than 900 million streams were accessed. Of those, almost 29 percent were handled by broadband delivery. In addition, the report said that as much as 15 percent of available stream inventory included “in-stream” advertising.

Does anyone besides me smell opportunity here?

The report’s author, says that right now broadcasters are missing a great streaming opportunity. Currently, local stations’ websites have miniscule audiences. Despite a relatively high audience rating for their on-air signals, most stations’ associated websites are visited by relatively few people.

That’s not the same case when comparing OTA broadcast news with cable broadcast news networks. For example, ABC’s broadcast news program has a significantly higher audience rating than does, for example, CNN. However, Colombo points out there is what he calls a “ratings inversion” when you look at websites. In other words, CNN’s website audience ratings are higher than ABC News’ website ratings.

This dichotomy reflects a challenge and an opportunity for broadcasters. It means that local stations’ webcasts are not likely to become a significant factor in audience attraction or revenue generation. Merely repeating what you do on-air won’t drive audience to your site.

Making your site “larger” than your on-air broadcasts is the key to setting your website apart from its competition. For instance, how much of your syndicated programming is available on your website? How about any locally produced, non-news programs? Do you have agreements with any other stations, perhaps fellow affiliates, to share programs for your Internet sites? Why not?

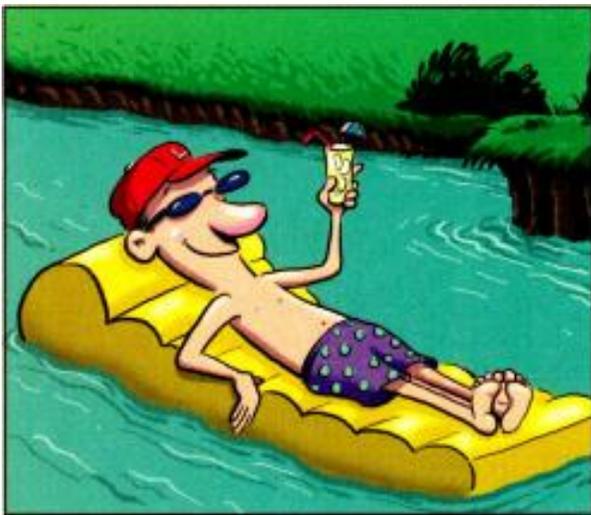
To really grow a station’s Internet presence, there will need to be a cooperative business model developed by local stations. There will need to be groups or even supergroups of stations that combine to produce and cooperatively share (read: syndicate) their programs.

The FeedRoom is a good example of how stations can work together to enhance the online news experience. By exchanging news stories from stations around the country and combining with international partners like CBS, Reuters and USA Today, affiliates gain programs that can be used to enhance the profile of their websites in the market.

And with NAB coming up, there’s no better place to find the how-to hardware. The show will be filled with new products to help you create, edit and stream programs to the Web. Recently announced Web solutions include the FlipFactory from Telestream, the WebSTATION from Parkervision and the 7000 series of products from eStudioLive. These products have been specifically targeted to those who already have content but need efficient ways to repurpose it to the Web.

During the next year, *Broadcast Engineering* will be highlighting the work of some of the leading edge stations out there. If your station is doing some interesting things on the Web, drop me a note.

Don’t forget to check out the *Broadcast Engineering* website, a member of the Digital Media Network, www.digitalmedianet.com. You’ll be able to link to other Intertec publications like our new magazine, *netmedia* and its website, www.netmedia-online.com. Also, look for this icon throughout *Broadcast Engineering*. It’s your key to finding additional information and articles on the *BE* website.



Brad Dick

Brad Dick, editor



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SMPTE responds

Dear Mr. Dick,

As President of the SMPTE, I'd like to respond to the letter from Paul McGoldrick published in the December 2000 issue of *Broadcast Engineering*. In this letter, Mr. McGoldrick takes the SMPTE to task over a few things, and at the end of his letter he tenders his resignation as a SMPTE member over his frustrations with the Society. Speaking for the entire Executive Committee of SMPTE, I can say I'm sorry that Mr. McGoldrick feels the way he does and we wish he would reconsider. No business or association likes to lose a good customer, and we all know how much harder it is to recapture dissatisfied customers than to find new ones.

Mr. McGoldrick's article challenges SMPTE's current viability and relevance as a professional and standards-setting organization. This is of concern to many of us within the organization as well. For most of the past year the Executive Committee, Board of Governors, and Headquarters Staff have participated in a Strategic Planning exercise facilitated by PriceWaterhouseCoopers, a preeminent business and organizational consulting firm. The purpose of this exercise has been to identify areas critical to the growth and general welfare of SMPTE and to re-energize the energies of its officers and members in pursuit of these worthwhile and value-enhancing goals to the benefit of the general membership and to the broader technical fields we serve.

One of the areas that Mr. McGoldrick gazes critically upon is the changing nature of SMPTE's standards work. He suggests that the standards making process today lacks some of the rigor and deliberateness of a more reflective time, and may be tainted by commercial interests. This perception must be addressed because standards work is central to what SMPTE has to offer current

and future members. We need to remember that in 1999 the standards and engineering groups within SMPTE approved, reaffirmed, or revised 89 engineering documents, and an additional 11 were approved in January 2000 alone. There are now more than 226 SMPTE Standards, 161 Recommended Practices, 32 Engineering Guidelines, and literally dozens more in development. This high level of output is truly amazing considering the very changes and pressures Mr. McGoldrick cites as being counterproductive to the standards work of the Society.

Early in January 2000, the SMPTE formed yet another technology committee, DC.28, the Digital Cinema Technology group, to look into all phases of the digital distribution and exhibition of motion pictures. At early meetings, there were over 250 participants from 110 different companies. Many representatives were from the creative community and organizations representing end-users and practitioners, such as the MPAA, NATO, the ASC and ACVL. There is great relevance in this, and no chance for commercial bias.

Mr. McGoldrick notes that he spent a long tenure of service overseas in Nigeria and that when he returned the organization "had changed profoundly." The suggestion is the Society had lost not only domestic relevance but had little to offer on the international front as well. The exact opposite is actually the case. As an example of heightened international credibility, I would point to the joint task force of the SMPTE and the European Broadcasting Union (EBU). This entity was formed in 1996 to look into the challenges, roadblocks and standards issues as worldwide broadcasting transitioned from analog to digital. An advanced summary of this report was presented at NAB in April of 1998, and a final report was presented to an enthusiastic and appreciative overflow audience at IBC in Amsterdam in September 1999. This study involved

the voluntary contributions of hundreds of people working on two continents and, given its impact on standards and broadcasting practice, was considered to be one of the most significant achievements ever of both groups.

There are several other points raised by Mr. McGoldrick that could be debated, but editorial space is limited. The critical point, as I mentioned at the outset, is the one about whether SMPTE is flat and unappealing to its audiences, or whether it has and is reaching out effectively to new audiences and to allied creative and technical associations. Let me close and address this with a recent quote from a respected technical writer, Debra Kaufman, writing in the January 2001 edition of *American Cinematographer*. In commenting about the 142nd Technical Conference and Exhibit in Pasadena in October, she writes, "and whereas past conferences have been the focus of arcane technological discussions that only an engineer could love, this year's event had much to offer the broader motion-picture and television community."

Give us another shot, Mr. McGoldrick. We're ready when you are.

Sincerely,

JOHN L. MASON
PRESIDENT
SMPTE

Update on NEC

NEC takes exception to Dr. Digital's comments on product support. "We've always been here to support our customers," says John Leahy, NEC America's Sales Manager, Broadcast Equipment Department. Readers should note that NEC has recently moved offices. Here are the new telephone numbers and address.

NEC America Inc. Broadcast Equipment Department

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Irving, TX 75039-2402

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214-262-3642 Main

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*Dave Mazza, Vice President of Engineering
for NBC Olympics.*

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*George Hoover, Senior VP
and General Manager of NEP.*

"The Canon Digi Super 86xs gave us memorable shots that made a definite impression on our viewers. It worked especially well in our Super Slo-Mo setup, by allowing us to live at the end of the lens in night game situations. The Image Stabilization worked very well to ensure that even the tightest shots - of the pitcher's fingers as he released the ball, for instance - were also totally smooth."

*Jerry Steinberg, VP of Field Operations for Fox
Sports commenting on the recent World Series.*

"When we saw this at NAB we were sold on the specs alone, but seeing the Image Stabilization in operation made the decision to pick them up immediately."

Dan Grainge, VP of Fletcher Chicago.

"When we got into the long lens market we wanted a lens that was the market leader and Canon's 86x with built-in Image Stabilization is just that."

Marker Karahadian, President, Plus 8 Video.

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Canon's 86x lens, the longest lens with built-in Image Stabilization technology, taking in all the action at the 2000 Summer Olympics in Sydney, Australia for NBC.

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Freeze-frame winners

With all the hullabaloo on HDTV receivers, we've not had space to list the recent Freeze-frame winners. Here are readers who will receive *Broadcast Engineering* T-shirts because of their correct answers to Freeze-frame questions. This month's question is on page 8.

October question: In May 1970 *Broadcast Engineering* carried a story about a Panasonic prototype "high-speed video tape printer." The system used a two-inch master tape and promised that "one day soon, [video tape recording] will

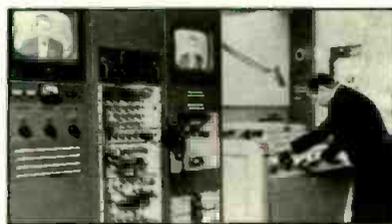


become a practical home activity." Name the Panasonic video recording device shown in the photo.

The device in question was a "High Speed Video Tape Printer." It used a "contact process" between master and dup to generate the copy.

October winners:

Karl Sargent, Director of Engineering
California Oregon Broadcasting
Patrick O'Brien, Chief Engineer
KATC-TV, Lafayette, LA



November question: Name the month, year and network that used the first tape-delayed (VTR) broadcast. The answer was "Douglas Edwards and the News," CBS, Nov. 30, 1956.

November winners:

Don Eckis
KEPR-TV, Pasco, WA

Tom Anderson
KHQ-TV, Spokane, WA

Dan Barton, Sr. Antenna Engineer
Andrew Corp., Orland Park, IL

Adi Doron, Tel Aviv

Andrew Henry, A-Channel Engineering
Calgary Alberta, Canada

Tim Stoffell
KNPB-TV, Reno, NV

(Tim even knew that playback was on an

Amplex VRX-1000, one of only 16 hand-built machines. Readers may want to view his collection of VTR photos and information at: www.lionlmb.org/quadpark.html.)

Michael Seidi
WOSU-TV, Columbus, OH

Roger E. Wilcox
WJW-TV, Cleveland, OH

Albert Abramamson, Las Vegas
(Albert added that the program was 15 minutes long and taped at TV City in Hollywood. The operator was John Radis.)

Bob Woodward
KAET-TV, Phoenix, AZ

Garen Braun
KGAN-TV, Marion, IA

Tom Brotsky
KPTH-TV, Sioux City, IA

Lee Anderson, Dublin, VA

Matt McCullar, Arlington, TX

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Because it includes all the channel-branding features and power of Oxtel's Imagistore, the de-facto standard for automated master-control. Features include: logo generation and keying, interstitial, clip and still storage and internal DVE for dynamic programme junctions. Presmaster also incorporates a powerful audio mixer with new options for 5.1 audio support.

But doesn't all that power make Presmaster difficult to operate? Absolutely not. Support for all standard switcher functions is always one button away to ensure quick and familiar operation. But, if you want to go deeper, a series of attractive and ergonomic, color touch-screens guide you through the most complex of set-up procedures and parameter entry.

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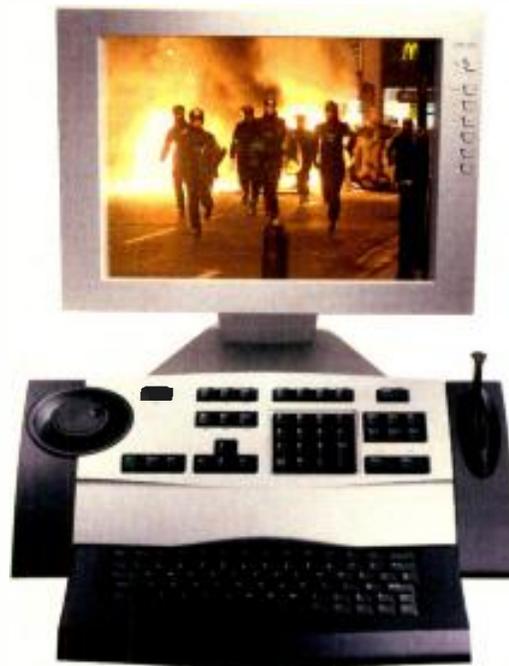
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News

Tests support 8VSB

BY BE STAFF

COFDM appears to have lost a significant battle according to a report presented in early January to a closed industry meeting sponsored by NAB and MSTV.

DTV reception tests were conducted in the Washington D.C./Baltimore area and Cleveland in late summer. The Washington/Baltimore tests relied on transmission from four different UHF DTV stations at some 200 outdoor and 45 indoor locations. The Cleveland tests involved transmissions from a low-channel VHF DTV station to about 100 outdoor sites and 20 indoor sites.

The outdoor receive antennas were positioned at elevations of either 30 feet or 6 feet. Indoor antennas were also used at each test site. According to an early report draft, the Washington/Baltimore location presented DTV signal challenges from severe multipath, interference and low signal areas. The Cleveland location suffered from impulse noise and other RF propagation

characteristics associated with low VHF operation. Because the Cleveland DTV facility (channel 2) was collocated with an

portable DTV applications. Successful indoor reception at the Washington/Baltimore sites was achieved at

Neither system exhibited the level of reliability that would be required of a practical broadcast service based solely on service to indoor antennas.

NTSC facility (channel 3), the tests also compared DTV and NTSC performance.

Did 8VSB get a KO?

The results reportedly show that in outdoor tests, VSB enjoyed a 75 percent success rate in the Washington/Baltimore area and 73 percent in Cleveland. COFDM signals were less receivable, scoring only 48 percent in the Washington/Baltimore area and 60 percent in Cleveland. Neither modulation scheme performed well for indoor DTV reception or in mobile or

only 30 percent of the sites for either modulation. Reception success with either modulation method on the six-foot antenna was not much better, only 50 percent.

The apparent besting of COFDM by VSB prompted Nat Ostroff, vice president, New Technology, Sinclair Broadcast Group to fire off a strongly worded response to the report. He claimed that the COFDM receivers' front-end design was defective. The receivers, according to Ostroff, were configured with an unprotected high-gain preamplifier connected directly to the antenna input. Without an input bandwidth filter, Sinclair suggested that the receiver's preamp was being overloaded by extraneous UHF, VHF and FM signals.

To support its contention, Sinclair then conducted its own set of tests. These tests used two BT COFDM DTVM 200(T) receivers obtained from the Canadian Research Center. At seven locations, using a COFDM signal from WBAL-DT, Ostroff reported that the COFDM receivers were easily overloaded and desensitized by 3dB to 7dB at all seven test sites. The same seven sites were then checked by switching into the antenna feed a bandpass filter that provided a broad (approx 40MHz 3dB bandwidth) pre-selection of the off-air signal prior to being fed to the receivers. The results were dramatically different and are summarized in Table 1.

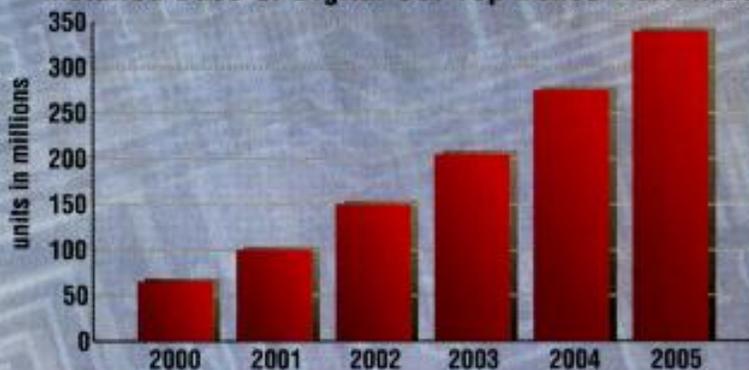
FRAME GRAB

A look at the issues driving today's technology.

DTV broadcasts will help drive STB market—but not yet.

It could be 2003 before OTA DTV helps STB sales take off.

Installed Base of Digital Set-Top Boxes worldwide.



SOURCE: Allied Business Intelligence www.alliedworld.com



TALKS WITH **KELLY HARRIS**
AT
KTVT

KTVT's jump into the HDTV digital age is a milestone. With boards like the CS2000 and the System 5, everything is much easier.

What is so great about Euphonix that has made you a returning customer?

"I am the CS2000's biggest fan. So even though the System 5 demo blew our socks off, it was years of reliability from the CS2000 that sealed the deal."



How has the System 5 held up to your expectations?

"As great as I thought it was when we bought it, I think it's even greater now."

How flexible is the system 5?

"When I see the same board we use for live broadcast being used by the film and music industry, I can't help but think that's pretty flexible."

"The main advantage we have with our Euphonix boards is that we can spend all our time working on the live or taped show. There isn't the wasted time of board resets and patching inputs."

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The Sinclair tests showed that without the bandpass filter, COFDM reception was intermittent or not possible at all seven locations. Reception from VSB signals was possible at six of the seven locations. However, when the bandpass filter was switched into the antenna feed, COFDM reception was possible at all seven locations. The reason for VSB's success over COFDM in the earlier MSTV/NAB tests was, according to Ostroff, that the VSB receivers included input filtering. Ostroff called the MSTV/NAB's use of COFDM receivers without similar protective channel filters as a "gross engineering error."

Overall, the preliminary report doesn't offer much hope for OTA broadcasters' DTV future, stating "...although some viewers would be able to enjoy indoor reception with either system, neither system exhibited the level of reliability that would be required of a practical broadcast service based solely on service to indoor antennas." This emphasizes the crucial issue for broadcasters, the requirement for DTV must-carry by cable.

Despite the wrangling, sources report

Site	VSB Reception	Power (dBm)	COFDM Reception w/o BPF	WNUV Relative Level (+dB)	COFDM Reception with BPF	COFDM Receiver de-sense w/o BPF
1	Yes	-68	Intermittent	~40	Yes	4dB
2	Yes	-71	No	~42	Yes	4dB *
3	Yes	-52	NO	~44	Yes	5dB *
4	Yes	-57	No	~37	Yes	4dB *
5	Yes	-62	No	~30	Yes	3dB *
6	Yes	-56	Yes	~20	Yes	4dB
7	No	-53	Intermittent	~24	Yes	7dB

*scaled

Table 1. Sinclair COFDM/8VSB tests show that with proper input filters, the COFDM receivers performed well, decoding DTV signals at all seven test sites. However, when the receivers were configured similarly to the MSTV/NAB tests, the COFDM receivers failed in six of seven trials. Source: Sinclair Broadcasting.

the Committee adopted a non-binding resolution by a 26-3 vote. The resolution states in part: "We conclude that there is insufficient evidence to add COFDM and we therefore reaffirm our endorsement of the VSB standard. We therefore will take all necessary steps to promote the rapid improvement of VSB technologies and other enhancements to digital television and direct the staffs to develop a plan and promptly submit it to the Boards."

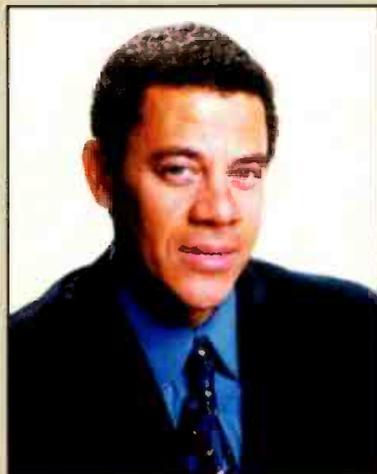
The latest report conflicts with the DTV tests conducted by other countries. In similar shootouts, five countries have recently announced the adoption of DTV (COFDM) technology: Australia, Brazil, Hong Kong, India and Singapore. The United States group has planned a Phase Two round of testing. However, given the first round's results and the Committee's apparent support for VSB, it remains unclear which companies might participate. ■

Kennard bails

BY LARRY BLOOMFIELD

At press time, FCC Chairman William E. Kennard announced his resignation to coincide with the end of President Bill Clinton's term.

Like him or not, Chairman Kennard ran the FCC during a time when highly controversial and far-reaching events occurred. Probably the most significant milestone during his three-year tenure was the implementation of the Telecommunications Act of 1996, successful legislation that brought competition to communications markets, and encouraging the rollout of broadband and digital technologies. He proudly



noted the Commission had expanded access to technology for all Americans and improved the very Commission itself through reorganization. He claimed credit for creating a market where "monopoly is ended, innovation and entrepreneurship are cherished, and consumers have competitive choice." Another action Kennard championed was the controversial low-power radioservice (LPFM), the scope of which was later scaled back by Congress. He also

takes credit for reducing telephone rates both domestically and internationally.

While some industries may view Kennard with appreciation, the

broadcast industry saw a different picture. Many broadcasters view Kennard as weak in the establishment of new regulations for cable companies and TV set manufacturers. At the same time, he applied draconian measures to his regulation of TV broadcasters, his actions requiring every broadcaster to spend millions of dollars on digital upgrades without the certainty of cable carriage.

Kennard will serve as a Senior Fellow at the Aspen Institute Communications and Society Program in Washington, D.C. He will advise them on leadership, communications policy, and program activities and operations. He will also become the first chairman of the program's new advisory board.

FCC Commissioner Michael Powell is predicted to be his successor as Chairman. ■

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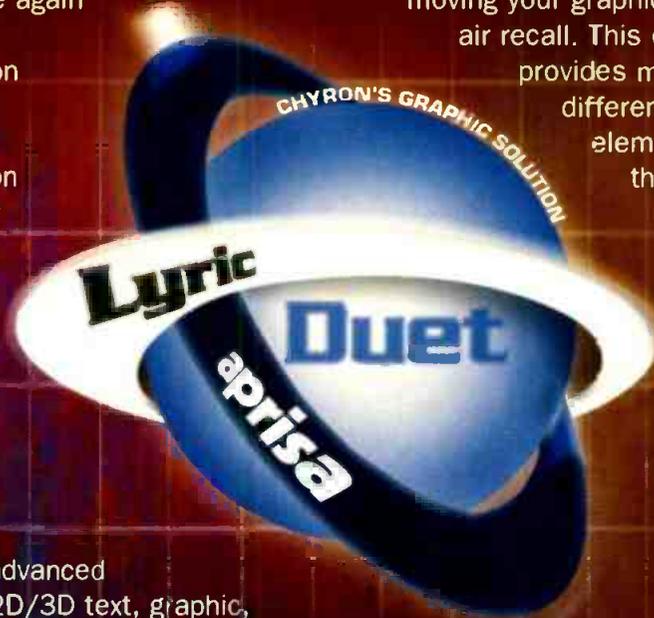
Years after the introduction of their iNFInIT! Character Generator, Chyron's Duet, Lyric, and Aprisa systems are **breaking sales records**, while providing the industry with enhanced graphic tools at very competitive prices.

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In the words of one customer, Chyron's Duet running Lyric Character Generator and the Aprisa Video Graphics Server "lets us push out twice as much volume - all at the high standards our viewers expect. It allows us to not only maintain quality, but also to increase it." Perhaps that's why when more and more broadcasters take a closer look at Chyron's powerful, integrated graphic solution, they like what they see.



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HD is coming ... or is it?

BY MAX UTSLER

The major television manufacturers represented at the 2001 Consumer Electronics Show in Las Vegas all agree on one thing — HDTV is just around the corner.

Unfortunately, they can't agree on what corner.

John Taylor, vice president of Public Affairs and Communication for Zenith, calls 2001 a "breakout year" for HD. Of course, one of the reasons he dubbed it so was the convention-timed announcement of a 27-inch HDTV for under \$1000. HD is just a \$699 converter box away. Zenith was also demonstrating a full-line of dual-tuner sets, ready for HDTV without a converter box.

Taylor said Zenith was calling 2001 a turning point because "more stations are coming on the air. More product is available, and HDTV is the centerpiece application. We're starting to hit some affordable price points." Taylor said Zenith had not stalled on HD, that "we always intended this to be a slow transition."

"Digital is hot," said Jonas Tanenbaum, national marketing manager for Panasonic. "We've really taken off in the last 12 months." Tanenbaum said Panasonic had sold more digital than analog big screens in 2000.

Sharp and Philips provide a more modest prediction for the future. Frank DeMartin, Sharp's director of product

marketing said, "HD-compatible is the market today. We won't begin offering full HDTV until 2002.

The demand is just not there." DeMartin said the real problem for Sharp had been the resistance of broadcasters. "We had wanted to be the leader (in HDTV), but we're more conservative now." He said he expected to see a big push from Congress

and the FCC in the next year or two to help ensure that broadcasters met the 2006 deadline.

James Jolliffe, staff engineer for Zenith, said he saw the HDTV market boom coming in the next 12 to 18 months. "The price has to come to \$1500 to \$2000 before you get out of the

"HDTV is the centerpiece application. We're starting to hit some affordable price points."

analog market. Even then, lower analog prices will help maintain that market."

Data from Vantis Research that suggested at least some of the audience felt unrestricted by price. Bob Gatton, national marketing manager for Philips, said the Vantis study predicted 600,000 pieces of plasma sold by 2006. Rear projection, in spite of being on the market for a number of years, didn't hit



Representatives at CES predict 600,000 pieces of plasma sold by 2006.

one million pieces until 1998.

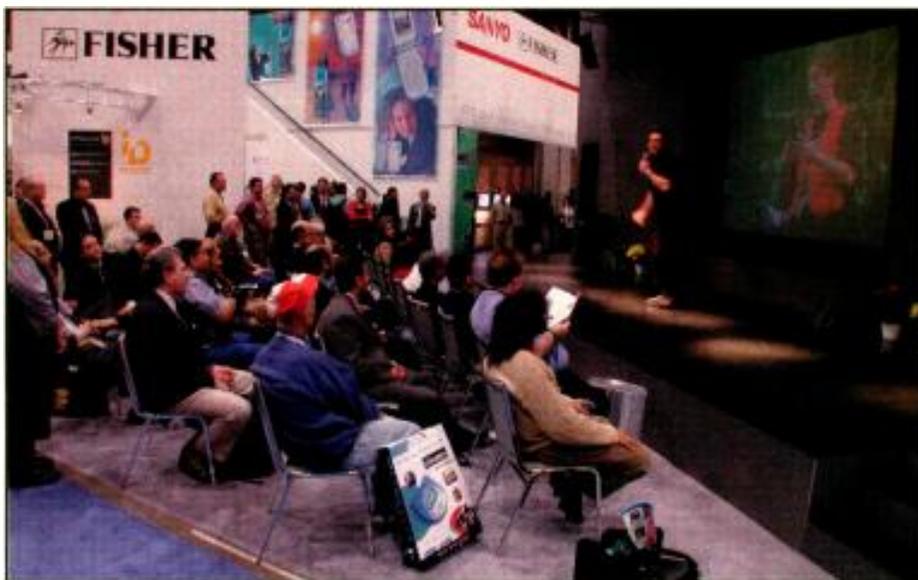
JVC and Sanyo provided the longest-term predictions for a breakout of HDTV. "We're carefully watching what's going on," said Dan McCarron, national product specialist for JVC. "We still have a lot of unresolved content issues, but we're pleased the FCC has become more involved with the manufacturers."

McCarron said next year is probably not a breakout year for HD, but "it's coming. We'll still be selling more analog than digital, just like everyone else." JVC will ship its first HDTV set in April of this year.

David Berkus, corporate manager of marketing communications for Sanyo, said his company was simply waiting for the mass market. They are using the same strategy that served them well in the portable CD business. "When you find HDTV in at Wal-Mart, you'll find Sanyo," said Berkus.

The companies also disagreed over the FCC's willingness and/or ability to enforce the 2006 digital conversion deadline. But all agreed they would be gearing their efforts with that date in mind. That gearing includes educating retailers as well as consumers.

As John Taylor of Zenith put it, "Consumer research shows they [consumers] have to have it [HDTV]. Maybe, they just can't afford it." ■



It remains to be seen if the relatively upbeat attitudes toward HD seen at CES will translate to action by broadcasters at April's NAB.

Dr. Max Utsler is with the William Allen White School of Journalism at the University of Kansas.

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DTV buildout

BY HARRY C. MARTIN

May 1, 2002, is the deadline for commercial stations in the top-30 markets to complete construction of their DTV facilities. In the past the FCC has granted time extensions to broadcasters who have had DTV transmitter site problems. NAB reported last year that 21 stations in the top-30 markets experienced problems that required extending their Nov. 1, 1999, deadline. Here is a summary of the problems that led to the extensions:

- New York: Two stations experienced delays in negotiating with the World Trade Center for tower space.
- Chicago: Two stations could not meet the deadline because they were unable to reach lease deals with the Sears Tower. Another station experienced technical problems when its signal interfered with cable boxes.
- Seattle: One station missed the deadline because of equipment delivery delays.
- Minneapolis: Three stations were unable to complete construction because of winter weather. Also, an analog tenant had not vacated one of the sites.
- Miami: One station failed to meet the deadline because of FCC delays in approving a site change.
- Denver: Local zoning authorities refused to approve towers for two stations at Lookout Mountain, and a third station went on the air with low power from another location.

- Pittsburgh: One station did not meet the deadline because it needed a new tower and new equipment.

- Sacramento: A one-year delay was caused by problems in obtaining equipment.

- St. Louis: Equipment delays postponed one station's DTV operations for one year.

- Orlando: Three stations were delayed for more than a year because of zoning and FAA issues.

- Hartford: Two stations were delayed because of zoning, tower space and potential interference with an analog station.

- Raleigh-Durham: Hurricanes delayed the construction of DTV facilities with one station's delay reaching more than a year.

As the above cases indicate, time extensions have been granted where antenna sites have been unavailable, equipment deliveries have been delayed or where other factors beyond the control of the licensee have prevented construction. Economic hardship is not considered a valid reason for an extension.

FCC rejects "dual-carriage" rights for DTV

The FCC has tentatively ruled that cable systems will not have to carry both DTV and analog signals of the same television broadcaster. However, once a TV station turned in its analog channel and continued on a digital-only basis, must-carry rights would be available but for only one DTV "primary video" channel. This means that stations choosing to multicast several streams of programming would be limited to one channel on local cable systems. The Commission's decision on dual carriage will be revisited in connection with further deliberations in the DTV cable carriage docket.

Many observers view the Commission's delay in dealing with the DTV

must-carry issue as a primary impediment to the implementation of DTV. The decision to back away from dual carriage and to require carriage of only a single DTV channel is expected to create further delays and uncertainty.

FCC studies interactive TV

The FCC has adopted a Notice of Inquiry on interactive television ("ITV") services. The FCC said that comments filed in the AOL-Time Warner merger proceeding raised the possibility that a vertically integrated cable operator / ITV services provider could discriminate in favor of affiliated interactive services. The FCC initiated this proceeding to develop a complete record and to determine whether rules of general applicability should be considered to ensure that ITV services develop in a competitive fashion.

The NOI seeks comment on a suitable definition of ITV services and identifies three major technical "building blocks" needed to provide ITV service: a video pipeline (e.g. an MPEG video stream); a high speed Internet Protocol connection (at least on a forward-going basis); and specialized customer premises equipment (i.e. an ITV set top box). It then seeks comment on whether any particular multichannel video-programming distributor ("MVPD") (e.g. cable) has or will have a substantial advantage in delivering ITV services.

The NOI also requests comment on whether a vertically-integrated MVPD (e.g. AOL-Time Warner) that itself offers ITV services, would have the incentive, in addition to the ability to discriminate against unaffiliated ITV service providers and if so, whether a nondiscrimination requirement should be imposed. ■

Dateline

TV stations in the following states must file their biennial ownership reports on or before April 1, 2001: Delaware, Indiana, Kentucky, Pennsylvania, Tennessee and Texas.

On or before April 10, each commercial TV station must file with the FCC and place quarterly Form 398 (Children's Programming Report) in its public file for Jan. 1-March 31, 2001.

A new form is scheduled to be in use by the April 10 deadline.

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

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By the Numbers

BY BRAD DICK, EDITOR

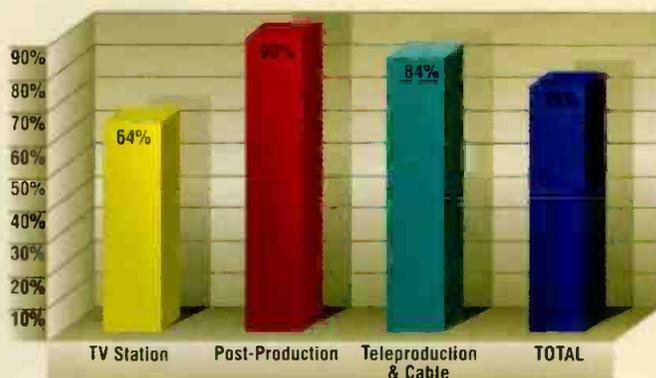
This month we begin a six-part series on the technology plans for broadcasters, cable systems/networks and production facilities. This state-of-the-industry series is based on the latest survey information from the Intertec Research department. The data presented here launches a year-long, six-part examina-

tion of how the broadcast and production industries are proceeding along the digital path. We'll look at spending plans, budgets and the equipment needed by these facilities. Additional surveys will be conducted throughout the year, so many of you will have the opportunity to participate in the project.

The goal is to help you better understand how industry dynamics may be playing out. This series of articles will help you develop an unbiased, authoritative position on some key issues for our industry. And as an aside, it might also help you know what your competition's planning. So, here we go... by the numbers.

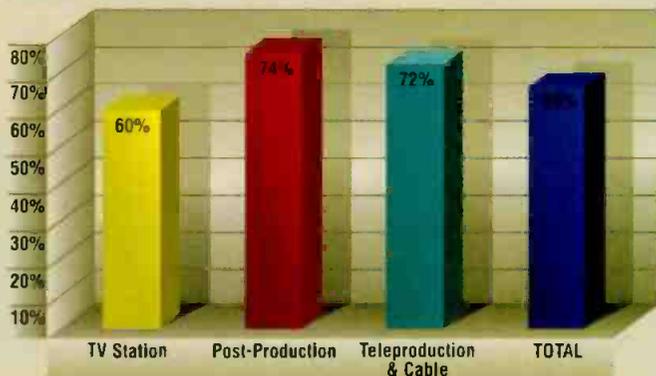
The race to digital.

Not surprisingly, post facilities lead the pack in already having digital facilities. Fully 90 percent report having at least some or all of their facilities already converted to "digital." Unfortunately, TV stations are bringing up the rear. About two-thirds reported having already converted at least some of their production areas to digital.



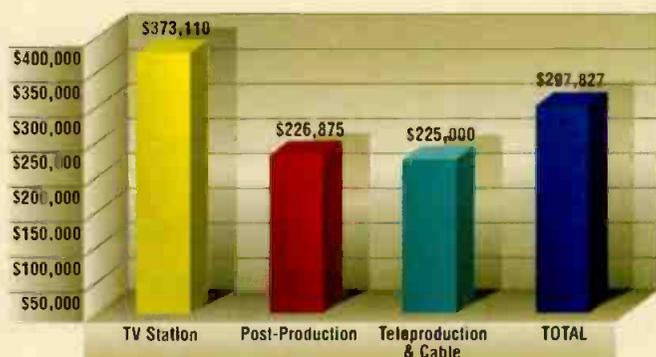
Do you plan to upgrade or replace production areas this year?

Post production readers also lead when it comes to upgrading their facilities. Almost three-quarters of these readers and almost as many of the cable readers said they planned to upgrade their facilities in 2001. That's almost 15 percent higher than TV stations' plans. Even so, close to two-thirds of TV respondents said they planned on upgrading their production rooms to digital this year.



Budgets and big spenders.

While TV stations may be slower adopters, they are definitely the big spenders. The average TV station's budget for production room upgrades is \$373,110. Production facilities and the cable sites will spend a little less, averaging just over a quarter million per facility. Measured overall, the production equipment market looks good with an average budget per facility of almost \$300,000.



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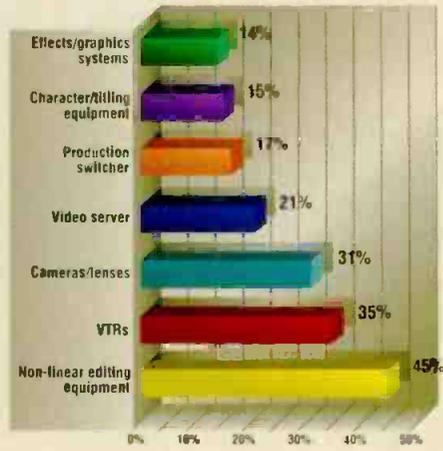
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Top equipment picks.

This chart details the type of equipment that facilities plan to buy. It's clear that NLE has matured, as almost one-half of all facilities plan to buy new digital NLE systems this year. It's also safe to say that "Tape is not dead," as more than one-third of the facilities plan to buy VTRs.



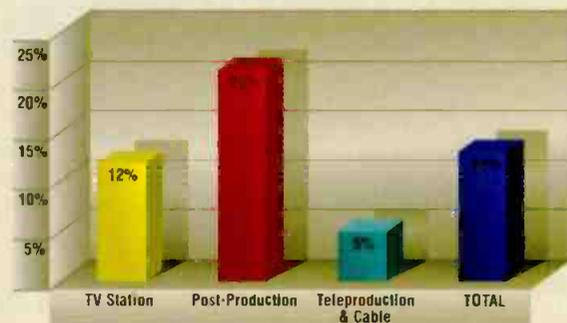
An HD implementation schedule.

Putting your money where your mouth is applies especially to expensive HD equipment. Respondents were asked when they expected to add HD capability. Measured over all responses by facility category, TV stations don't see adding HD production capability until 2005. Cable and production facilities are a year earlier, 2004.



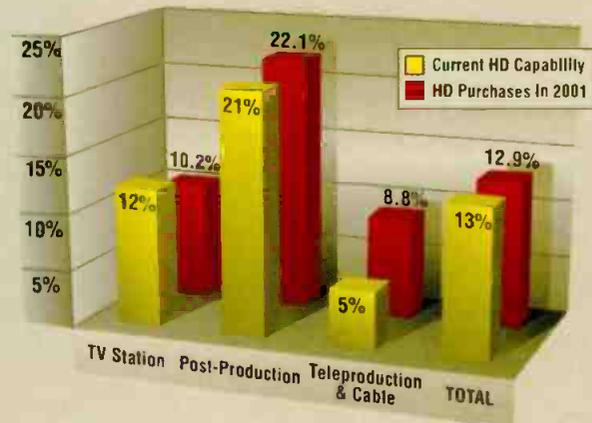
The state of HD.

High definition technology usage isn't large yet. One-fifth of the production/post facilities have HD capability and only 12 percent of the TV stations do. Given that we're approaching the 200 DTV station point, this isn't really bad and expect this number to climb. Cable couldn't care less about HD, with only 5 percent reporting any HD capability. Keep in mind this number includes major cable networks and program suppliers. No support for HD there.



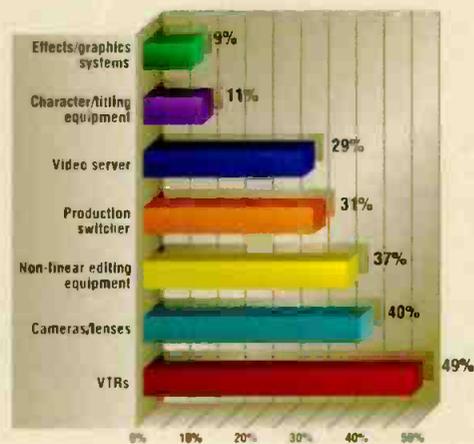
When will you add HD production equipment?

This chart provides an interesting summary of important data. First, it combines the data from above showing the number of facilities that already have HD capability in yellow. Then, red columns are added showing predicted HD spending plans, by facility type, for 2001. Note the close correlation between those that already have HD capability with those that plan to buy more HD gear this year. This suggests growth, albeit slower than some would like, for HD technology.



For those buying HD equipment, what's hot?

In a word—tape. The workhorse VTR is at the top of the list of desired purchases for HD production applications. Next in line is cameras/lenses followed by digital nonlinear editing systems.



The next update on *By the Numbers* will be in April. We'll review facility plans for nonlinear editing technology. ■



Transition to Digital

Digital standards defined

BY MICHAEL ROBIN

Because the ATSC committee could not agree on supporting a single scanning format, North America is faced with a choice of 18 formats if we choose a 60Hz-related frame rate, or 36 formats if we take into consideration the legacy NTSC-related 59.94Hz frame rate. The ATSC document does not describe analog, digital and other signal characteristics that led to a flurry of standard developing activities in the SMPTE to fill the vacuum. The activity is still merrily going on as existing standards are updated and new standards are developed and issued. On the international scale the problem is compounded by the virtual impossibility of achieving a common frame rate due to the entrenched 60Hz and 50Hz power-line related scanning formats.

In April 2000 the International Telecommunications Union issued the fourth revision of the ITU-R BT.709 Standard, Parameter Values for the HDTV Standards for production and International

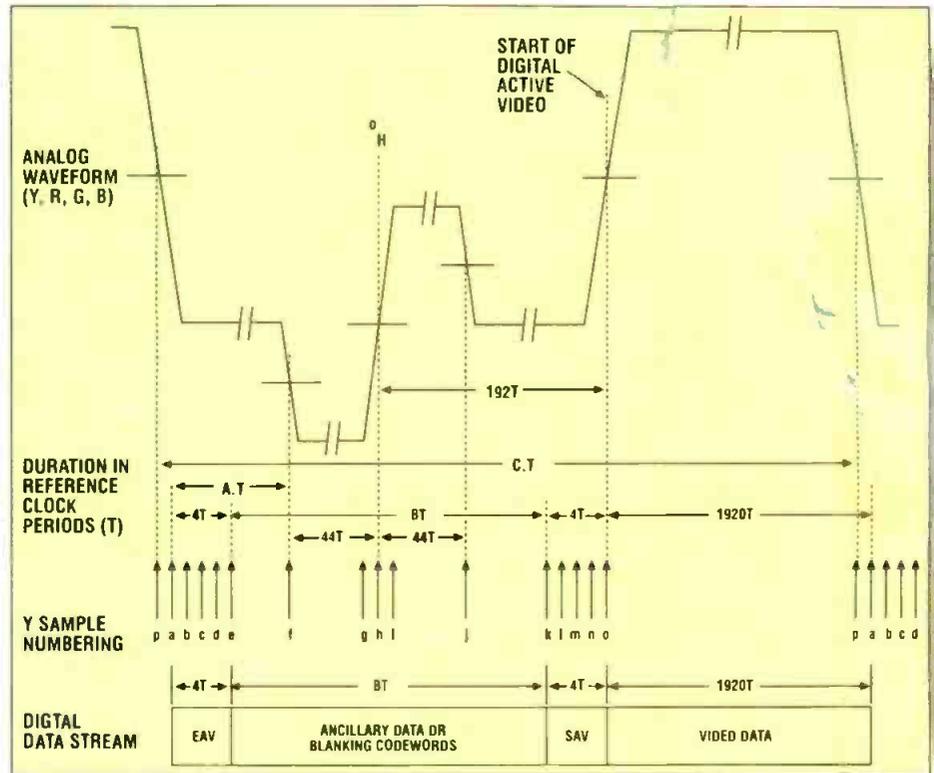


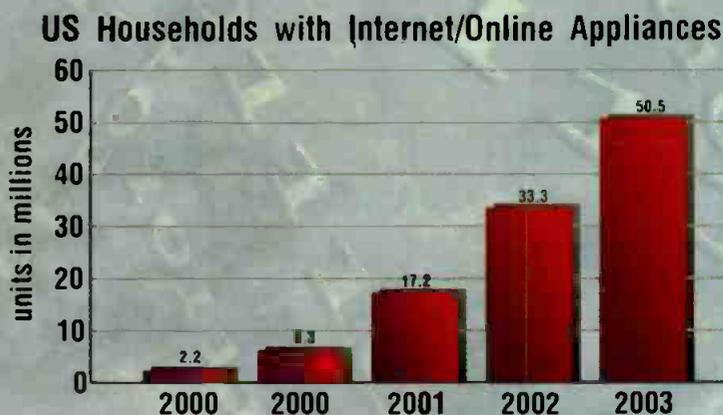
Figure 1. 1920 x 1080 scanning format analog and digital timing relationship. Note: Horizontal axis not to scale.

FRAME GRAB

A look at tomorrow's technology.

65% of US homes will have online appliances by 2005.

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SOURCE: David Mercer
Dmercer@strategyanalytics.com

Program Exchange. This version of the standard reaches out to encompass the 50Hz- and 60Hz-based 1920 x 1080 scanning formats in both their progressive and interlaced aspects. In addition it introduces the recently developed progressive sequential frame (PsF) concept as applied to the 24-, 25- and 30Hz frame systems. This standard makes no mention of the 1280 x 720 scanning format that is not recognized as an HDTV format.

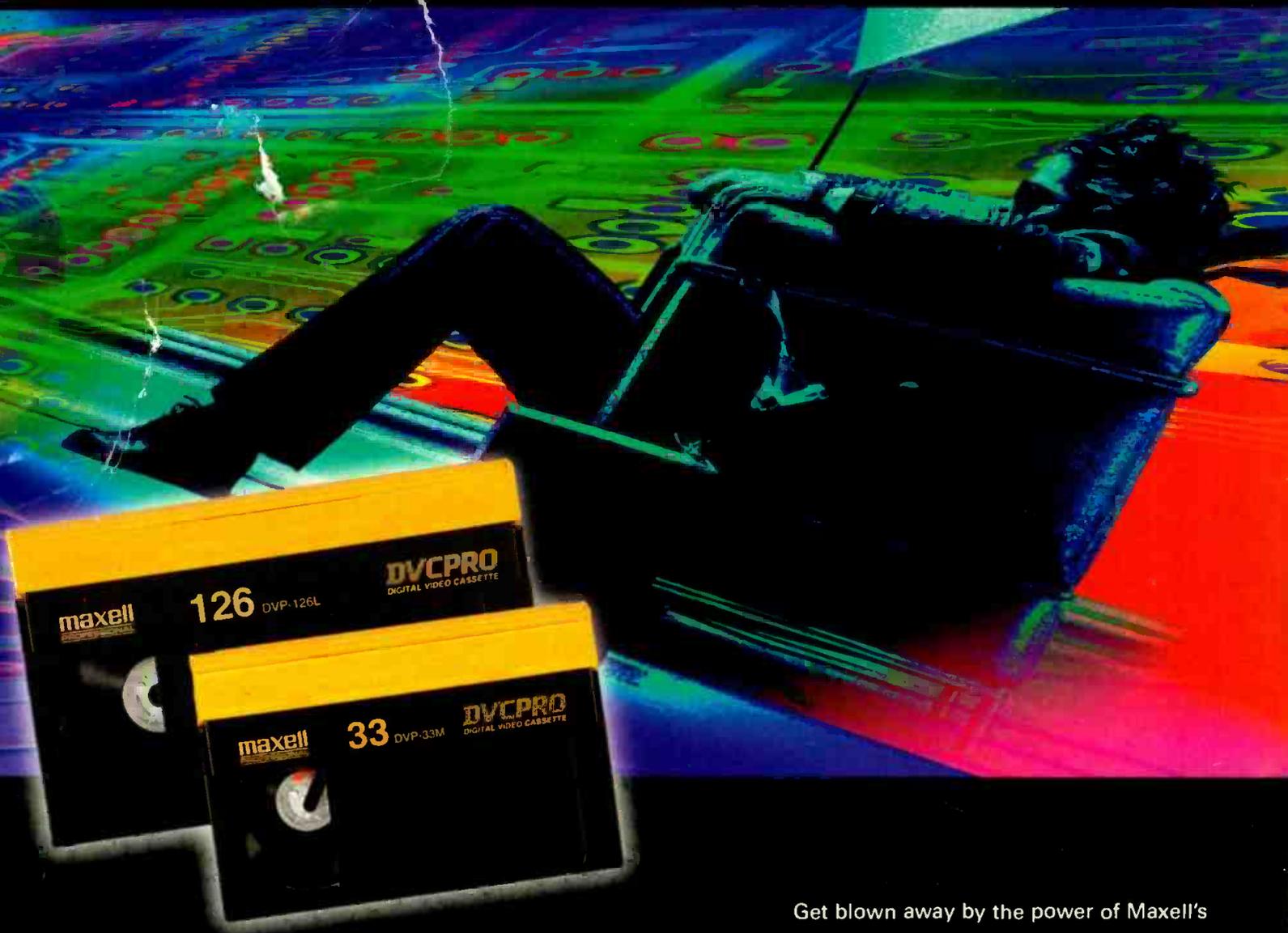
This article outlines several characteristics of the 1920 x 1080 HDTV picture formats.

The 1920 x 1080 picture formats

Table 1 details the picture scanning characteristics of the various 1920 x 1080 formats. There are two distinct categories:

- 60Hz-related: 60p, 60i, 30PsF and

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30p with a choice of nominal or NTSC-friendly vertical scanning, numbered 1 through 8. All formats in this category feature 2200 Y samples per total line and 1100 each C_B and C_R samples

the picture rate.

The digital coding is based on one luminance E'_Y , and two color-difference signals E'_{CB} and E'_{CR} or on the use of three primary signals E'_G , E'_B and E'_R .

The problem is compounded by the virtual impossibility of achieving a common frame rate.

each per total line. The H and V scanning rates and the related Y, C_B and C_R sampling frequencies depend on the scanning system. The highest quality format, 60p, has a Y digital sampling frequency of 148.5MHz and a C_B , C_R digital sampling frequency of 74.25MHz each. At 10 bits per sample this results in a Y, C_B , C_R time-division-multiplexed serial distribution bit rate of 2.97Gb/s. The other formats in this category have an equivalent serial bit rate of 1.485Gb/s.

- 50Hz-related: 50p, 50i, 25PsF and 25p numbered 9 through 12. All formats in this category feature 2640 Y samples per total line and 1320 each C_B and C_R samples per total line. The H and V scanning rates and the related Y, C_B and C_R sampling frequencies depend on the scanning system. The highest quality format, 50p, has a Y digital sampling frequency of 148.5MHz and a C_B , C_R digital sampling frequency of 74.25MHz each. At 10 bits per sample, this results in a Y, C_B , C_R time-division multiplexed serial distribution bit-rate of 2.97GB/s. The other formats in this category have an equivalent serial bit rate of 1.485Gb/s.

- 24Hz-related: 24PsF and 24p with a choice of nominal or NTSC-friendly vertical scanning, numbered 13 through 16. All formats in this category feature 2750 Y samples per total line and 1375 each C_B and C_R samples per total line. The H and V scanning rates and the related Y, C_B and C_R sampling frequencies are the same for all formats. All formats have a Y sampling frequency of 74.25MHz and a C_B , C_R sampling frequency of 37.125MHz each.

The various 1920 x 1080 categories all belong to a "Common Image Format," which features a constant number of active lines (1080) and samples per active line (1920) independent of

The most common digital representation assumes a dual-channel parallel data stream consisting of:

- A digital data stream conveying digitized luminance signal (Y) sampled at one of the frequencies listed in Table 1 with 10-bit accuracy.

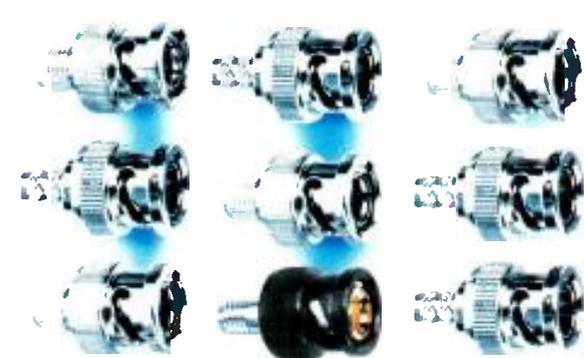
- A digital data stream conveying time-division-multiplexed signals C_B and C_R . Each data stream carries the active video information, the *timing reference signal* (TRS) information and the ancillary data if present.

Figure 1 shows the analog and digital timing relationships along a scanning line for the Y component. A similar situation exists in the C_B and C_R scanning line not shown here. All timing figures

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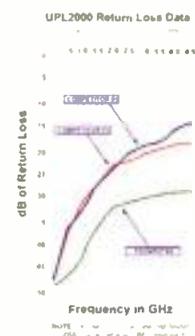
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Item	Parameter	System														
		1 (2) 60P	3 (4) 60I	5 (6) 30PsF	7 (8) 30P	9 50P	10 50I	11 25PsF	12 25P	12 (14) 24PsF	15 (16) 24P					
1	Order of sample presentation in a scanned system	Left to right, top to bottom For interlace and segmented frame systems, first active line of field 1 at top of the picture														
2	Field/frame/segment frequency (Hz) (1)	60 (60/1.001)			30 (30/1.001)			50			25		48 (48/1.001)		24 (24/1.001)3	
3	Interlace ratio	1:1	2:1	1:1SF	1:1	1:1	2:1	1:1SF	1:1	1:1SF	1:1	1:1SF	1:1	1:1	1:1	
4	Picture rate (Hz)	60 (60/1.001)			30 (30/1.001)			50			25		24 (24/1.001)		24 (24/1.001)	
5	Line frequency (Hz) (2)	67500 (67500/1.001)			33750 (33750/1.001)			56250			28125		27000 (27000/1.001)		27000 (27000/1.001)	
6	Samples per full line R, G, B, Y Cb, Cr	2200						2640			1320		2750		1375	
7	Nominal signal bandwidth (MHz) (3)	60			30			60			30					
8	Sampling frequency R, G, B, Y (MHz) (4)	148.5 (148.5/1.001)			74.25 (74.25/1.001)			148.5			74.25		74.25 (74.25/1.001)		74.25 (74.25/1.001)	
9	Sampling frequency Cb, Cr (MHz) (5)	74.25 (74.25/1.001)			37.125 (37.125/1.001)			74.25			37.125		37.125 (37.125/1.001)		37.125 (37.125/1.001)	

1 - Value in parenthesis is for NTSC friendly systems where the frame divisor is 1.001
2 - The tolerance on line frequency is $\pm 0.001\%$
3 - Bandwidth is for all components before anti-aliasing to-pass filtering
4 - The tolerance on sampling frequency is $\pm 0.00\%$
5 - Cb, Cr sampling frequency is half of luminance sampling frequency

Table 1. Picture scanning characteristics for the 1920 x 1080 picture format.

are expressed in multiples of T, where T is the reciprocal of the digital sampling frequency f_s of the luminance (Y) component signal. Note the peculiar tri-level analog sync waveform. In all likelihood you may never see this analog waveform because you will be mostly dealing with digital signals that do not carry the analog sync.

The 0th datum represents the analog line start. A digital sampling instant in a line is defined by a number from 0

Scanning system	Sample numbering															
	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p
1,2,3,4 5,6,7,8	1920	1921	1922	1923	1924	1964	2007	2008	2009	2052	2196	2197	2198	2199	0	1919
9,10 11,12	1920	1921	1922	1923	1924	2404	2447	2448	2449	2492	2636	2637	2638	2639	0	1919
13,14 15,16	1920	1921	1922	1923	1924	2515	2557	2558	2602	2474	2746	2747	2748	2749	0	1919
Scanning system	Duration of reference clock periods (T)															
	A				B				C							
1,2,3,4,5,6,7,8	44				272				2200							
9,10,11,12	484				712				2640							
13,14,15,16	594				822				2750							

Table 2. Values for symbols in Figure 1 for different scanning systems.

(the first active digital sample) through a number representing the total number of samples in a line less one. In Figure 1, a number of significant sampling instants are identified with alphabetical symbols "a" through and including "p." The values assumed by the symbols in Figure 1 represent the number of the digital sample. They depend on the scanning system.

The digital line starts with sample "o," which assumes the value 0 in all systems. The last active video sample "p" assumes the value 1919 in all scanning systems. This indicates that all scanning systems have the same number (1920) of active samples per

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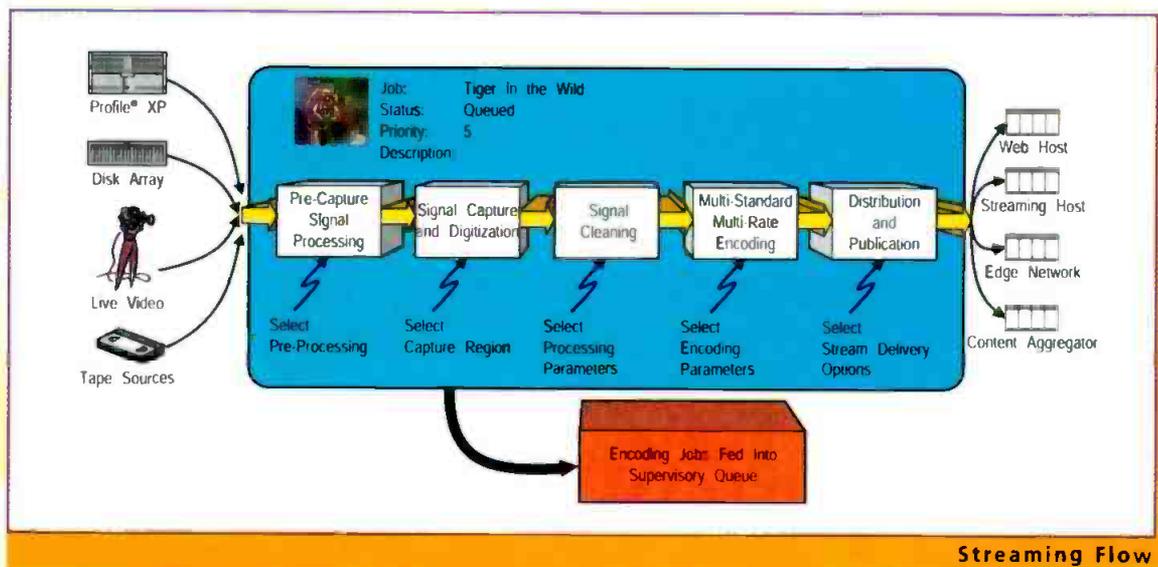
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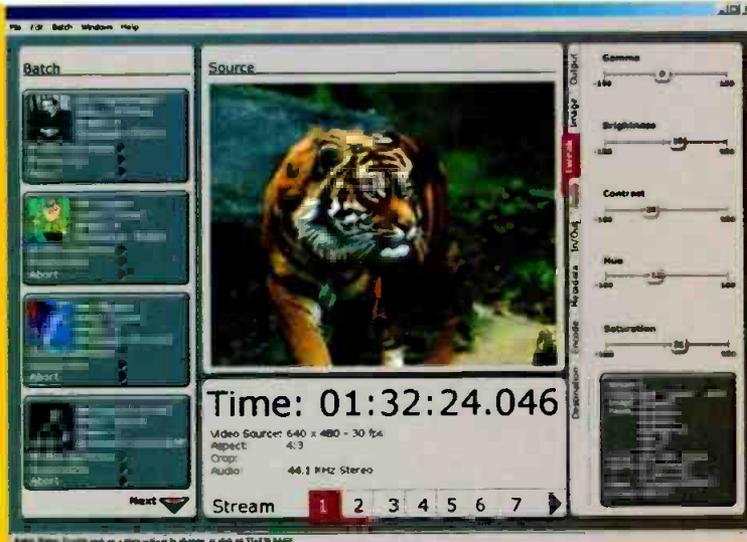
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From networks and post-production houses to broadband ISPs and Fortune 500 companies to encoding labs and services, these companies are metamorphosing into a new breed of content creators—Digicasters. These professionals recognize the key role that the Internet and streaming media will play in digital entertainment, news, and services. Naturally, how they do so depends on the adoption and deployment trajectories of broadband technologies. Nonetheless, they recognize that streaming will transform Web-based experiences and media, making them more compelling and interactive across

multiple digital devices. Get it right, and rich media and rich opportunities abound in this market.

Tools, Not Toys

Digicasters need tools, not toys, for streaming. And that's where the Grass Valley Group comes in. Short on time and long on content, Digicasters want to streamline and simplify the manner in which they re-purpose their content for the Web and e-commerce. They want a Web publishing application that will associate the appropriate meta-data with the transferred content—descriptive information, pricing information, legal rights, and content shelf life. They must have the ability to easily access any asset at any time regardless of the original application. And they want that same application to appropriately transform content as it is moved to the Web—to handle the encoding and encryption that will assure the highest possible quality video and the greatest security possible. They want a streaming solution that conditions incoming video and audio, enables simple editing of the media to be encoded, features a unified user interface for all functionality, simplified input/output, and batch processing.



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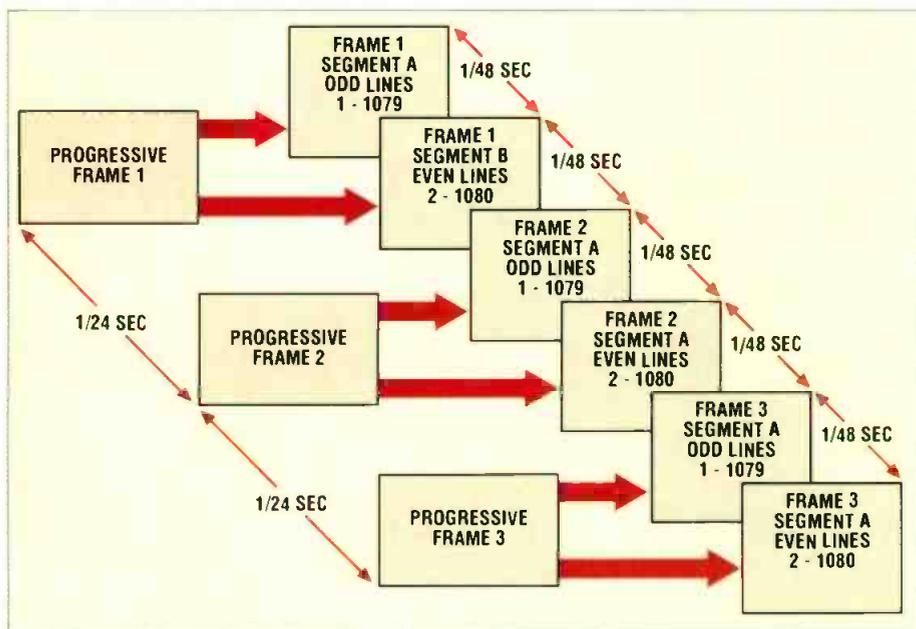


Figure 2. Formation of a sequence of segmented frames from a sequence of progressive frames.

line. Samples "a," "b," "c" and "d" identify the four EAV (End of Active Video) words and assume identical values (1920, 1921, 1922 and 1923) in all scanning systems. Sample "e," the first sample in the horizontal digital blanking interval, assumes the value 1924 in all scanning systems. The sam-

ples "f" through and including "n" assume different values depending on the scanning system. As a result symbol "B," representing the duration of the horizontal blanking interval, assumes a value of 272T for systems 1, 2, 3, 4, 5, 6, 7 and 8. For systems 9, 10, 11 and 12, "B" assumes a value of 822T. This

results in an equal number of 1920 active samples per line in all scanning standards, common in all scanning systems. The duration of Active Video is a scanning standard of a four-word symbol. The hexadecimal value 3FF, 000 and 000. The XYZ word the bit, the F bit and the define the vertical and blanking. In addition, bits and P3, which assume values on the status of the V, F and provide a limited error correction (single errors) and detection (two errors) of these bits.

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

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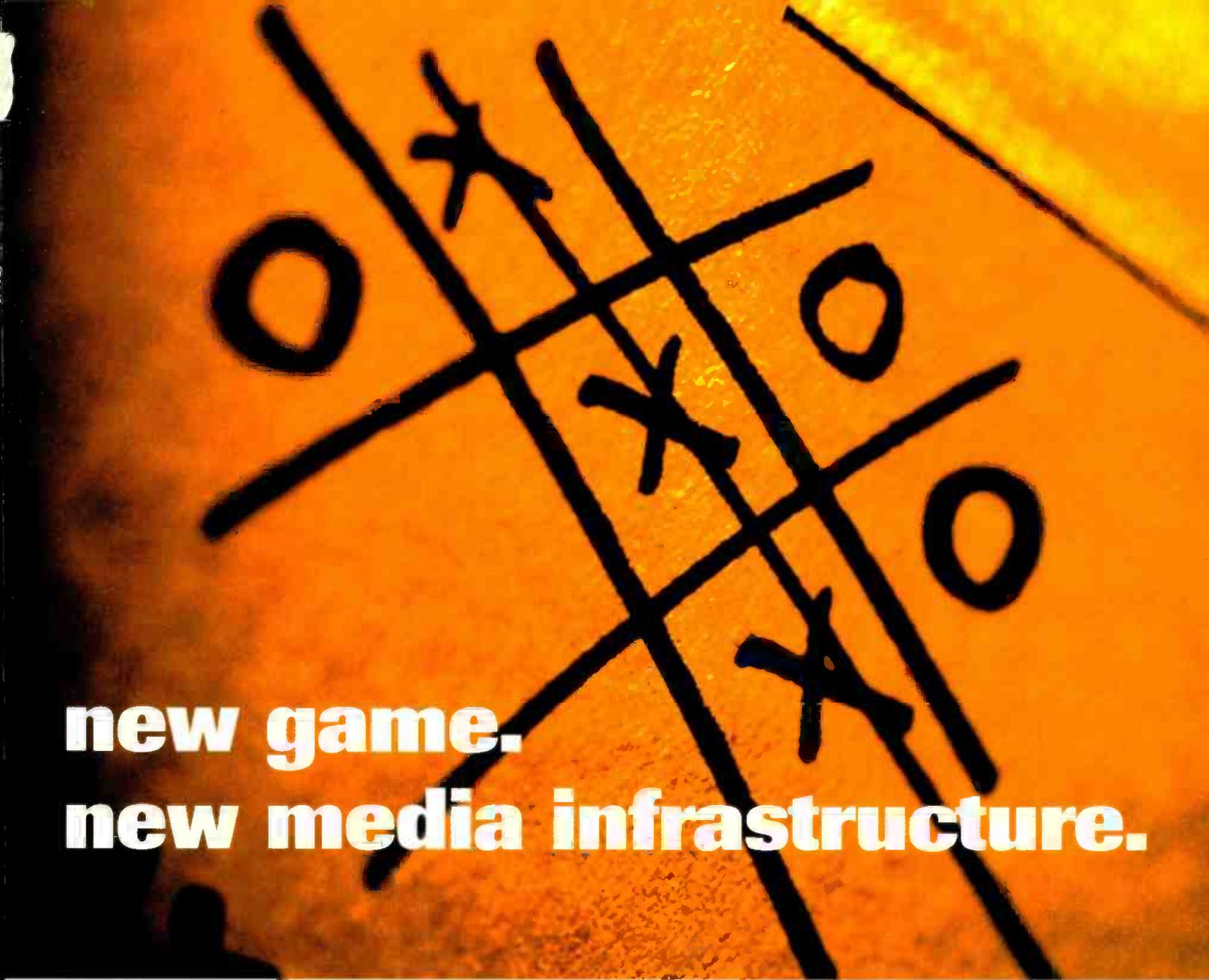


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File interchange formats

BY BRAD GILMER

If you are going to exchange video and audio using computers, you have two choices. The first is streaming; the second is file transfer. Broadcasters are very familiar with stream mode. Put a tape in a machine and press play — a stream comes out the video connector. We are also quite familiar with file transfer. Most of us e-mail documents to colleagues all the time. However, file transfer for video is something many of us are still learning about.

Why file transfer?

The first question to ask is why use files to move video and audio at all? After all, NTSC, PAL and 601 have been around for some time. One reason to use file transfer is if you want to know for sure whether the content got to the other end. Another reason is if you want to send your content at a rate other than real time. (True, you can stream at non-real-time rates as well, but file transfer is completely independent of frame rate.) A third reason to use file transfer is if you are sending files between computer-based video devices.

Of course, stream transfer (such as

NTSC and 601) has its place too. It is not that one is better than the other. However, in the future, both will be used.

Purpose of a file format

What is the purpose of a file format? A file format is a wrapper into which a system places video, audio and metadata. You can think of the wrapper as an envelope. It holds the contents, and it has an address on the outside that says where the envelope

The fact is, people understand envelopes very well. Computers are infinitely less flexible.

When it comes to wrappers and their contents, computers have to know how to read the header of the wrapper, they have to know how the wrapper works so they can unwrap the contents and, finally, they have to know how to interpret the contents. This can create considerable challenges. So sending a file from one

A file format is a wrapper into which a system places video, audio and metadata.

should be delivered. Some wrappers also have “labels” that describe the contents so that receiving systems can tell whether they can read the contents of the envelope without having to open it. (You might use a similar system, marking boxes in your attic as “Christmas,” so that you do not have to open each box to see what is inside.)

On the surface, this seems simple — put the video, audio and metadata in an envelope and send it across a computer network to the recipient.

vendor to another can actually be quite challenging.

A common file interchange format

What are some possible solutions to this problem? One is for a manufacturer to come up with a proprietary wrapper or file format. Since the manufacturer knows everything about the format, he or she can use it to send content from one system to another without any difficulty, so long as both systems are made by the same manufacturer. The vendor may share information about the file format with a few partners so that they can exchange content.

There are a number of proprietary file formats in use today. These formats work very well in single-vendor environments, but of course they do not work well in installations where users require several different vendors’ equipment to work together. In these situations, a common file interchange format is required.

These help the broadcaster build multivendor facilities by clearly documenting interchange information in a public forum. Individual companies can implement the interchange format so users can interchange information.

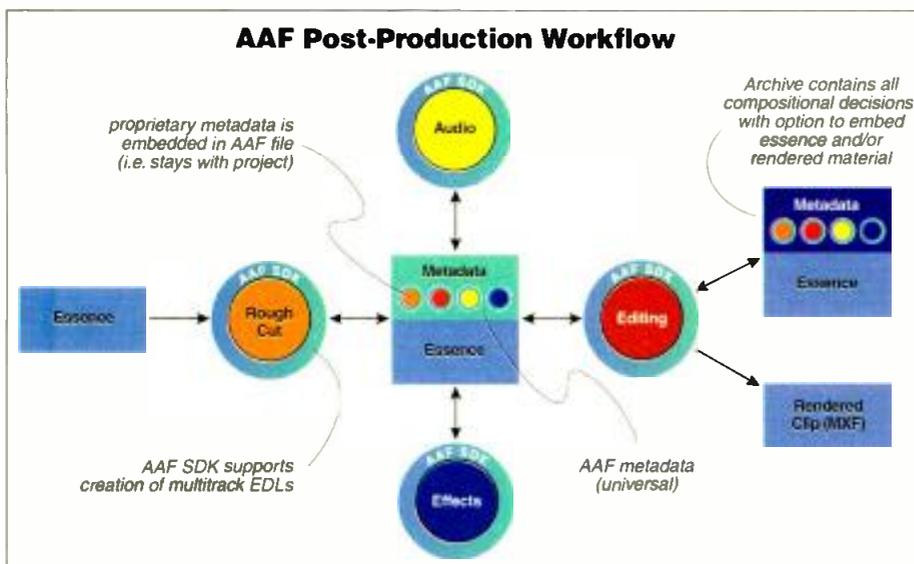
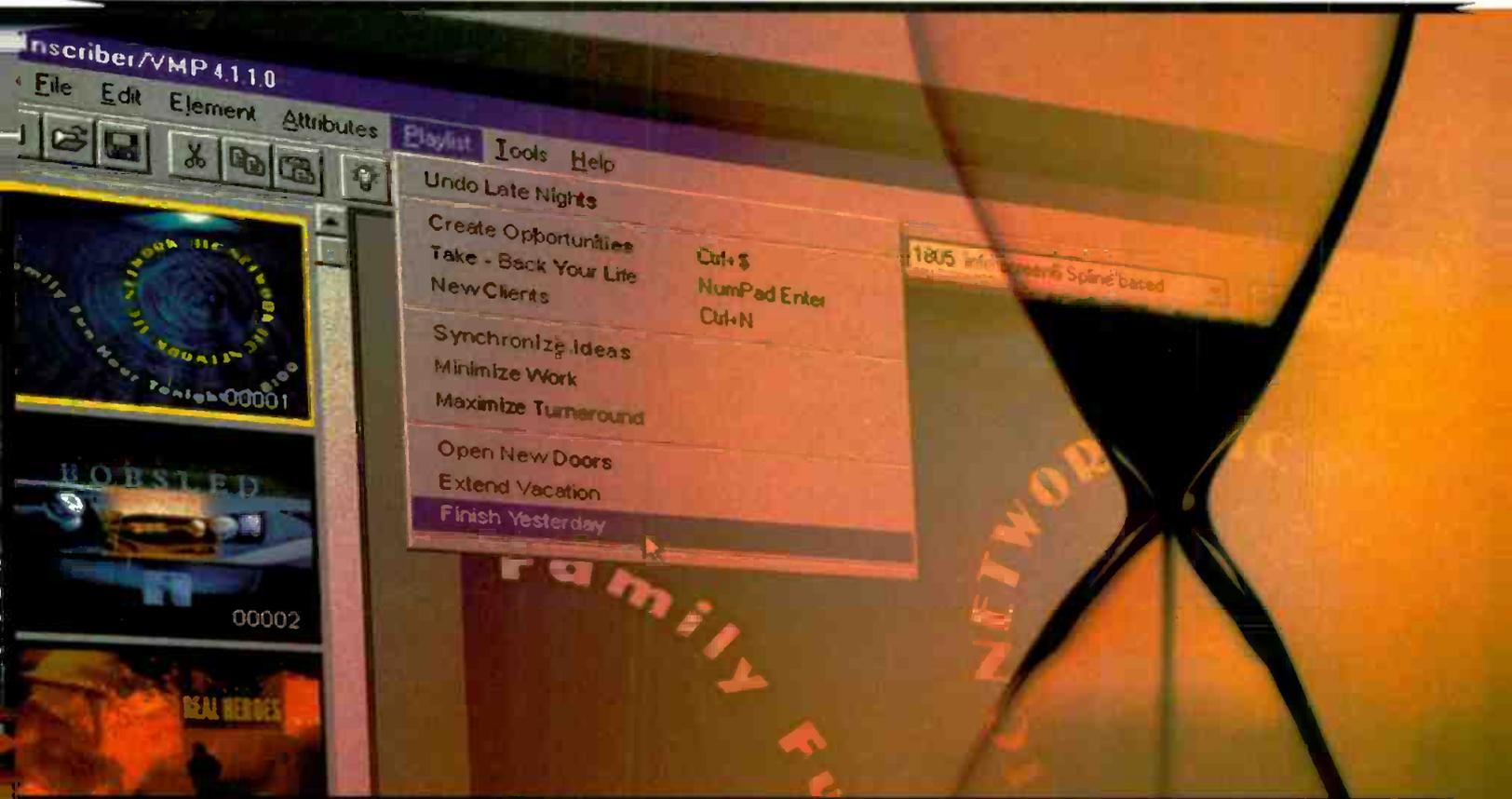


Figure 1. Advanced Authoring Format enables interchange between different applications.

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In the operation shown in Figure 1, the Advanced Authoring Format (AAF) allows artists in the post-production environment to exchange video and audio (essence) and metadata between rough-cut, audio, editing and effects applications using a common interchange format.

Current work on file formats

There are several activities underway in the file format area. (See Table 1.) These are GXF, MXF and AAF (no it is not a prerequisite that a file format end in "F").

GXF stands for the General Exchange

Stream transfers (using PAL, NTSC, SDI or even SDTI) will co-exist with file transfers in new television facilities.

Format. It is promoted by Grass Valley Group (www.grassvalleygroup.com). GXF supports transfers using data networking technology. It also supports storage on data devices such as tape streamers. It is compression format independent, and it is now undergoing standardization within the Society of Motion Picture and Television Engineers (SMPTE).

GXF is designed for on-air applications. It is extensible by design, but does not comply with SMPTE KLV coding. (KLV is one way to wrap data for transport over networks.) GXF supports MPEG (elementary streams), DVCPRO and JPEG video. It also supports uncompressed AC3 and Dolby E audio. GXF supports cuts-only video edits, audio fade in/out and allows for the encapsulation of user metadata. GXF can encapsulate KLV or XML, but it is not KLV native.

GXF has limited editing features – it does not support complex transitions, effects or editing of complex packages. However, it fits the on-air applications space very well. It is not intended to support post-production applications.

MXF is the Media Exchange Format. MXF is supported by ProMPEG (www.pro-mpeg.org). MXF is a file for the exchange of program material between file servers. It is also a format for tape streamers and digital

archives. It usually contains one complete sequence, but this may comprise a sequence of clips and program segments. There are six operational patterns: Simple, Compiled, Compound, Uncompiled Simple, Uncompiled Compound and Metadata only.

The body can be based on one of several basic kinds including MPEG, DV and uncompressed. The body contains an interleaved sequence of picture frames, where each frame comprises audio, video and data essence plus frame-based metadata. MXF is fully SMPTE KLV compliant. It is also a subset of the AAF

metadata allowing direct reading and writing with AAF implementations.

AAF is the Advanced Authoring Format. AAF is supported by the AAF Association (www.aafassociation.org). It is used primarily in the post-production and authoring environment. AAF is different from MXF and GXF in several ways. First, it has very rich metadata capabilities. This enables it to describe complex edits, compositing, effects and other functions that are used in the post-production environment. Second, AAF can contain a finished program, but more usually, it contains all of the source elements that will be used to render a finished program. Third, AAF permits external references. For example, an AAF file can contain three audio clips, two video clips and the EDL in metadata form telling a system what to do with the clips. In addition, the AAF file can contain a reference to a closed-caption file that is kept in a separate system. In this way, the AAF file can contain all the information about a post-production project, regardless of how large the project is or where project elements are stored. Finally, AAF differs from GXF and MXF in the wrapper structure. While GXF and MXF store data in a simple "flat file" structure, AAF uses structured storage, which is best described as a

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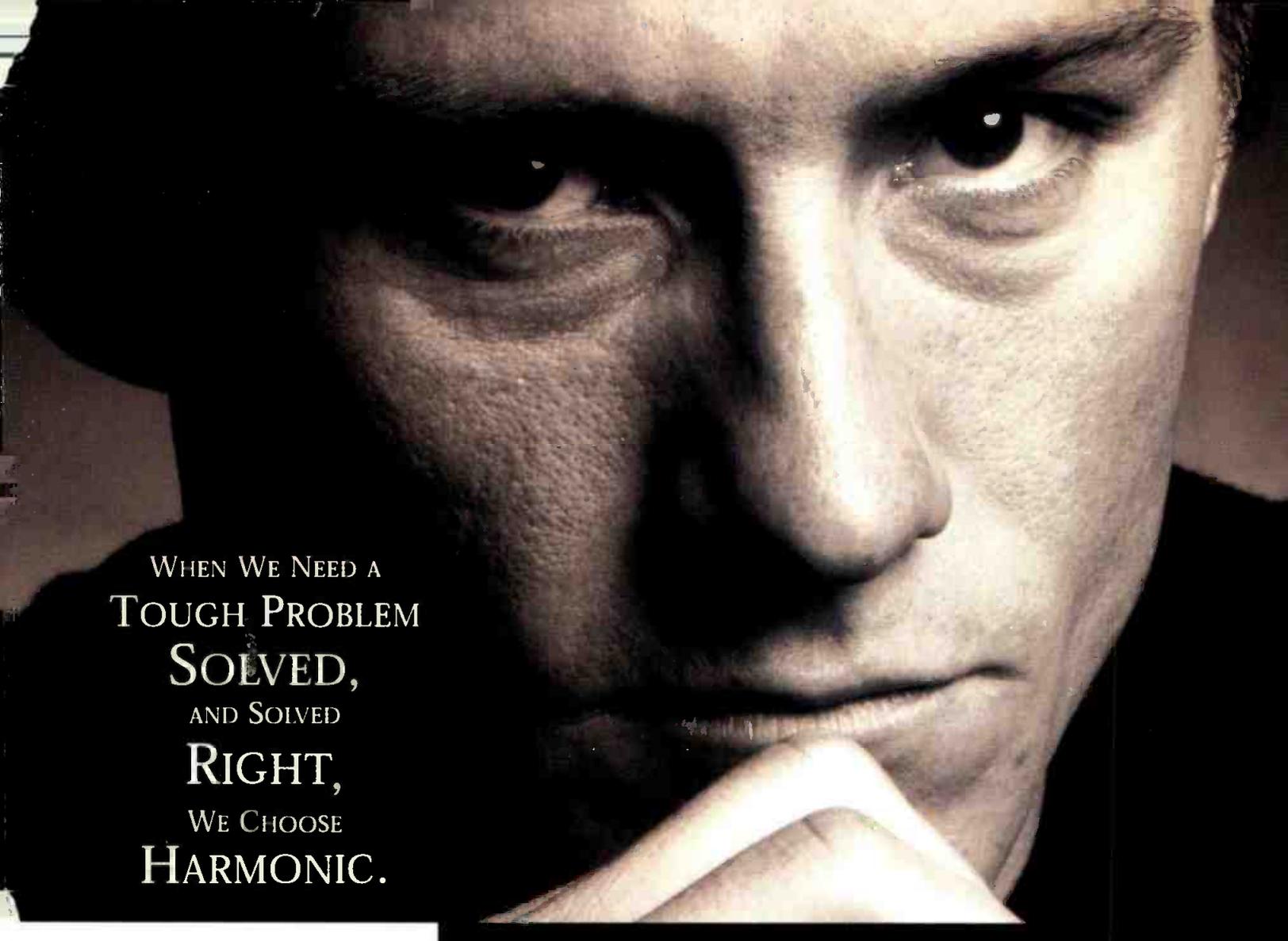
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Sponsor	Grass Valley Group	Pro-MPEG Forum	AAF Association
KLV coding	Can encapsulate	KLV native	KLV native
Playback before end of file received?	Yes	Yes	NO
Effects support	Limited	Yes, but in defined cases only	Full featured
Editing features	Limited	Limited	Full featured
Standardization	Submitted to SMPTE December 1999 – almost complete	Will be submitted to SMPTE in March 2001	Submitted to SMPTE
Compression agnostic	Yes	Yes	Yes
Feature set	Well suited for on-air and archive applications	First applications in on-air and acquisition	Very rich functionality supports post-production
External references allowed	No	No, except in defined cases	Yes
Status	In Grass Valley and some other vendor products today	Under development – some vendor R&D projects underway	Product development under way. SDK available, implemented in Avid, soon to be in others
User metadata support	Limited	Extensive	Extensive

Table 1. Characteristics of newformats developed to allow file interchange between vendors.

“file system within a file.” This has several important implications. Both GXF and MXF support playback before an end of file is received. In other words, it is possible to start

file. For those of you who know a little about how FAT works, structured storage supports similar functionality. Files can be expanded without having to be contiguous.

playing an MXF file back from a file server before the server is finished receiving the transfer. With AAF this is not possible. The transfer must be complete before the contents of the file can be viewed. However, structured storage supports AAF’s full feature capability and allows users to make alterations and additions to the file easily without having to re-

write the entire While AAF can be used with a number of compression formats, it also supports uncompressed. This is important since AAF’s primary application space is the post-production environment. For the same reason, AAF’s complexity may not be appropriate for the store and forward or broadcast playout environment.

Stream transfers (using PAL, NTSC, SDI or even SDTI) will co-exist with file transfers in new television facilities. As file transfer becomes more common, well-established file formats will serve a similar role to signal standards in the streaming world. GXF, MXF and AAF are three new file formats. There will be more. As the industry matures we will settle on a few of these standards, just as the industry settled on the analog stream standards of the past. ■

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



Send questions and comments to: brad_gilmer@intertec.com

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Multicast

BY STEVEN M. BLUMENFELD

What is multicasting? Any description of multicast must start with unicast. Unicast is what many of us know as the basis for World Wide Web communications. In the unicast world of the Internet a user requests information from a server and the server sends that information to each user.

The unicast model works very well for page views and text – relatively low bandwidth. As the demands on the network grow with the use of more high bandwidth media, we have had to build up the networking capability.

Currently, in the unicast world, you have to create a separate connection to each receiver. Imagine, if you will, that your broadcast station had to be wired in a star configuration from your transmitter directly to each and every listener – or worse yet, each and every potential listener.

Over the long run this is not affordable – either in terms of actual data delivery or server infrastructure. If for a moment we do a little math – let’s say you have 100,000 users/viewers of your content and their average bit rate requirements are a measly 128k (equivalent to ISDN): $128K * 100,000 \text{ users} = 12,800,000,000 \text{ bit per sec}$, or 12.8Gb/s. That’s an awful lot of OC-3 pipes just to serve 100,000 users. The costs of transmission alone make this prohibitive. This does not even account for the servers, space and power required to “broadcast” to your users.

Unicast broadcast

Unicast broadcast is a caching solution that is being used by many today. Media is sent to every host/server on the network with no regard for when and where it will actually be used. In this caching scheme data is moved from a centralized server to specialized caching servers at the edge of a network. The problem is that only a few servers actually need the data within the network. Others outside

your network are also requesting the information. Once you try to move data to specific servers outside of your own network, you are back to the same unicast problem of setting up extremely large data requirements.

	Class A	Class B	Class C	Multicast	Reserved
IP Datagram	0	1 0	1 1 0	1 1 1 0	1 1 1 1 0
Start Address	0.0.0.0	128.0.0.0	192.0.0.0	224.0.0.0	240.0.0.0
Ending Address	127.255.255.255	191.255.255.255	223.255.255.255	239.255.255.255	247.255.255.255

Table 1. The “classes” of IP addresses, based on the high order bits. IP addresses that start with “1110” are IP multicasts.

Multicast

When it comes to streaming high bandwidth audio and video there is a problem with the Internet. As stated earlier, the Internet and the protocols used were originally designed for a unicast environment. In steps multicast, we have a solution to a problem that didn’t really exist in 1992 when some of the first RFCs were written about multicast protocols. RFC 1301, February 1992, defines a multicast protocol as “a protocol for reliable transport that utilizes the multicast capability of applicable lower layer networking architectures. The transport definition permits an arbitrary number of transport providers to perform real-time collaborations without requiring networking clients [or applications] to possess detailed knowledge of the population or geographical dispersion of the participating members. It is not network architectural specific, but does implicitly require some form of multicasting [or broadcasting] at the data link level, as well as some means of communicating that capability up through the layers to the transport.”

Multicast is communication between a single sender and multiple receivers on a network. Using a multicast design, an application can send one copy of each packet and address it to the group of computers that want to receive it. The network then forwards the packets only to the computers that

need to receive them. It was designed to more efficiently distribute real-time audio and video to the set of hosts that have “tuned” in. Multicasting is not connection-oriented and all traffic is handled at the transport layer with UDP.

In a multicast environment the “broadcast” server sends data to a very specific address. Any user/device that chooses to receive the broadcast “tunes” to that address and becomes aware of all media with that destination address.

The nuts and bolts

IP addresses are divided into “classes” based on the high order bits of a 32-bit IP address. (See Table 1.)

Every IP whose destination address starts with “1110” is an IP multicast; the multicast “group” is identified by the remaining 28 bits. Multicast group addresses range from 224.0.0.0 to 239.255.255.255.

There are three fundamental types of addresses: unicast, broadcast and multicast. A unicast address is designed to transmit a packet to a single destination. A broadcast address is used to send a datagram to an entire subnetwork. A multicast address is designed to enable the delivery of datagrams to a set of hosts that have been configured as members of a multicast group in various scattered subnetworks.

Network devices can conform to the multicast specifications at any one of the following three levels.

- Level 0: No support for IP multicasting. Support for multicast is not currently a requirement and most network equipment is set to level 0, although this is changing. Devices set to level 0 must ignore all multicast packets.

• Level 1: Support for sending but not receiving multicast IP datagrams.

• Level 2: Full support for IP multicasting level. All Level 2 devices are able to send and receive multicast traffic, "join and leave" multicast groups, and propagate information to other multicast routers. To fully conform to multicast Level 2 specifications, a network device must implement the Internet Group Management Protocol (IGMP) in their TCP/IP stack. This allows an application to open a UDP socket and specify a class D multicast address that it wants to send/get data to/from.

A multicast application transmits the address of the multicast group it is interested in. Multicast datagrams are then filtered and only those with a destination group matching the address transmitted via a "join" request are accepted. When we join a group, the application is told to disregard all other data except for the datagrams in the multicast group. The protocol by its very nature is simple. This makes the difficult task of tuning and finding the data easy and the whole system scalable.

IP multicasting is a best-effort protocol, it assumes some data can be lost or dropped. What's a few missing bytes to a digital video?

Multicasting has a long way to go before it will be able to truly deliver on the promise of high-bandwidth media distributed over the Internet. The challenge this protocol faces is finding a financial model so a mix of

hardware, software and network service companies will be encouraged to promote it. ■

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

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One of the benefits of the partnership between digital content and broadband is that new possibilities are emerging for shopping, distance learning and customized entertainment. The efforts of MediaGateway and the Fantastic Corporation are lighting the way toward a new revenue stream for broadcasters.

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MediaGateway's technology currently adapts to the various digital set-top boxes in use by cable and satellite TV operators in Scandinavia. By applying the software to the digital set-top box, retailers will have direct access to consumers regardless of cable or satellite provider.

Fantastic Corporation's software allows retailers to aggregate packaged content tailored to a specific audience regardless of data format. The Fantastic broadband platform manages point to multipoint delivery and can schedule broadcasts, track revenue and define subscribers and channels. ■

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SYSTEMS DESIGN SHOWCASE



mtv's

Times Square Studios

By Paul Catterson



Control-B can seat 11 production personnel at the front, middle and rear (not shown) consoles. Melabee M. Miller Photographer

Traditionally, when a facility build is complete, the as-built documentation is handed over to the client and it becomes the reference point for all future amendments to the facility's design. What becomes of that documentation after the systems integrator's departure will be determined by two factors: the orientation of the end-user by

the SI as to the documentation standards and the discipline of the end-user's engineering staff to regularly update the package.

Initial systems design considerations must always take into account the future needs of a client in their facility architecture. Is there a limit to what future expansion entails? Is there a budget limitation? Is there an architectural or physical space limitation? Is there a more clever means of providing future expansion than just leaving extra space in racks and empty distribution slots? The project design team needs to look ahead in order to provide the extra "handles" that not only prepare the facility for future growth, but also provide a fast and furious means of implementing an expansion if it needs to happen quickly.

The Systems Group (TSG) recently had the opportunity to put these considerations and the respective TSG approach to the test.

The call

MTV Networks contacted TSG and requested help to implement a plan to upgrade its teleproduction studios in Times Square. The network's production needs had expanded beyond the practical capability of its existing facility, and the limited real estate in its concourse-level home was creating some unique expansion challenges. TSG had worked with the MTV engineering team in the design and build of these same studios just over three years prior, and welcomed the opportunity to perform this upgrade with them now.

The original Times Square Studios were designed around a serial digital video and analog audio infrastructure with a level of the facility's routing switcher being dedicated to analog video monitoring and those devices

that were to remain in the analog format. The project included the construction of a production control room, audio control room, tape record/playback area, camera control room and a central equipment room. The primary performance spaces are two traditional studios, but numerous broadcast service panels were distributed about the facility to allow for ad-hoc productions, providing a variety of on-air looks. A small insert control room was added late in the project cycle and soon proved to be a worthwhile addition, as much of the overflow from the main control room was brought here.

For the upgrade, MTV's orders were direct. The Systems Group was to replace the existing insert control room, audio room and tape room with upgraded facilities capable of advanced productions on par with the primary control room. This necessitated an expansion of the existing SDI routing to 256-by-256 which, because of extreme space limitations, required the elimination of the existing analog video level of the router and changing the monitoring "philosophy" from direct NTSC to SDI with converters.

Additionally, TSG was tasked with improving the BSP connectivity necessary to support the increased level of production MTV was planning for the upcoming year.

The engineering plan

Because TSG had completed the original project, it did not have to wait to receive documentation from MTV to begin the "research and discovery"

It was critical to identify, within the AutoCAD drawings and cabling wirelists, what the new and revised elements were, what was existing and what was to remain untouched. With the MTV-provided documentation in hand, TSG identified it as the logical baseline, developed its procedures for identifying changes and began the engineering process.

The goal for this upgrade was to

The goal for this upgrade was to achieve a nearly full-digital video plant.

portion of the upgrade project. A copy of the documentation was requested from MTV nonetheless, and a meeting was arranged to discuss the changes that had been made to the facility since the original Systems Group integration had been completed three years earlier. Fortunately, the MTV engineering team had done an admirable job of maintaining the facility's drawings and wirelists, and acknowledged the importance of this phase of the project by providing TSG the time necessary to collect information and evaluate the nature of the facility upgrades and changes that had taken place.

The next step required TSG's engineering and integration team to review the tactical goals of the expansion plan, the nature of the existing plant infrastructure, and the proposed timing and integration strategy, as well as identify some of the less obvious pitfalls that might be faced during the project. The upgrade was going to include a substantial increase to the existing equipment complement and cabling infrastructure.

achieve a nearly full-digital video plant. It became clear that much of the monitoring conversion could be replaced with high-density, lower cost, one-in by one-out encoders. So TSG continued to develop the upgrade engineering plan, identifying the new conversion products required and those that could be made available for re-purposing by decommissioning the existing insert control room.

During this phase, TSG established a timeline for the appropriation of those modular devices to be performed either by removing them physically from the frame in which they were currently operating or by rewiring their new source signals to that slot. It became evident that many of these products could be removed without issue after decommissioning that control room, but others served dual purposes and could not be removed until the infrastructure for the new model had been laid. This quickly became a disjointed list of products and frames, and it seemed that once the upgrade was complete, there could be a cost-inefficient loading of modular product frames. With client-approval, TSG revised its modular product allocation list to shuffle the new devices and certain less-critical existing devices into common frames. The leftover frames would then be available as spares or utility conversion frames. This may have been viewed as an additional, unnecessary level of complexity at the onset of the project, but it ultimately proved to be a worthwhile undertaking.

The project management team next



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focused on the configuration and requisition of the necessary equipment for the initial phase, as well as on the client-driven product selections for the upgrade of the insert control room, soon to be renamed Control-B. The common devices were ordered right away: equipment racks, patchbays, modular products, audio/video monitoring, tape machines and, of course, the new router.

Based on the level of production that was to be expected, MTV staff identified the more user-definable products. Control-B was to include a new Grass Valley Group four-M/E Kalypso video production center, an AMS Neve Libra Live II digital audio console, an Image Video under-monitor display system and a Grass Valley Group Profile XP MPEG file-server with external, removable media storage. The balance of the graphics and communications equipment would be repurposed from the original control room, and added where necessary.

With the equipment purchases complete, the project management team established an integration timeline based on numerous factors: the estimated arrival date of the equipment, the Control-B construction schedule provided by the general contractor

and the anticipated—though limited—downtime of the production schedule. The timeline was developed, and it looked as though the week and weekend preceding Labor Day was the optimum time to remove the analog router and upgrade the SDI router. The production staff would be at the MTV

critical signal paths requires more attention. Developing a timeline and a comprehensive scheme for flagging any cabling being replaced, moved or abandoned will ultimately determine the accuracy and efficiency of the process. Given the nature of on-air operations, this critical path step often

A systematic and well-timed approach is the key to a successful on-air upgrade.

Beach House in California for the week, and when they returned, they would be operating in seemingly the same environment as they had previously. The digital upgrade would be transparent to them. The TSG project team moved to the installation phase.

The installation plan

A systematic and well-timed approach is the key to a successful on-air upgrade. Identifying the areas within the facility, or the core equipment areas, that can be altered without concern for the on-air signal integrity is a reasonably simple task. Identifying

determines the success of an upgrade of this nature.

For this move, TSG chose the simple yet effective method of flagging the various cables with colored tape and attaching the new cable labels, with the “move to” information immediately behind the originals. After the cable was moved to its new address, the original cable label was removed. This gave the numerous installation technicians involved in the process the ability to understand where the areas of concentration were, as well as their level of sensitivity, without being intimately familiar with the facility as a



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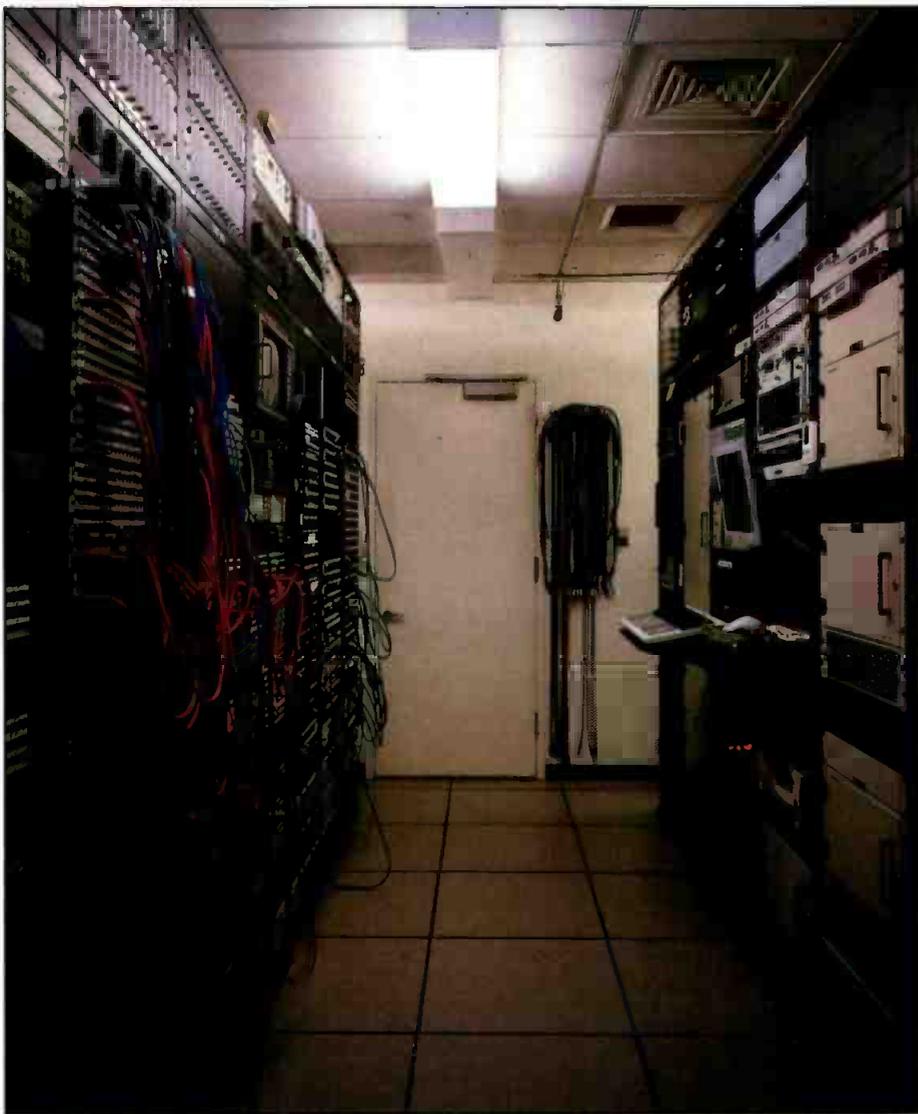
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The 8RU upper rack extensions provide a location for the additional terminal equipment, while leaving the lower sections available for the extensive show patching.

whole. This, joined with the proper identifiers in the documentation, provided nearly all the information necessary to perform the work accurately and quickly, with limited supervisory attention.

The TSG cabling upgrade plan called for laying new cabling in the floor first and connecting it to any of the new equipment. Next, the team moved to the more sensitive items, such as the existing router cabling and reference systems, then on to distribution and conversion products. With a nod from the MTV engineering staff, TSG took advantage of the many, short-lived breaks in the daily production schedule to make the appropriate cable moves. With each of these many moves feeling like its own "point of no return," the integration team took the time just prior to each move to confirm all the new cabling and move-to documentation was accurate and

consistent. This provided an opportunity for a "go, no go" decision to be made prior to proceeding and—while prolonging the process somewhat—was a critical component in the drive to avoid mistakes that could impact the MTV on-air operations.

The end result

The MTV Concourse Studio upgrades proceeded smoothly, on time and with no significant impact to any on-air operations. The collaboration between the MTV engineering staff and the TSG integration team once again proved how important it is to develop and maintain accurate systems and engineering documentation. The seamless integration of new equipment and infrastructure in an existing plant depends on setting realistic goals, assigning strong technical personnel, managing good communication among the project team and implementing

the changes according to an agreed-upon plan. The best approach to planning that integration starts with developing and maintaining solid plant documentation. ■

Paul Catterson is the Senior Manager, Project Operations, for The Systems Group and served as senior project manager for the recent MTV upgrade and as senior systems engineer during the original Times Square Studios design/build.

Equipment list

- Grass Valley Group SMS7500WB - 256x256 Wideband Routing Switcher
- Grass Valley Group Kalypso4 - 4M/E Production Center
- Grass Valley Group ProfileXP - MPEG file server
- Grass Valley Group GVEous - Dual Twin DVE
- AMS-Neve Libra Live II - 48 fader digital audio console
- Pro-Bel 5698/5699 - MADI transcoding frames
- Aphex 800 Series - Modular audio distribution products
- Ensemble Design 5250 - Avenue Series high-density signal conversion products
- Miranda Symphonie - Digital Video modular conversion products
- Image Video - Dynamic Under Monitor Display system
- Sony DVW-A500 - Digital BetaCam tape machines
- Ikegami - TM&PM Series video monitoring products
- Audio Accessories - Audio/Video patchbays
- Time Base Consoles - Production Consoles, misc. millwork

Design team

MTV Staff:

- Mike Bivona - Director of Engineering, Technical Facilities
- Allan Rider - Chief Engineer
- Jim Brizzolara - Assistant Chief Engineer
- TSG: (Systems Integrator)
- Paul Catterson - Senior Project Manager
- Robert Degnan - Senior Systems Engineer
- John Zulick - Project Engineer
- Mattias Allevik - Integration Supervisor
- DJ Rice - Lead Technician

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SYSTEMS DESIGN SHOWCASE

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ebFN is well on its way to surmounting its vision of a virtual financial news network.

Based in Chicago, WebFN currently streams 12 hours of live financial news — including audio, video, graphics and ticker — every United States market day at WebFN.com, with archived video-on-demand available 24 hours a day. In the spirit of true convergence, the organization broadcasts on two low-power TV stations in Chicago and Milwaukee and is progressively adding affiliates to its roster. Most recently, they launched radio production for the E*TRADE Internet radio show. Surprisingly, WebFN has yet to celebrate its first birthday.

Since its launch in June 2000, WebFN's 35-member staff has produced a multimedia financial newscast by careful planning, judicious use of resources, customized hardware and software, and a phased approach to the construction of its technical facilities.

WebFN is a joint venture between Weigel Broadcasting of Chicago and New York-based Bridge Information Systems.

Weigel Broadcasting owns nine broadcast TV stations, including WFBT (Channel 23) in Chicago and WCIC (Channel 41) in Milwaukee, both of which air WebFN.

Bridge Information Systems is a fast-growing provider of a variety of financial information and related services, with a Trading and Technology Center located in St. Louis. WebFN's ability to deliver extensive market coverage leverages Bridge's more than 600 reporters in over 100 newsrooms worldwide.

WebFN's format is akin to the program wheel used for all-news radio. Mixed in with video of live anchors in the Chicago studio are reports from the New York Stock Exchange, Nasdaq, key New York-based brokerage houses, the four Chicago-based financial trading centers, and Bridge News' St. Louis and New York offices. WebFN's programming also integrates taped segments such as

WebFN SPINS multimedia virtual

financial news network



WebFN is a joint venture between Weigel Broadcasting of Chicago and New York-based Bridge Information Systems that endeavors to maximize convergence between broadcasting and the Internet by offering live financial news and archived video-on-demand online, and broadcasting on two low-power TV stations in Chicago and Milwaukee. Photos by Nathan Mandell Photography.

By Laura Collins, Associate Editor

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WebFN University and CEO interviews.

Viewers log on the site to watch live coverage and commentary streaming from the WebFN ViewCaster window. A box directly below this displays graphics that correspond to the stream and change as it does. Additionally, viewers can catch WebFN on the websites of licensed companies that host WebFN's content. Such contracted companies have WebFN's ViewCaster window showcased on their sites.

WebFN technical facility

WebFN houses its broadcasting and administrative operations within Weigel's West-loop Chicago building, a space that was formerly occupied by the long-running Weigel-produced Stock Market Observer. Although a small control room from the former program remains, the remainder of the floor was gutted to allow WebFN to build wholly new facilities geared toward its specific convergence newscasting needs.

The technical facility includes a computer center, a newsroom/studio, another smaller studio, two control rooms, a video-on-demand (VOD) edit station, and an audio control room and studio for radio production of programming for WebFN affiliate E*TRADE.

The 3500-square-foot newsroom/studio is actually one large room where the newsroom area flows into an area containing two sets. The newsroom section is laid out to accommodate four production teams, each with its own NRCS workstation. Next to the newsroom/studio is another small studio used for taping segments for the telecast or for spots airing outside of WebFN's live online programming hours.

In the main control room, WebFN uses an Image Video switcher, a Pinnacle DVE, a Virtual Recorder video server, Sony Beta SP VTRs for playback and three Insciber character generators (for television graphics, streaming ticker and back-up production). Other equipment used in the facility includes a Ramsa audio board, a QTV Windows-based teleprompter system, and an Odetics system for the commercial and segment playout. The control room computers run the iNEWS NRCS from iNEWS (which was recently acquired by Avid Technology and is now part of the Avid Media

Solutions division), Bridge News and other special applications.

The computer center contains redundant servers for iNEWS and Bridge. Two Unisys servers support iNEWS, and an IBM AS400 handles Weigel traffic and billing. Other auxiliary equipment supports the WebFN network.

WebFN uses Weigel's master control as well as their edit and graphics suites. The WebFN full-bandwidth video and audio feed is sent to Weigel's master control for commercial integration of

correspondents file two-minute audio packages that are rolled into the WebFN-produced E*TRADE Internet radio show and are available as discrete two-minute audio-on-demand clips.

The VOD station in Chicago uses one Insciber, two Sony Beta SP decks, a Sony DAT machine and a computer running Cool Edit Pro software for audio-on-demand editing.

The two VOD stations in Bridge St. Louis use ReplayTV to capture the

A key element of WebFN's vision was the ability to trigger simultaneous and instantaneous graphics for both its webcast and its TV broadcast.

the two TV stations.

The WebFN feed is also sent to Bridge in St. Louis for streaming. There it is encoded and sent to Savvis, a large fiber optic carrier, and then to Enron, the stream distributor.

WebFN operates one VOD station in Chicago and two in St. Louis. In these stations, Web programming is cut into segments for recall via the website. The St. Louis stations are responsible for repurposing all video. The Chicago station handles a variety of tasks for third parties that license WebFN content (i.e. pulling audio-on-demand segments for the E*TRADE site). Contributing

incoming video/audio feed. The ReplayTV then outputs to a computer running software that clips segments into separate files and embeds flags that will call up new metadata for current prices when an on-demand clip is played out.

Almost everything that appears on the WebFN website is archived and retrievable through a searchable database.

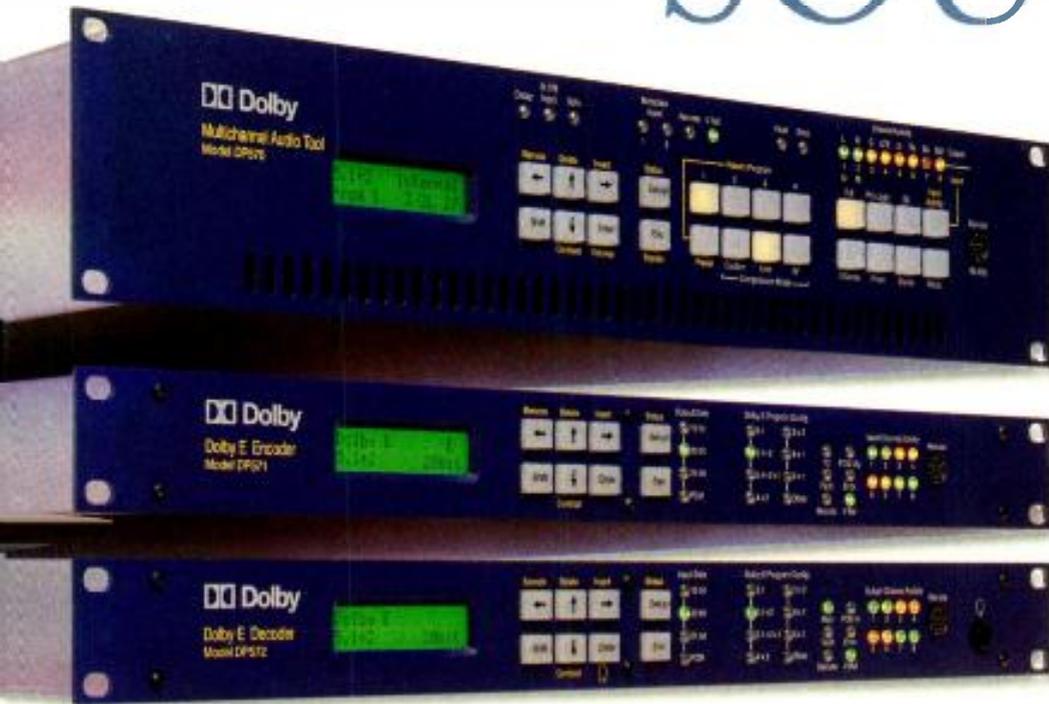
WebFN's convergence newscast

WebFN uses three different custom computer programs that run automation assist applications. The total effect is an unprecedented level of integration that marries multiple technologies from



Above, technical director Jay Richards works in WebFN's Chicago control room, which houses equipment including an Image Video switcher, a Pinnacle DVE, a Virtual Recorder video server and Sony Beta SP VTRs for playback.

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Arun Khosla (above) is a member of one of WebFN's four production teams, working on iNews NRCS workstations to produce WebFN's live financial newscasts.

the likes of iNEWS, Bridge News, Inscraper and Windows NT networking.

At the core of WebFN's operation is the iNEWS Newsroom Computer System (NRCS). Currently, WebFN owns approximately 25 workstations located among the pods and in the executive producer and news director offices, the WebFN control room, radio studio, and IT office, as well as on the sets.

iNEWS was chosen for its functionality, which was a significant requirement of the majority of the management team and staff for WebFN's convergence newscast. Without the luxury of being able to visit a similar operation, WebFN was truly testing both itself and the capacity of the iNEWS system to manage a multifaceted financial news network. It was a complex target for both companies, but their shared confidence and passion to realize an unmatched vision has proven successful.

A key element of WebFN's vision was the ability to trigger simultaneous and instantaneous graphics for both its webcast and TV broadcast. Codes located in the production notes column in the NRCS rundown indicate which type of graphic — a chart, earnings report or stock quote — is needed. WebFN designed an automation program that, in conjunction with the iNEWS interface, reads the codes and sends out commands.

When a command for a graphic is triggered from the iNEWS rundown, a request is sent to Bridge in St. Louis. Serving as the single source of data used to fill both the website and the TV

full-screen graphic templates, Bridge News responds by returning data that calls up the graphics for the website and the TV full screen.

The Inscraper CGs provide full-screen graphics for the TV feed. Both sets of graphics are created from templates designed by WebFN.

This intricate automation provides WebFN with the most up-to-the-minute information. For example, when the graphic displays a stock quote, WebFN shows the price of the

stock right at that moment.

Another key component of the WebFN system is the marriage of Bridge News with iNEWS. All workstations, except those located on the set, are outfitted with two monitors. A typical setup displays Bridge News on one monitor and iNEWS on the other. Journalists have the flexibility to set personal preferences because both run on a Windows platform.

The integration between the systems allows the user to cut and paste from Bridge News into the iNEWS script, which can then be edited or used as is. Then the script is automatically sent from iNEWS to the teleprompter.

This setup provides several advantages for WebFN. First, WebFN was able to create a paperless newsroom. Without paper scripts, WebFN is more nimble at managing script changes — a major task when reporting volatile financial news. The editorial nature of financial news is driven by frequent market ebbs and flows. What the market is focusing on is what WebFN is focusing on. It is like election night coverage, where the reporters are waiting for the numbers to come in. As a result, the style of WebFN's reporting is more conversational and ad-libbed. The anchors provide play-by-play coverage and analysis of the numbers and report on how the day's events unfold. Of course, a paperless newsroom offers monetary and environmental benefits as well.

Virtual network and commercial integration

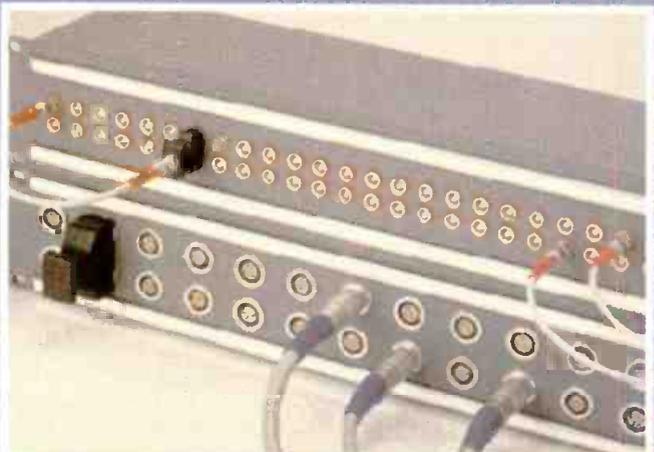
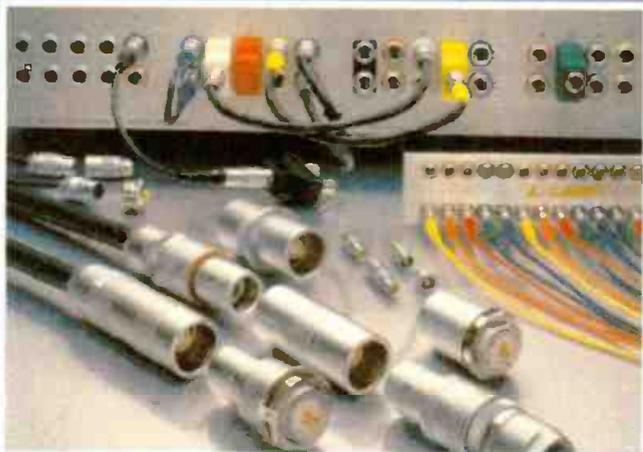
WebFN currently handles six different commercial loads for its site, TV and affiliate feeds, including WebFN.com, WebFN TV, Fidelity, E*TRADE and Microsoft. Additionally, WebFN also furnishes a commercial load that is free of any financial commercial advertisements. Fidelity, for example, requested a constant flow of financial

Without paper scripts, WebFN is more nimble at managing script changes — a major task when reporting volatile financial news.

news during market hours. In this particular case, the in-stream commercials playing on WebFN.com are replaced with segments such as WebFN University on the Fidelity site. Also, the two TV stations break away from the webcast at 40 minutes after the hour for an eight-minute TV-only segment produced from WebFN's small studio.

The commercial loading is split between WebFN and Weigel. Weigel receives the TV channels, while WebFN's hard-disc based Odetics system handles the commercials and short segments for the affiliates' websites. The Odetics system is programmed by the traffic department and allows the TD to initiate multiple breaks with different material

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at the push of a button.

WebFN envisions a time when, not too far down the road, the WebFN licensees (affiliates) will receive private-label content for their individual sites. When that happens, WebFN will build more sets and control rooms and will truly become a virtual network with customized and branded feeds for each affiliate.

As part of its program, WebFN receives feeds from reporters in several external locations worldwide. Many of these locations will soon have automated camera positions under the control of WebFN's own privately managed network. WebFN plans to install London-, Washington- and San Francisco-based cameras online by early February 2001.

Currently, feeds from the Chicago Board Options Exchange top the list with approximately 30 to 40 per day. WebFN has set up a small studio there, with a line dedicated to Weigel



WebFN's 35-member staff produces multimedia financial coverage that includes reports from financial centers and Bridge News' St. Louis and New York offices, live newscasts from its Chicago studio, and taped segments.

by a dial-up telephone accessed through Waterfront. Not surprisingly, setting up the remote audio and IFB was the hardest part of all.

Eventually, WebFN envisions installing

streamed at the moment, all controlled by the rundown. Most recently, WebFN has developed a clickable stream, where a click on a streaming commercial opens that advertiser's website.

Websites are becoming extremely sophisticated and complicated as the demand for deeper content and a greater degree of interactivity evolves. In the spirit of true entrepreneurialism, WebFN has plans to create interactive choices for its audience that are beyond anyone's wildest dreams. Blessed with a work environment that is filled with camaraderie and a spirit of discovery, WebFN is well poised to continue its unparalleled success. ■

**Banner ads could change and new links appear —
all dependent upon the content being streamed at the
moment, all controlled by the rundown.**

Broadcasting that is manned throughout the broadcast day. The Chicago Board Options Exchange studio can also serve as a backup studio for WebFN should the regular studios experience an emergency requiring the entire program to take place in a remote location.

WebFN has remote-controlled camera positions in the three other Chicago trading centers: Chicago Board of Trade, Chicago Mercantile Exchange and Chicago Stock Exchange.

WebFN also has cameras in Bridge in New York and St. Louis (where it also takes reporter feeds). Bridge New York is connected to Waterfront, a large fiber optic provider in the New York area, which enables WebFN access to the New York Stock Exchange, Nasdaq and several New York brokerage firms.

These New York locations have their own cameras and provide media spokespeople whom do reports for WebFN. IFB to Bridge locations is done through WebFN's own network. Other remote locations are supplied

hundreds of cameras around the world in banks, Fortune 500 companies and universities. When that happens, they would like to see the iNEWS rundown send commands to remote camera systems, IFB and audio systems to automatically switch the technical setups for the remotes. Other automation systems on the same network can be slaved to the rundown.

WebFN has taken a very calculated, step-by-step approach to its facilities' design — installing the most essential elements first and building from there.

WebFN plans to add more affiliates in 2001 and to eventually increase its live coverage to 24 hours a day as content partners in Asia and Europe are signed.

WebFN is in discussions with both iNEWS and Odetics about interactively programming its website. Presently, the site has dozens of discrete elements that could automatically be changed by a rundown. For example, banner ads could change and new links appear — all dependent upon the content being

WebFN Project Team

Bob Reichblum, Chief Executive Officer, WebFN
Greg Stephan, Executive Producer, WebFN
Mark Luciano, Director of Development, WebFN
Norman Shapiro, President, Weigel Broadcasting
Bob Berry, Technical Developer, Bridge Information Systems
Sophia Pissato, Website Design and Development, Wall Street on Demand

WebFN Major Equipment

iNEWS NRCS newsroom computer system
Panasonic and Sony cameras
Image Video video switcher
Pinnacle DVE
Ramsa audio mixer
QTV teleprompter
Sony Beta SP VTRs
Virtual Recorder video server
Inscriber Technology character generator
Odetics commercial insertion



Shall we gather by the tall tower?

BY DON MARKLEY

Traditionally, most broadcasters had their own tower. It was widely accepted that the top spot on a tower was by far the best location, reaching far more viewers than an antenna mounted 10 or 50 feet lower. Besides, it was simply the manly thing to do. Stations sharing their towers was as unforgivable and unthinkable as engineers sharing their underwear. Fortunately, that school of thought (the tower one) has vanished along with the intention to sue as a matter of principle when the cost of such principle is realized.

The cost of high steel is simply too much, in many cases, for an individual station to insist on their own tower. When considering the added problems of zoning, the cost and availability of useable sites, and the additional expenses involved in building several small buildings instead of one big one, the practicality of a community tower grows at a rapid rate.

A single tower can often be built to handle all of the television stations in a given market. This may be in the form of a standard tower with stacked antennas on the top and side-mounted antennas below the top, a "T-Bar" type of tower with four or more antennas on or near the top, or a full-blown "candelabra" with multiple TV and FM antennas above and below the top and side-mounted antennas on the basic structure. Transmitting antennas can be either mounted on top of such structures or suspended from the arms or platform, effectively doubling the available space. Careful coordination and selection of the antenna types and locations can minimize interference and pattern distortion, leading to a successful operation for all involved.

Building community towers

There are three conventional ways to approach such a project, all of which have problems. First, one of the stations can simply build the tower and provide space to all others. The problem here is obvious. The station building the tower will get the choice real estate on the tower. It is the golden rule

Owning such a structure can create something of a cash cow. Providing the building space simply increases the cash flow if the owner is willing to put up that much money.

The second approach to a community tower finds all of the stations in the market joining together to form a new corporation whose only function is to

The first advantage of a community tower is usually in the site itself.

— the one with the gold rules. This doesn't have to be a source of problems but often becomes one as personnel change, etc. In this type of operation, the station owning the tower does not usually provide building space for other stations, although that isn't a rule.

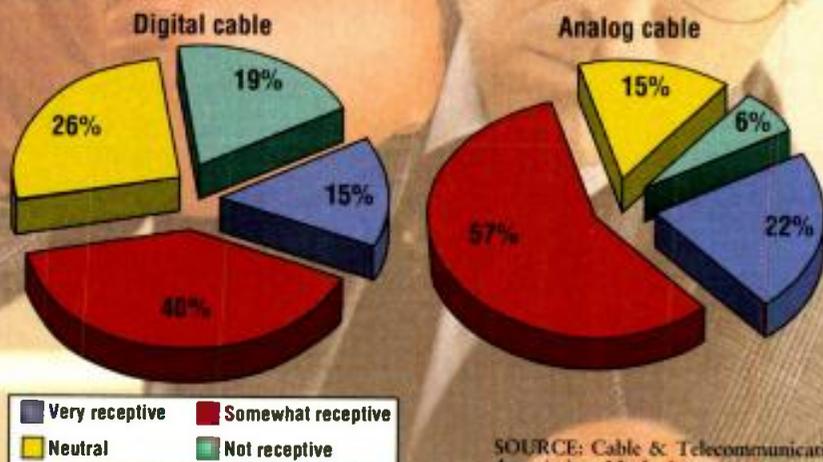
own and operate the tower. The stations each hold stock in the corporation and jointly select a project manager who is employed by the tower corporation. This often results in one big building being constructed to hold all of the transmitters in separate rooms.

FRAME GRAB

A look at the consumer side of DTV.

Viewers increasingly want to punch back at their TVs.

Surveys show up to 79% of viewers are receptive to interactive TV features.



That is probably the most economical way to provide equal facilities for all stations and is a very good approach to the problem. The stations mutually agree on the type of tower and building, on the architect to design the building, the contractor for the tower and a single contractor for the building construction. If the individual stations underwrite loans, the cost of the structure can often be covered by a single large loan to be repaid by rental fees from the stations, resulting in a much smaller initial cash outlay. The economies of scale are obvious in such a situation.

The third approach is for all the stations to contract with a third party to build the tower and lease space to everyone. Several corporations are now in the business and can put such a project together quickly and fairly.

The construction of a tower acts as a magnet, drawing unanticipated users with little antennas and checkbook in hand.

The advantage of this approach is the stations don't have to put up the cash for the tower immediately. They pay for their tower space every year, and it is an operating expense rather than a cost to be amortized. The biggest disadvantage is the stations lose a degree of control. That is, they are dependent upon someone else for maintenance of the tower and building. They also run the danger of losing the whole structure if the underlying corporation owning the tower goes down the drain. In reality, this is not a bad method of putting together a community tower project, given a careful selection of the company to be the tower owner and well-written contracts to fairly protect everyone's interests.

Advantages of shared towers

The first advantage of a community tower is usually in the site itself. The fact that such a project may be necessary demonstrates that at least one of the stations in a market has a tower that is unsuitable for additional antennas or is nearing the end of its reasonable life expectancy. The existing tower site may

well be suitable for the new tower, avoiding the problem of finding a new location. The fact that a tower currently exists on the site will greatly improve the prospects for zoning. The existing tower has already broken the skyline and is familiar to the neighbors. The existing zoning for the present structure may mean that no new zoning is necessary. That is an enormous boon in today's atmosphere of "NIMBY" (not in my back yard). In some areas of the country, that atmosphere has now changed to "BANANA" (build absolutely nothing anywhere near anything).

In any case, zoning boards are usually in favor of having one structure to accommodate all users, rather than multiple towers. In approaching the zoning authorities, the point should be

made that the tower will be built to hold all foreseeable antennas. Besides being appealing to zoning authorities, such construction only makes good sense. Provide for plenty of future antenna space. Additional rentals only increase the cash flow to the owners. The construction of a tower acts as a magnet, drawing unanticipated users with little antennas and checkbook in hand. It would not be unusual to find the tower not only pays for itself but also provides a good source of income.

The economies of scale extend to ancillary items such as electric power. First, it may not be necessary for each station to have its own transformer. Depending on the local and state regulations for utilities, it may be possible for the tower corporation to buy power at the distribution voltage. This involves purchasing your own step-down transformer and protection equipment, but the cost savings over the years should more than pay back the original investment. The corporation would receive only one power bill. Individual metering would be performed for each station as well as for the

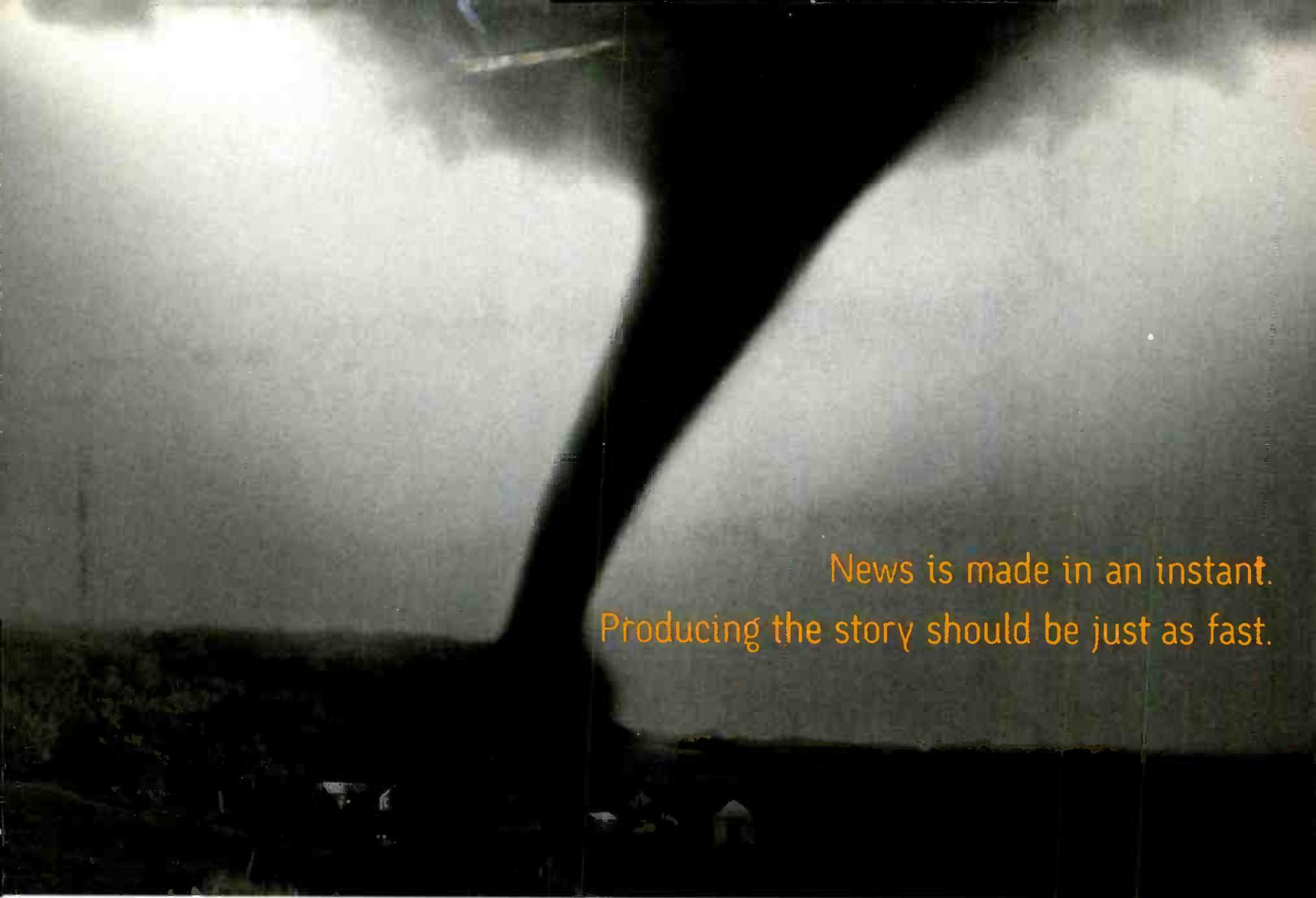
tower and building use and each station would then be billed appropriately. Current regulations allow the large user to purchase power from any desired provider. Such an approach is much more feasible if only one customer is involved with an accordingly larger power demand.

Standby power in such a situation could be provided by a single, large standby power plant. Again, one large plant is a far more reasonable solution to the problem than a number of individual plants. After all, if the main power source fails, everyone will need an alternate source, not just one station.

The insurance and maintenance costs of the community tower will also be far less than for individual towers for all stations. There is no question that the most economical solution to multiple users' needs is a single structure. It also offers the advantage that all antennas in the area can be pointed to a single source for optimum reception.

Again, the use of an outside party to construct and own the community tower can still be a viable option and it avoids the initial large expense. But think of one major point before calling in someone else to build your tower. There is only one reason why these outside companies are interested in building your tower: these structures make money – lots of money. Renting space is just like renting housing – it goes on and on without end and, certainly, without reduction in the annual rate. If the stations build their own tower, the rental rate for those stations that participate in the ownership can be reduced as other renters come on the tower and assist in repaying the original debt. With a little luck, this will eventually result in very low annual cost to the original stations. The tower cost will have been repaid and a positive cash flow will result. The final result — money is saved, service improved and the suits in the front office are happy. As the chief engineer bringing them this great idea, you will be a hero – at least until the ENG truck breaks down again. Then, all will be forgotten and you will revert to the status quo. ■

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



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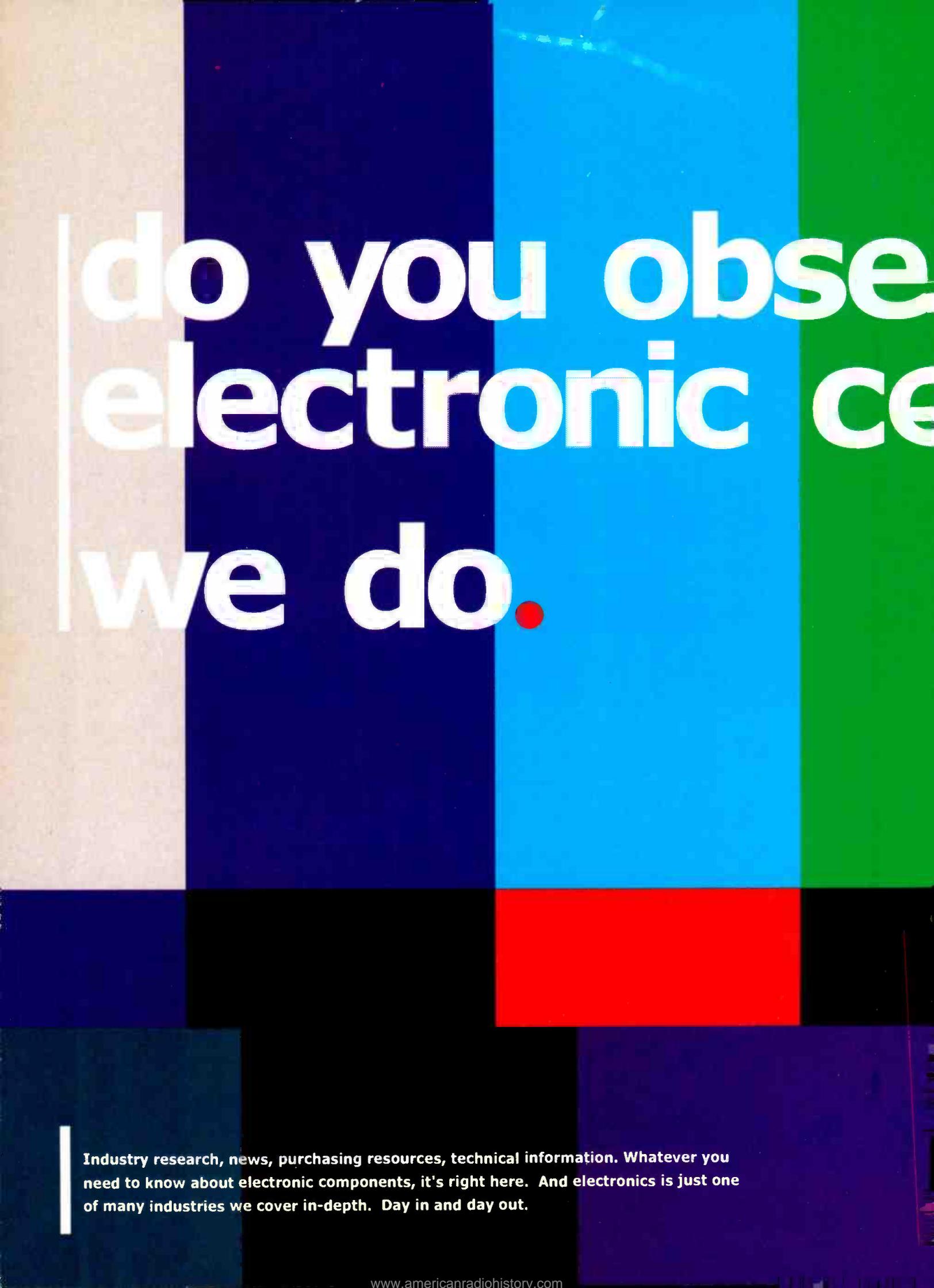
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480p production systems

BY TONY SALGADO

My work as director of photography has afforded me the capacity to work with numerous film and digital videotape formats during my career. In early 1999, after shooting countless projects using NTSC, PAL and HDTV interlace formats, I was given the opportunity to work in progressive scan using Panasonic's DVCPRO Progressive format, also known as 480p. After conducting camera tests and research with various digital formats including digital betacam and 1080i HDCAM (at the time of this production 24psf or 720p were not available), I selected 480p to shoot my first project—a short digital film entitled "Crystal Clear." After comparing image quality, it was apparent acquisition in a progressive scan format offered significant improvements over interlace.

The most astounding aspect of the entire project was screening the D5 HD master on a 50-foot movie screen, which clearly proved 480p origination was ideal for large-screen video projection. The primary benefits of starting with 480p are: progressive scan recording allows increased vertical resolution and it significantly reduces interlace

motion and detail artifacts; 60 progressive frames are recorded per second resulting in a sharper image with less motion blur than interlace; and 480p allows the use of existing NTSC support equipment and infrastructure during both field and post-production.

The 480 progressive recording format captures each image as a full frame, 60

DVCPRO50 (4:2:2) or 480 progressive (4:2:0) in addition to being switchable between 4:3 or 16:9 aspect ratios. The PD900's diversity is unheard of in the world of digital production equipment and makes this camera an extremely flexible unit. The camcorder includes two internal 480p to NTSC downconverted outputs

It was apparent that acquisition in a progressive scan format offered significant improvements over interlace.

times per second compared with interlace—where the frame is scanned as two fields creating an odd and an even sequence. Even when a recording that originated in progressive mode is downconverted to NTSC, the images maintain a substantial improvement in the reduction of interlace artifacts such as interline twitter and jaggies. Slow motion playback in 480p is very smooth and fluid and it must be seen firsthand to truly appreciate the advantages of shooting 60 progressive frames per second.

The budgetary aspects of using 480p as an origination format are quickly realized with location production. The cost of renting a camera package is comparable to that of a standard definition, but the progressive image quality exceeds any current interlace 60i format.

The Panasonic AJ-PD900WP Camcorder has the unique ability to select different record modes in DVCPRO (4:1:1),

allowing for compatibility with existing NTSC monitors, playback and video assist stations. In contrast, shooting in HDTV and monitoring in NTSC requires external downconversion equipment on set. Using 480p allows a director the assurance that, while the camcorder records in 480 progressive mode, an NTSC output is available and suitable for evaluation of content, framing, depth of field and lighting design.

The field production process for my digital feature started with an AJ-PD900WP camcorder outfitted with Canon high-definition zoom lenses. My primary objective in choosing HD lenses instead of standard definition lenses was to maximize image quality for transfer to 35mm film. I firmly believe in applying a film production philosophy to electronic cinematography by starting with the superior glass in the front of the camera to maximize optical image quality. The results were quite apparent when, during the screening of a 480p to 35mm transfer at a major high definition facility in Los Angeles, the images were mistaken to have originated on 1080/60i high definition.

As a director of photography my intent is to create images that maximize electronic cinematography. I personally place a strong emphasis on using "film



Panasonic AJ-PD900WP 480p Camcorder. Photo courtesy Tony Salgado.

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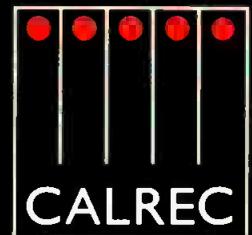
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style" lighting while working within the limited dynamic range that all digital camcorders have to contend with. I have termed this lighting technique "film-for-tape style lighting." Regardless of what manufacturers have said about the ability their digital camcorders have to faithfully reproduce a scene compared to a motion picture film, it is apparent in my experience that film maintains greater exposure latitude — especially in the highlight areas. Careful attention to avoid excessive white clipping and crushing of blacks will offer an ideal digital emulsion for transfer to film.

Post production with 480p can be accomplished using the Panasonic AJ-PD950A studio VTR, which outputs a down-converted video signal via 601 serial digital, analog component, composite or 480 progressive analog or serial digital. During the downconversion, the original 59.94 progressive frames are downconverted to 59.94 fields. Progressive frame one becomes interlace field one, progressive frame two becomes interlace field two. 480p utilizes 29.97 non-drop or dropframe timecode, which makes downconversion to NTSC extremely simple. The use of 29.97 timecode within a 59.94 frame rate can be confusing. However, it can be easily understood by carefully examining how 480p scans and records the progressive image.

In interlace, a second of time is made up of 59.94 odd and even fields that make up a total of 29.97 frames. It is a commonly accepted practice to round off the fields to 60 and the frames to 30. Since each field (half a frame) is captured at 1/60 sec, a progressive frame can be scanned in the same amount of time by doubling the horizontal scan rate to 31.468Hz. This method allows for squeezing in a full progressive frame in the same temporal period 1/60 sec, which previously represented a field. The timecode in 480p can therefore use 29.97, which makes it compatible with a multitude of existing production and post production NTSC equipment. The same timecode method is also used for 720 progressive. 480p can later be converted to a segmented frame via Panasonic's AJ-UFC1800 Universal Format Converter by dividing the progressive frame into odd and even fields that each contain the same temporal information. This method will allow for post-production editing using interlace equipment while maintaining the progressive temporal advantages.

I have used 480p as an interim acquisition format for delivery of high definition programs by acquiring in 480p and upconverting to high definition 720p or 1080i during online editing. The results have proven that originating in progressive is beneficial when upconverting to high definition or when transferring to 35mm film. 480p is an effective and high-quality alternative for productions that are seeking progressive frame imagery suitable for airing on SDTV, upconverting to HDTV and/or transferring to 35mm film. 480p represents an economical entry point for eventual conversion to high definition, but maintains compatibility within an established NTSC infrastructure. ■

Tony Salgado is a film and video director of photography based in Los Angeles, CA. He can be contacted via email at tony@24-7dtv.com His 480p digital short "Crystal Clear" won three awards at the Brooklyn Film Festival after its first-ever public screening.

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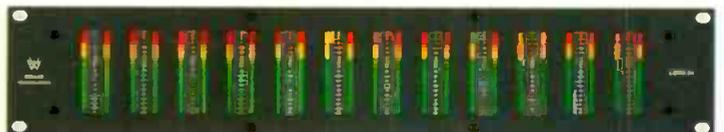
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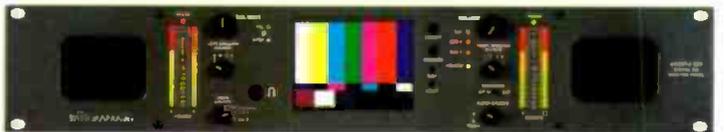
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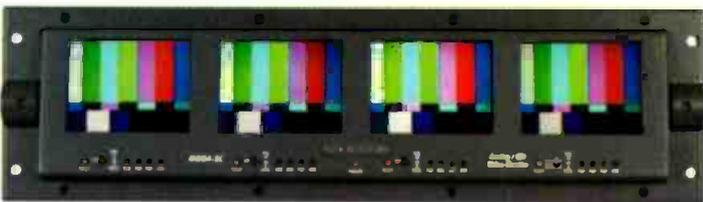
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Troubleshooting compression systems

BY JIM BOSTON

Here we are going to look at some basic approaches to take when troubleshooting compression systems. How well your compression system works depends on the quality of the data fed into them. We'll start with the data (you know, those video and audio streams) we feed into a compression system. Compression systems are basically embedded computer systems. They perform extremely complex digital signal processing (DSP) driven by microprocessors, application-specific ICs (ASICs), and lots and lots of RAM. Orchestrating this hardware is software and firmware that carries out the algorithms that determine what data can be thrown away and not be missed (too much). One of today's myths is that digital devices all process digital data entrusted to them equally well and in the same manner. This is not true in the baseband digital arena, as we will see shortly, and it definitely isn't true in compression systems. The ISO MPEG standard defines the resulting PES and transport streams that emerge from compression systems so a user can recover the data. Each manufacturer of compression systems is left to develop their own methods to create those streams.

Most DTV stations are currently taking their NTSC video and analog audio outputs and converting them to digital streams immediately before compression. This process is known as decoding because NTSC color info is decoded into component color. The process of going from analog to digital is not the hard part; it is separating the chroma from the luminance. Another process that should be in the signal chain before compression is noise reduction in the signals because noise generates random data that stresses

compression systems. These two processes actually use similar techniques since decoding and noise reduction both involve filtering. Most of us know that 3D filtering is better than 2D, which is better than 1D, which in turn is better than linear filtering.

Filtering

If the video is in the digital domain we can use 1/2/3D-filtering techniques. This filtering technique operates in the time domain. The higher

but points on multiple lines as well. Thus the aperture not only extends horizontally but vertically. These are the two dimensions in 2D. Intuitively you can see that a more intelligent decision on a particular data point can be made via 2D than 1D. 2D filters are used as comb filters for separating chroma from luminance. 1D and 2D filters are known as spatial filters. A 3D filter combines 2D filtering across multiple fields (or frames) of video. This filter is known as a temporal

One way to limit the amount of compression needed is to sub-sample the chroma.

the number the more hardware that is required, which results in increased cost. 1D simply looks at data that comes before and after the data point of interest. The number of data points before and after the point of interest are called the aperture of the filter. The wider the aperture the more intelligent the decision that can be made as to how to act on the data point of interest. 1D filtering applied to television streams usually means that any filtering process was done solely along a single horizontal line.

2D filtering is done in an array of data. A raster of video (many horizontal lines – one after another) is an array. 2D filtering not only uses data points along a single horizontal line,

filter since it acts over a wider time. Much more intelligent decisions can obviously be made over multiple video frames than within a single frame.

NTSC decoding and limiting of noise are important precursors to successful compression. JPEG was the original algorithm for compression. It is spatial compression as it only works on a single frame of video. Many digital VTRs still use JPEG, as do some video servers. When more severe compression was needed MPEG was adopted. MPEG is temporal compression as it works across multiple video frames. STL and DTV transmissions rely on MPEG. JPEG compression ratios of four or less are generally considered transparent. JPEG

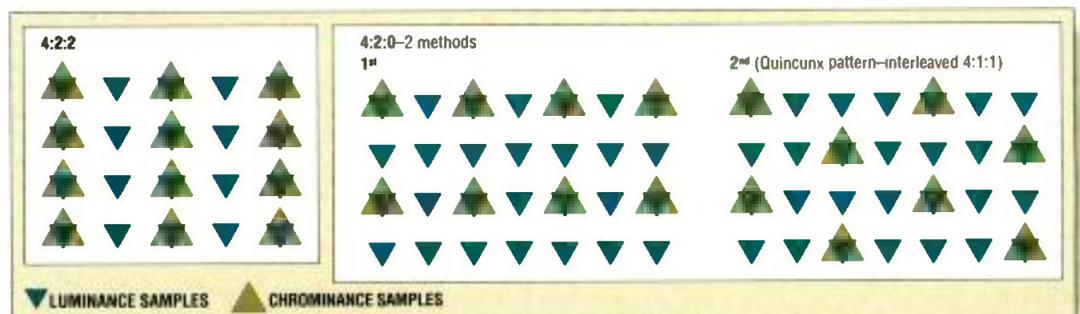


Figure 1. Not all sampling structures use the same techniques for sampling video. The arrangement of the co-sited Cr/Y/Cb samples depends on the way the sampling structure is defined.



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Betacam quality is generally obtained with compression ratios of 8:1. MPEG can usually increase the JPEG numbers by a factor of five. As compression ratios increase, some compression algorithms work better than others. SMPTE259 data streams require a 45:1 compression or data reduction ratio to produce a 6Mb/s PES stream.

Sampling

One way to limit the amount of compression needed is to sub-sample

the chroma. SMPTE259 is sub-sampled already. As most of us know the 4:2:2 ratio applied to digital component video means that the chroma information is sampled one-half as often as the luminance information. If this were not done, the bit rate of SMPTE259 would be 315Mb/s instead of 270Mb/s. But many compression systems take the chroma sub-sampling even farther. Instead of chroma sub-sampling only in the horizontal direction some compression

systems also work in the vertical axis. This sub-sample scheme is known as a 4:2:0 ratio. This method reduces the bit rate fed to the compression engine to 126Mb/s. This reduces the compression ratio required to obtain a desired bit rate out of the compression system. Another sub-sampling scheme is to take the 4:2:2 horizontal sub-sampling approach and sub-sample the chroma only one-fourth as many times as the luminance. This sub-sampling scheme is known as 4:1:1. 4:1:1 produces the same bit rate as 4:2:0. Which is better?

4:2:0 produces more horizontal chroma information, plus the horizontal and vertical chroma resolution is equal, but 4:1:1 is easier to implement. So is it better to increase the chroma sub-sampling or increase the compression ratio required? A few years ago the EBU and the CBC conducted a test. They found that 4:2:2 sub-sampling produced marginally better video quality than 4:2:0 until the bit rates got extremely low. At that time 4:2:0 had the advantage. But another interesting finding of the study was that when multiple compression and decompression cycles were encountered 4:2:2 performed better. This illustrated that starting out with more was still better than starting out with less.

Compression

So now we can start to compress. There are three aspects when it comes to video that can be manipulated to reduce the video rate. The first is spatial information, which is the dependence or similarities between neighboring pixels. The second is temporal information, or the dependence between neighboring frames in a video sequence. The third is coding redundancy, which is the likelihood that one data byte will be similar to another. Audio compression uses both spectral (frequency) and temporal techniques to reduce bit rates. Spectral masking implements a threshold mask across the audio spectrum. This mask varies with frequency. If a sound is below the threshold it is not encoded. Temporal masking eliminates softer sounds that occur immediately before or after louder sounds. An interesting fact here is if you starve an

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AC-3 (Dolby compression standard used in ATSC DTV) bitstream (as an example, the output set for 64Kb/s – 384 Kb/s is normal) that has a sporting event with an announcer talking over crowd noise, the crowd noise disappears. The same effect happens with a musical piece. The accompanying background instruments disappear and you end up hearing only the loudest voices or instruments.

A compression system has a target bit rate to achieve that is based on setup input by the user. Most systems offer users some choice as to how to achieve that bit rate. Those choices are via the MPEG toolkit, which is comprised of levels and profiles. When we talk levels in MPEG we mean the (sub) sampling structure and bit rate. Sampling structure and bit rate have a great effect on how many times we can compress and decompress before the quality is unacceptable. MPEG profiles refer to the tools used for temporal compression. These tools are the types of frames used (I,B,P) and the ratio of each. The mix of B and P to I becomes important when multiple compression/decompression cycles are encountered. But compression systems do have some parameters that become set after the user has decided on bit rate out of the compression system and on the MPEG tools to use. If you decide to use only I frames (essentially a JPEG situation) the compression required to hit the target bit rate will be much higher than if P and B frames were also used. The I frame is a stand-alone, spatially compressed frame. Generating I frames only means more redundant information to throw away. The compression engine using the Discreet Cosine Transform (almost all do) to do this will ratchet up the quantization value used to throw away low-level values in the frequency coefficient block or array. This array is generated by transforming and mapping small blocks of spatial video information into small blocks that represent frequency values describing the original video information. The frequency block is arranged so the coefficients representing high frequencies are mapped together. These coefficients are usually low in value and are therefore likely to

be scaled to zero by the quantization value. The higher this value the more coefficients become zero. Manufacturers of compression systems usually employ proprietary algorithms to determine what the quantization value will be under different circumstances.

After the DCT process, which is lossy, a lossless compression tech-

approximated in P and B frames until the next I anchor frame arrives. So another tradeoff is either I frames that are more harshly compressed and few approximation frames (P/B) or I frames that are more lightly compressed, with video quality that decreases in value with successive P or B frames until the next I frame.

4:1:1 sampling produces the same bit rate as 4:2:0. Which is better?

nique is used. This is the coding redundancy aspect of compression mentioned earlier. As just mentioned, the coefficients that become zero are located such that they usually follow each other when read out of the frequency coefficient block. A process called run length encoding will replace long runs of the same value with data that indicates the redundant situation and how long it lasts. After this step Hoffman coding is applied. This assigns likely-to-happen values to short codes, and unlikely values longer codes. The Morris code is an example of this. The code for likely letters (a, e, i) is short while less-likely letters have longer code. When this is done we have an I frame. P frames use the information from other preceding I and P frames. This greatly reduces the amount of data to build a P frame. Spatial differences between the preceding I or P frame and the newly generated P frame undergo I-frame-like spatial compression. Plus, areas of video information that don't change, but simply move, are encoded as vector change information. Thus in some ways a P frame merely describes the changes that have occurred. This greatly reduces the data needed over completely repainting a new frame each time. B frames can also be added. B frames use information from preceding and succeeding I and P frames. More P and B frames used between I frames means that I frame encoding is less severe. The tradeoff is perceived video quality will be slightly less with each additional P or B frame because video information is increasingly

Some encoders provide a little help as to how hard the I frame compression engine is working by displaying a bar graph or a number that indicates the value of the quantization being used. Some multiplexers, which take the various PES streams coming from multiple MPEG encoders and weave them into a single transport stream, use statistical multiplexing to control the quantization values of the encoders. Encoders processing video with lots of changes — say a sporting event — receive lower quantization values and thus produce higher bit rates than encoders handling video that is fairly static.

Setting up compression systems offers many tradeoffs. Most installations can only rely on their subjective opinion of what constitutes good compress video and audio. Bit rates, sampling and MPEG tools used can vary widely and produce the same overall subjective result. The best setting for one type of program might not be the best for the program that follows. Since most compression systems are not yet under automation control your settings must represent a compromise that achieves the look you want. Remember though that what you feed into the compression system must be as clean as possible. The bottom line here is that DTV's cause will not be helped if viewers merely end up trading a set of NTSC artifacts for a new set of ATSC artifacts. ■

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

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high definition

The linear online edit suite at HD VISION utilizes a Snell & Wilcox HD 1024 switcher, Sony 9100 online editor and Sony HDVS monitors. A separate environmentally controlled and sound proofed tape room feeds signals to the suite. Photos by Michael Penn Smith.



by Jerry Wojtas

Developing a high definition post facility here in Dallas has taken eight years, hundreds of thousands of man-hours and millions of dollars. Every project has peculiarities and nuances that push you into new areas of HD and leave you excited about the next assignment. Recently electronics giant Texas Instruments wanted to do a multilayered, interactive-style HD video project. "Your Personal DLP" is a scripted example of high definition interactive television that Texas Instruments is using for display on their Digital Light Processing (DLP) high definition monitors.

Off-line for HD

Off-line work on the project was done in Final Cut Pro (FCP). Two ways of capturing video into FCP are Firewire or Analog. In this instance, we used DVCAM via Firewire and had the HD format down-converted to Beta SP. We kept the 16:9 format by letterboxing the images. We chose to do the project in DVCAM because of inadequate information from video card manufacturers and local video systems supply vendors. We would have preferred to eliminate the DVCAM step and capture directly from the down-converted Beta SP tapes. However, we were unable to upgrade our Macintosh G4 Final Cut Pro system to include analog (Beta SP) in November 2000. Directly

editing in post

after the DLP project, we upgraded our system with a minimum of help from manufacturers or vendors.

There are problems with downconverting HD to analog. The most apparent problem is the image quality. When viewing analog

downconversions from HD, it is difficult to see full details in the image. The image looks great in analog NTSC, but you may miss imperfections in the HD video and even images in the distance. This can be a big problem when finishing in HD. Also, graphics in standard definition do not necessarily look as good as they will in HD. Off-line editors depend on the producers to view all material in HD prior to downconverting to make sure the images to be downconverted are of the highest quality and the best for use in the project. Failure to produce with image control in mind can lead to longer online sessions.

This is the importance of off-line — to save costs and time in the online process. Searching for images in the online is cost prohibitive and wastes valuable resources. The organization of graphics for an HD project is of utmost importance. The graphics are made for 16:9 HD 1920 x 1080. In the off-line process, we used 4:3 DV NTSC 720 x 480 (FCP offers 16:9 editing). We do believe 16:9 will be the format of the near future; however, in most instances, we are still editing in 4:3 (720 x 480 or 720 x 486) format. We have not found it cost effective to purchase 16:9 equipment at this time. In order to optimize the process, the graphic artist needs to change the ratio to 4:3 (720 x 480) for DV and 720 x 486 for standard definition. The HD online needed a matte made for each graphic (white on black); in the off-line, we needed an alpha channel attached to the graphic to speed up the off-line rendering. The graphic artist not only changes the aspect ratio, but also includes an alpha channel for off-line. We found it important to do all graphics in the off-line first, both for organization and to check for mistakes. It is costly to find these mistakes in the online process.

“Your Personal DLP” consists of three video layers. The first is a full screen background layer of high definition sports footage, nature images and travel footage. Layer two consists of the interactive character “OK Bob.” The third video layer contains all the graphics and interactive menus used for the interaction between the OK Bob character and the interactive (voiceover only) television viewer.

When off-line editing was done and approved by the client, we broke down the layers in FCP for the edit decision list (EDL). The first EDL, V1, contained all B-Roll. The second EDL, V2, contained all graphics. The third EDL, V3, was for the interactive character OK Bob. The three EDLs represent the three video layers normally used while layering in nonlinear systems. All EDLs were then sent to Tim Werner, HD VISION’s senior online editor, via e-mail. The final step was audio mixing of B-Roll natural sounds and SFX. We did not mix down OK Bob’s voice because Tim Werner had already flanged his voice. We based the final audio mix on OK Bob’s level. The levels of natural sounds and SFX needed only minor adjustments during the final audio mix. We passed the audio mix to a Beta SP tape that could

Designer on the television pilot “Texas Tales and Legends” — a period look at Texas during the 1930s and 1940s. He went into the project with much anticipation and no experience with “HD do’s and don’ts.” He knew that he wanted to keep close watch on texture and color palette — especially working with reds and black and patterns that vibrate on screen. For the open, he used old photos in a moving montage with lots of rich color enhancement, but still retaining the look of the “old” sepia tones. During shooting, the beauty of the detail that emerged from a sensitively lit set was evident. The HD sensitivity to light is especially wonderful in the night shots. Some of these scenes tend to be over-lit because of the need to do so when shooting regular film or video. He loved the period detail, the colors that stayed

In high definition, NTSC keying and compositing shortcuts do not work!

then be brought into the HD online suite and mixed down to the final master of the DLP OK Bob project. The digital music was added in the online, so the final audio mix would retain quality. To keep optimum quality, audio should be kept in its original digital format. When passing audio back and forth between digital and analog, you inherit many problems, from distortion to pops and cracks and degradation of the signal.

Building graphics for HD

Working as a production designer and art director on HD projects requires rethinking old design issues. Barry Phillips’ move from editorial and advertising illustration to film art direction made him acutely aware of the benefits of illustration translating directly into film. But the format of film seemed to cloud a lot of the detail and texture, and he became frustrated by the camera missing so much of the effort put toward detail.

His introduction to working in HD came a year ago, with a position as Supervising Producer/Production

constant and the expanse that the HD format created. Nuances that happen all on their own had now found a visual place to live on the screen.

In the HD VISION projects, the HD format complements an overall reach for perfection in design, color and look. We wanted the graphics for Texas Instruments and Travelbyus Inc. to have a retro art deco feel combined with the contemporary flair that HD design gives. HD allows designers to work with delicate, fine line design and use colors that are exactly what is wanted when displayed, with no variation from the original intent. The look is crisp, clean and the format is handsome in its wider and broader sweep across the screen.

As a graphic artist with years of experience in illustration and designing for print, Blue Bliss scrutinizes everything with an eye for detail — be it paint on paper or pixels on a monitor. When designing for NTSC, you have to throw half of that detail away, thinking in terms of large readable text and avoiding that major taboo, bright red.



The color correction menu on HD VISION's Snell & Wilcox HD 1024. The video switcher has seven color correctors for making adjustments to RGB brightness, gamma and pedestal separately or in tandem.

In her recent work for HD VISION, she found that she got back everything she had lost to NTSC. She was able to use fine lines, subtle color changes and delicate details, almost at the level of print graphics, without having to “dumb down” the images for television. This was demonstrated by HD VISION's recent projects for Texas Instruments and Travelbyus. The team created two video presentations, both with graphics in HD. One would also be downconverted to NTSC to be used by the client for other applications. Knowing this beforehand, Blue Bliss had the whole luxurious width of the HD horizontal format to play with, but still had to confine name keys and the like to the NTSC safe title area, centered within the HD area. In a test of the graphics in NTSC, the huge difference in image quality was apparent. Slim, elegant name keys had to be changed into comparatively large, crude ones for readability. It did seem a shame to have to build NTSC's limitations into the design of an HD piece.

Another interesting issue that emerged during the course of the two projects is the nature of relationships — not only between people working together for the first time, but also between machines and software. For instance, when art directors created Photoshop files, they had to keep in mind that the online editor needed to have two PICT files for each graphic

— one full color and white on black for the alpha — at 1920 x 1080 pixels. Also, the off-line people needed the files sized to 720 x 480 for their equipment. Another issue the art directors had to consider was the fact that when their PC files were loaded onto the Mac machines used by the off-line editors, all of the file names were truncated to just a few characters, making them unusable for identification.

Every project has peculiarities and nuances that push you into new areas of HD.

It is evident when working in HD, as in any other project, that while you can do your best to plan a job up front, when entering new territory unknowns can and will emerge to ambush you. As the team works together on future projects, they will build a foundation of shared knowledge and experience that will make things go more smoothly. A continuing dialog between teammates also facilitates developing new and better ways of getting results, and the kinds of creative ideas that only come from the process of doing.

Online editing

At HD VISION we can record to three different HD formats: Sony HDD 1000 one inch at 1035i, Sony HD Cam at 1035i or 1080i, and Panasonic HD D5 at 1035i or 1080i.

HD VISION opened its doors for business in 1993 and has a very large library of high definition footage. A lot of this material is 1035i. It is used with 1080i footage when clients request use of this material. If a majority of the material in a project is 1035i, with a client's approval, a 1035i master will be edited. If most of the footage is 1080i, a 1080i master will be generated. The difference — 45 lines — is really minimal, especially for broadcast masters, where most of the additional 45 lines of a 1080i master at the top of the image are lost in transmission. Both formats have 1125 total scan lines. With 1080i the vertical interval is smaller.

We do have to be careful when using 1080i and 1035i material in a master, so field interchange problems do not occur. We use a Snell and Wilcox HD 1024 switcher in our edit bay. When cross point inputs are set manually at the appropriate line input or set on “auto,” this switcher will align 1035i and 1080i inputs properly so that both

formats can be used when mastering at 1035i or 1080i.

If a client needs 1035i footage converted to 1080i so that the 45-line gap at the top of the frame is filled, Werner will use the optional 502 board available in Sony HDW 500 HD Cam decks to accomplish the conversion. There are ways of making the 1035i / 1080i situation work properly, and this will become less of a problem as more and more native 1080i footage is recorded in high definition production.

One online editing procedure is to have off-line editors e-mail their edit

decision lists (EDLs) to the online editor a few days before the edit session if possible. This allows time to download the list and double check the EDL.

a source machine that is fed directly into the only NTSC monitor in the room. This letterboxed off-line master was only a visual reference and was

The Snell and Wilcox HD 1024 video switcher in use at HD VISION has seven color correctors. These color correctors offer RGB brightness, gamma and pedestal adjustments that can be made separately or in tandem. YPh-Pr controls are also provided.

HD images offer a lot more contrast than NTSC images and a much larger color palette. A single frame of high definition contains four to six times more picture information than NTSC. Even subtle color correction adjustments are very noticeable in high definition. In many cases just a small gamma adjustment (black stretch) will cause a significant improvement in the look of a properly recorded HD image.

Werner uses a Tektronix RGB high

When designing for NTSC, think in terms of large readable text and avoid that major taboo, bright red.

for readability in the Sony 9100 online editor. We routinely have clients that travel great distances (from Germany, Scotland, California, etc.) to edit with us here at HD VISION in Irving, TX. This helps to minimize any possible EDL problems well in advance of someone's arrival so that any glitches can be taken care of while a client is still at their home location.

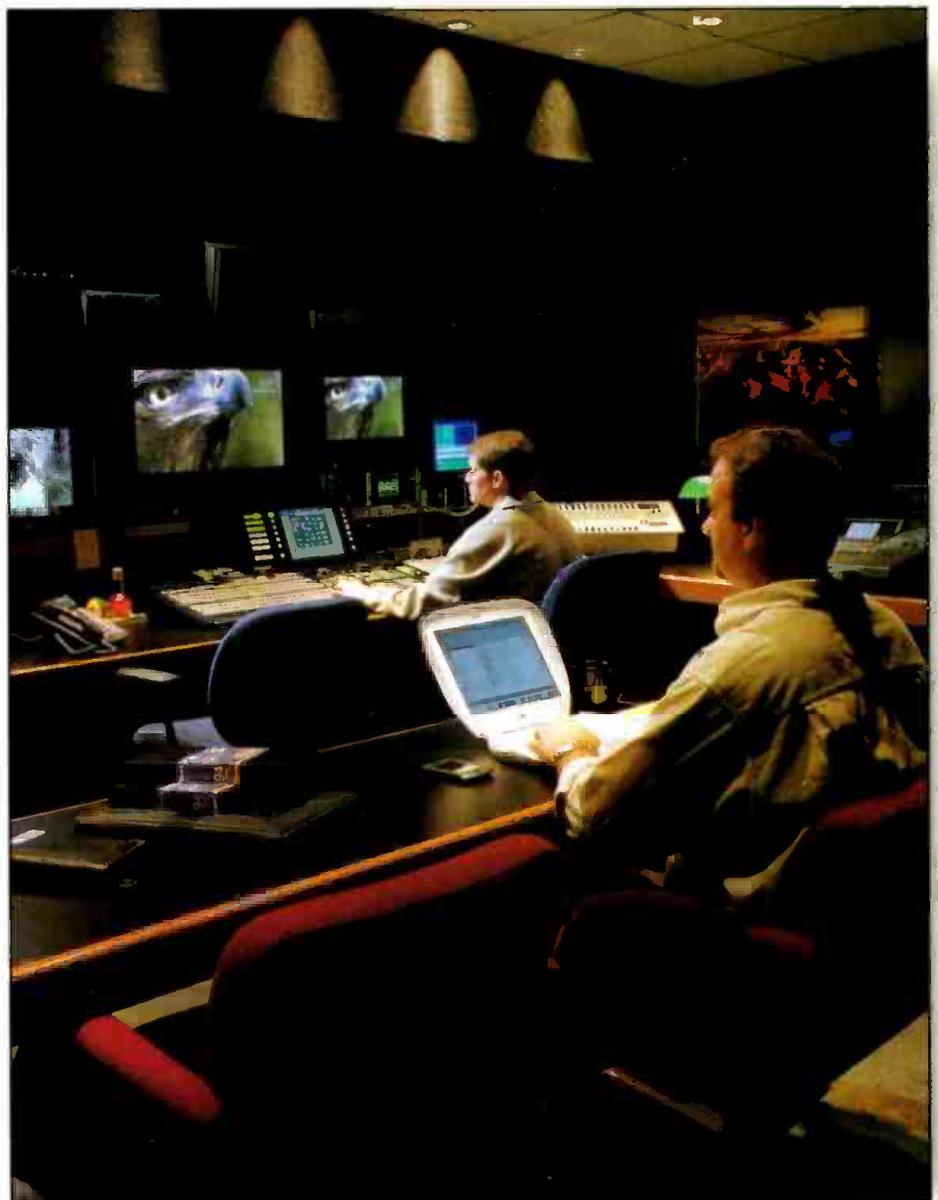
When we are mastering to HD Cam and will be using the deck's pre-read capability, the EDL is run through the Software Grille's Pre-Reader program to modify the lists for a more efficient high definition linear online edit. This was the case with the Texas Instruments "Your Personal DLP" project.

Off-line editors Dan Whiteman and Mike Losurdo formatted their Final Cut Pro EDLs with multiple B-Rolls for shots coming from the same reel that require dissolve type transitions. In this way, the EDLs could be modified properly via Pre-Reader for a pre-read online edit. Pre-Reader has been used many times in the past with Avid-generated EDLs and, in this project, was also shown to work well with the Final Cut Pro edit decision lists.

Dan Whiteman e-mailed Werner the three EDLs that corresponded to the three video layers. Werner then put video layer one—the background layer—through Pre-Reader for a sequential "A" mode pre-read edit, which allowed for proper color correction on adjacent shots.

Whiteman also supplied him with a Beta Cam SP of the approved off-line master. Werner has control via the Sony 9100 editor of a Beta Cam SP machine in the HD online edit bay, as

not fed as an upconverted source into a cross point on the HD 1024 switcher. It was used in conjunction with the edit decision lists.



HD VISION's linear online edit suite was configured for operational efficiency and accommodates group collaboration and intimate sessions. The room design allows for future expansion or renovation without the need for major modifications.

definition waveform monitor in conjunction with a Sony 28-inch HD color monitor to color correct HD footage. There is no color subcarrier or color frame issues to deal with in high definition and therefore no need for a vector-scope. Color correction settings can be stored as DMEMs in the HD 1024 DMEM registers. Notes are added to edits in the online EDL regarding DMEM registers that correspond to color correction settings, so that they can be recalled and adjusted if necessary.

After editing the first video layer of "Your Personal DLP" Werner cloned layer one to an HD D5 tape. Gary Sextro, Texas Instruments' executive producer on the project, wanted each video layer as a separate element for future editing flexibility.

After cloning layer one, he used the layer two EDL to pre-read the OK Bob character in the upper righthand corner of layer one of the HD Cam master. He chroma keyed OK Bob and added a DVE warp effect to his image. This effect, along with the flanging of his voice, gave OK Bob a slightly ethereal look and sound.

Chroma and luminance keys are easier to do in high definition, once again because of the additional picture infor-

hide anything when it comes to proper keying or compositing. If you do you will see it. In high definition, NTSC keying and compositing shortcuts do not work!

After the OK Bob character was added to the HD Cam master and cloned to HD D5, Werner used the EDL for video layer three to pre-read the Photoshop supplied graphics and interactive menus onto the master. These were luminance keyed with corresponding white on black mattes. Once again subtle clip and gain adjustments to the luminance keyers on the Snell and Wilcox switcher made for significantly noticeable changes to the look of the key in the HD image. So much so that we have since moved the Snell and Wilcox HD 1024 switcher closer to the edit bay's 28-inch Sony HD color monitor to be able to better scrutinize key clip and gain adjustments.

These adjustments are especially important because a high definition image may wind up being projected onto a large viewing screen — sometimes as wide as 32 feet. This was the case with the Texas Instruments project. An even slightly misadjusted chroma or luminance key in a high definition image will not look good, and can become

Final project review

Gary Sextro, Texas Instruments DLP Division, reviewed the completed project on a Panasonic 52" DLP (720p) rear view HDTV. He was impressed with the crisp graphics and audio and of course the picture quality. As a side note, the project was then viewed at Texas Instruments' in-house theater using their DLP technology 1080i projector system. The video was shown using an HD D5 VTR. Even after enlarging the picture onto a 30-foot screen the graphics and picture quality remained intact. This is one aspect of HD that is often overlooked. As Kevin Caddell, chief engineer remarked, "While in the production process always...think big." Historically, completed HD projects have been viewed through consumer-sized display systems. Larger venues, such as e-cinema, take advantage of HD's increased resolution and can show the same material without degradation or loss of resolution. The project was aired at CES and will be shown again at NAB.

The future

This is the only industry that is still in its infancy after more than fourteen years of development. We will continue to research and develop new technologies to enhance our production capabilities. Through future expansion and expenditures we will bring some of the strengths of nonlinear editing to the table to enhance our real-time linear editing capabilities. One is the addition of a new graphics workstation with Adobe's After Effects and Pinnacle's Commotion to do roto-scoping and high definition after effect composites that we can then render to a high definition digital disk recorder. While there will always be differing opinions and solutions to the many obstacles we face in high definition production one thing is sure: It will only get better from here. That is what it is all about. ■

Jerry D. Wojtas is vice president of HD VISION (www.hdvision.com). He can be reached at jwojtas@hdvision.com. Barry Phillips, production designer and art director, and Blue Bliss from Killer Bee's; freelance off-line editors Dan Whiteman and Michael Losurdo; and Tim Werner, senior online editor for HD VISION, contributed to this article.

A single frame of high definition contains four to six times more picture information than NTSC.

mation in each frame of HD. Keys have more range, and with the Snell and Wilcox switcher editors can chroma key just about any color. We used standard chroma key blue as our key color for the OK Bob character. The HD 1024's chroma key adjustments allowed Werner to feather the edges of OK Bob for a great-looking chroma key.

The Snell and Wilcox chroma keyer offers a wide range, and it turns out you really need it. The great thing about HD is beautifully detailed images. The bad thing about HD — not really all that bad but undeniable — is that you cannot take any shortcuts or

even worse if it is projected onto a large screen. Especially if it is projected with a high definition video projector that uses the Texas Instruments DLP system.

When he finished pre-reading the graphics onto the HD Cam master, Werner made one final clone onto an HD D5 of the completed HD video edit. Then he did a stereo mix of the music, the OK Bob flanged audio, and the stereo sync and voiceover audio (from the Beta Cam SP off-line master) onto the HD D5 clone of the final HD video to create a duplication master that was delivered to Texas Instruments DLP Division.

audio monitoring



Both workspaces at Lower East Side Studios offer full 5.1 Surround Sound capabilities through their Soundtracs DPC-1 digital consoles and Avid AudioVision DAWs. A nearly silent HVAC system and THX-approved JBL LSR-series monitors meet the highest of audio monitoring standards. Photos courtesy Walters-Storyk Design Group. Photo by Wojtsch/Pollara Photography.

systems

By Gary Eskow

The old maxim that tells us to watch what we ask for applies to the audio post community in spades these days. Complete mixes, including dialog, effects and music may have sounded hideous coming out of a single three-inch speaker, but engineers and producers knew exactly what the listener would get.

Audio mixers wanted more though, and a stereo field wasn't enough. Those who hungered for full surround audio have seen their wishes come true. More homes have theater systems than ever before, and the numbers are growing. The ability to create full-range mixes that convey the creative ideas of content providers is now part of the audio post process on many, if not most, commercial assignments being executed today.

But this bonanza has created thorny new problems that audio post engineers have to contend with. Monitoring a mix that will sound good in all of the environments it

will be played back in, including mono, stereo and 5.1, is perhaps the greatest challenge facing audio engineers. For starters, surround sound packages vary widely in price and quality. Spending \$300 on a six-speaker system will allow a listener to hear sound effects pan across the entire field, but how will the frequencies that are reproduced compare with the performance of speakers that cost far more?

Speaker placement is another monitoring problem to be considered by engineers and content providers of material that is designed primarily for the home market, or that will eventually make its way into this environment. The rigorous standards applied



Proper monitoring at the proper stage helps a piece translate well to the viewing environment without overwhelming the home system. Toward this end, many audio post houses are setting up two viewing environments: one for high-end monitoring and the other to replicate home theater model.

concern even factor into the equation? Perhaps mixers should create their work to the highest standard, and let the home theater owner who places Aunt Bessie's ceramic vase in front of the left rear speaker suffer the consequences. The decisions that mix facilities are making today regarding how to monitor audio will have a critical effect on how well they fare in the competitive audio post market.

When broadcasters first began dealing with audio for picture issues back in the 1940s, downmixing — the term applies to the need to simultaneously monitor surround sound mixes in stereo and mono while working with all six speakers — was not an issue. When

Digital audio workstations allow for an almost unlimited amount of tracks, many of them virtual spaces on a hard disk that can be ported out a smaller number of discrete, physical outputs during mixdown. Today, mixes that contain 100 or more channels of audio are not uncommon. As a result, phase cancellation becomes more of a problem, especially when stereo mixes, for example, need to be downmixed to mono. Careful monitoring is required to insure that two elements at the same frequency do not nullify and cancel each other out when a mono mix is executed. The combination of synthesizers, acoustic instruments and complex sound effects insures that phase problems will arise, and they must be carefully addressed while monitoring a mix. Question: You're producing the movie of the week for a network. In your audio mix, which you've decided to optimize for stereo (the primary audience), your audio engineer has created a stereo field that matches the film's climactic scene, a car chase through a crowded city, frame for frame. When the engineer references this scene in mono you find that you're losing several metal-against-metal effects that your sound designer has created. Do you live with this or rework the stereo mix so these effects

Monitoring issues multiply as we move from stereo to 5.1.

to movie theaters desiring THX approval regarding speaker placement and a host of other issues are absent in the home. How does an audio post facility set up a surround sound mixing room that will let an engineer effectively monitor for the greatest number of homes that will play back the material? Should this kind of democratic

stereo programming was introduced, the need to reference these mixes in mono was apparent. Today, many viewers still listen to the audio portion of programming on a single speaker built into the set.

There has been a steady escalation in the sheer amount of audio material used in broadcast production. How does this increase affect monitoring?

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Applied Technology

Zero-effort Web broadcasting: Grass Valley's Aqua brings simplicity to webcasting

BY ROSS SUMMERS

Producing a television show, live or taped, is hard enough. Formatting that same program for the Web is an added task that broadcasters are now faced with every day, and sometimes continuously throughout the day. While almost every television station and most television programs have their own website, the process of taking "broadcast-friendly" programming and formatting it for the Web has been — until now — a process that revolved around tools of the computer industry.

These computer industry tools, used to repurpose and reformat content for Internet distribution, have created less-than-ideal situations. They are either technically complex, requiring additional manpower to program and su-

pervise, or they are low-power "toys" that take too long and don't provide the quality that broadcasters and program producers truly desire — regardless of the bandwidth used to play the

high quality), while simple and almost automatic to operate. A system that could handle multiple Web-based video formats and operate in either a live real-time mode, pre-programmed

The process of formatting on-air programming for the Web has revolved around tools of the computer industry—until now.

online content. Clearly, a new solution was needed to enable broadcasters and program producers to prepare their content for the Web. A solution that was broadcast-friendly (meaning

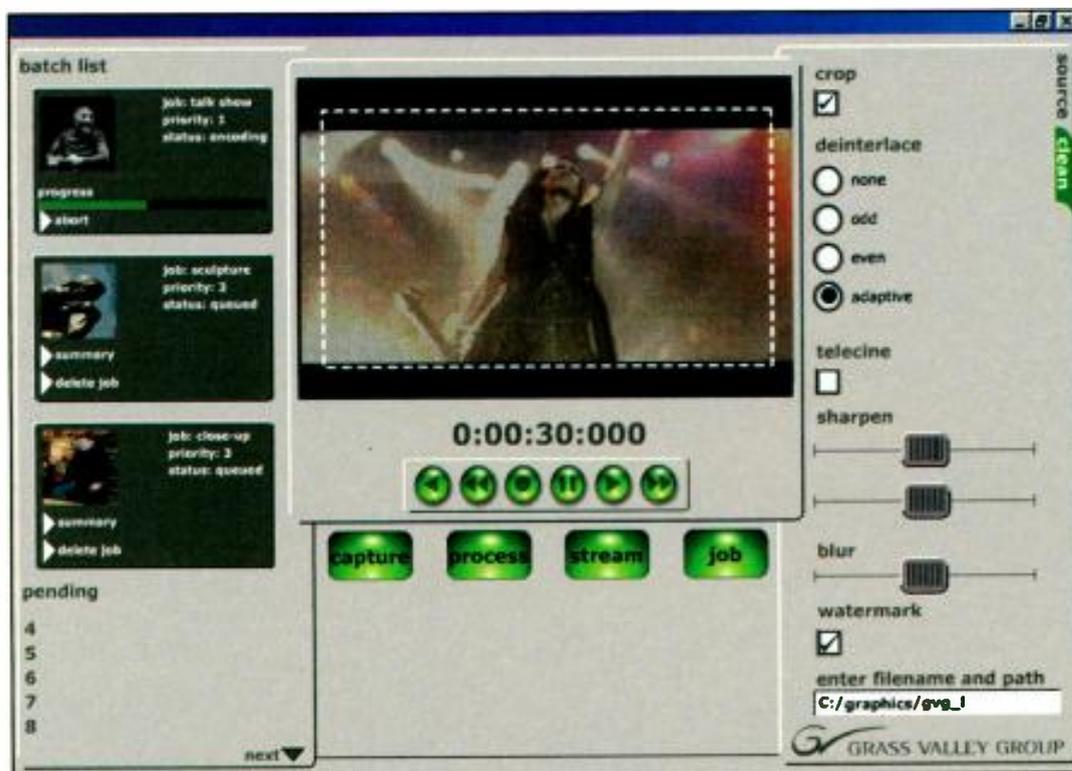
mode or an on-demand mode, one that understood tape cueing, SDI embedded audio and ruggedness.

The Aqua Internet encoder, developed by the Grass Valley Group, provides these powerful tools and is easy to use. The encoder, a hardware and software turnkey system, has been designed with the needs of broadcasters, program producers and other content owners in mind.

It is part of the Grass Valley Group's Web Media Publishing offerings, which include the Profile XP Media Platform, the ContentShare software platform for digital asset management and WebAble technology for streamlining the repurposing of content for the Web.

One-pass encoding technology

Leveraging the Grass Valley Group's experience as a world leader in video and audio signal processing,



The Aqua Internet encoder features Grass Valley's One Pass Encoding technology, which allows it to pre-process, capture, clean and encode an input source, and render it into multiple streaming formats at multiple bit rates, all in real time. Screen capture courtesy of the Grass Valley Group.



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the company's One Pass Encoding technology was created to provide the same premium-quality video to online as that seen on-air. The technology provides a comprehensive set of audio and video "cleaning" tools during both pre- and post-digitization. These tools include noise reduction, artifact removal, de-interlacing and color correction. As a result, the encoder can produce high-quality, real-time output. It is capable of sustaining multiple, simultaneous, real-time and high-bit-rate encoding processes as well as producing outputs from a simple audio stream (at 28.8kb/s) to DVD-quality streams (at more than 2Mb/s).

The encoder also features basic editing capabilities (such as fades to and from a pre-selected background color) for manipulation of the content prior to encoding, and a user interface designed to accommodate various levels of operator encoding experience.

The user can choose any or all of today's major streaming formats — Microsoft's Windows Media, RealNetworks' RealVideo and Apple's QuickTime —

and encode them all simultaneously, in real time, with whatever data rate is needed. This flexibility means fewer man-hours are needed for the encoding process and the highest quality possible is maintained.

The encoder also features an auto detect and encode feature that, when connected to the Profile XP Media Platform, allows it to look into the Profile's media storage directory. When new files are detected on a Profile system, Aqua can automatically transcode the file's contents to the pre-selected streaming media format (or formats) without user intervention.

Input flexibility is another feature and includes SDI video, analog video (fully configurable), an AES/EBU stereo pair and analog stereo audio on a single capture card. Since the system is capable of automatic capture from tape in a batch-processing mode, an additional capture card is available as an option. This allows the user to shuttle a tape machine and preview the tape's contents through the encoder without affecting the batch process.

Advanced functionality

Rights management systems will play an increasing role as content owners repurpose their assets for the Web. Keeping track of descriptive information, pricing information, legal rights and shelf life will be of prime importance to the owners or licensees of content. The encoder's design features interfaces for rights management systems, as well as the ability to increase throughput by distributing workloads using standard load-balancing software. By using Microsoft's .NET framework, users of the encoder can work directly with the encoder regardless of its location or the location of the material to be encoded. Additionally, the system is designed to accommodate interfaces to various e-commerce and digital media publishing and syndication applications.

For branding purposes, an optional logo burner is available. This option allows specific logo branding on the encoded streaming content without tying up traditional keyers or switchers prior to digitizing or encoding.

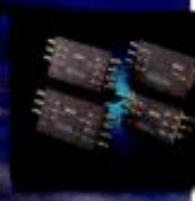
Portability and ruggedness are also of importance, as more webcasts are produced on location simultaneously with traditional television program production. Fully configured, fully redundant Aqua encoding requires 12RU of space and 950W of 110V power (8.6 amps) and weighs less than 100 pounds. Combined with hot-swappable PCI processors connected by an extremely fast, high-speed interconnect and shock mounted major components, the Aqua encoder is suited for permanent or ad-hoc installation in today's sophisticated production trucks. In this configuration, it can provide live, real-time, simultaneous encoding of the program content to Windows Media, RealVideo, QuickTime or any combination of the three.

As broadcasters and other content owners transition themselves into the world of digicasters, the Grass Valley Group's commitment to media without bounds is focused on expanding how content is managed, stored and manipulated. ■

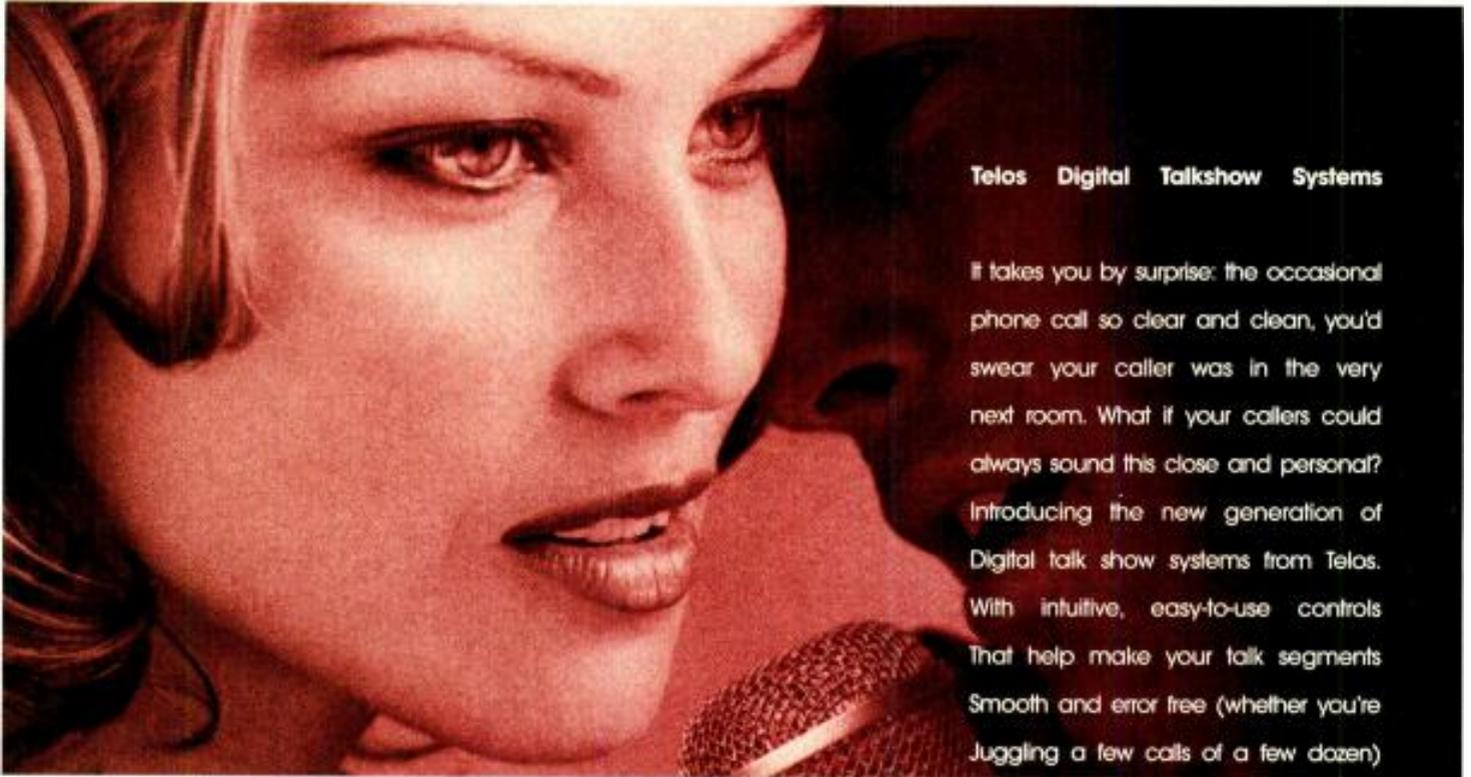
For more information on the Grass Valley Group's Aqua, circle (450) on the Free Info Card.

Ross Summers is the director of Internet business development for the Grass Valley Group.

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Camcorders: Beyond the boxing ring

BY EDWARD E. WILLIAMS

The fights have been going on for years. Most people who've been around a while remember all too well the Beta vs. MII bout. In the last few years, we've seen the advent of a number of competing analog and digital tape formats – all with their proponents and sometimes-vociferous detractors. There are days when it seems that "Friday Night Fights" seems an appropriate way to describe the discussions over MPEG compression at the local SBE chapter meeting.

Let's look at three main points that most people seem to gravitate towards when looking at new camcorders. First we'll look at imager technology and some of the recent advances in chip design. Next, we'll focus on optics – the all-important step in getting the image to the imager. We'll finish up with a quick look at those pesky recording technologies, both tape and tapeless.

Heart of the camera — the chips

The key word on imaging chips is "improvement." There has been a steady and impressive improvement in chip design over the last couple of years. Most manufacturers chalk this up to what they've learned in creating new HD imagers. The technology required to produce a cost-effective two million pixel imager on a 2/3" CCD chip is truly mind-boggling. The trickle-down effect of all that R & D is showing itself in the families of standard definition imagers coming out now.

Just about every manufacturer is offering IT and FIT imagers in both 1/2"

and 2/3" chips. A couple of companies offer FT devices in 2/3" as well. The benefits of the aforementioned HD research, however, are that today it is possible to buy a very nice 2/3" FIT or FT chip camera for the price of a 1/2" IT a couple of years ago. With new DSP chips coming on the market, even the lower end IT cameras are

It is absolutely vital that a good match is achieved between your camcorder and its lens.

making impressive pictures with much better smear control than was possible in even relatively recent designs.

One area in which the various mainline broadcast camera manufacturers differentiate their products is in how they use the imagers. For instance, cameras that can switch back and forth between 4:3 and 16:9 aspect ratio are common now. It is how easily that switchover is made and



Switchable cameras are commonplace now. What separates them is how easily they perform that switchover.

how the camera's optical system compensates for it that becomes the selling point. Of course, it is still possible to buy a camera that uses a fixed aspect ratio CCD and outputs only that aspect. If you're looking at HD camcorders, then that CCD will be a 16:9 chip with between 1.5 million and two million pixels. In the world of standard definition, the fixed 4:3 chip is really at the height of its evolution right now. Low light capability, blue sensitivity, anti-smear and overall resolution has never been better.

Optical choices

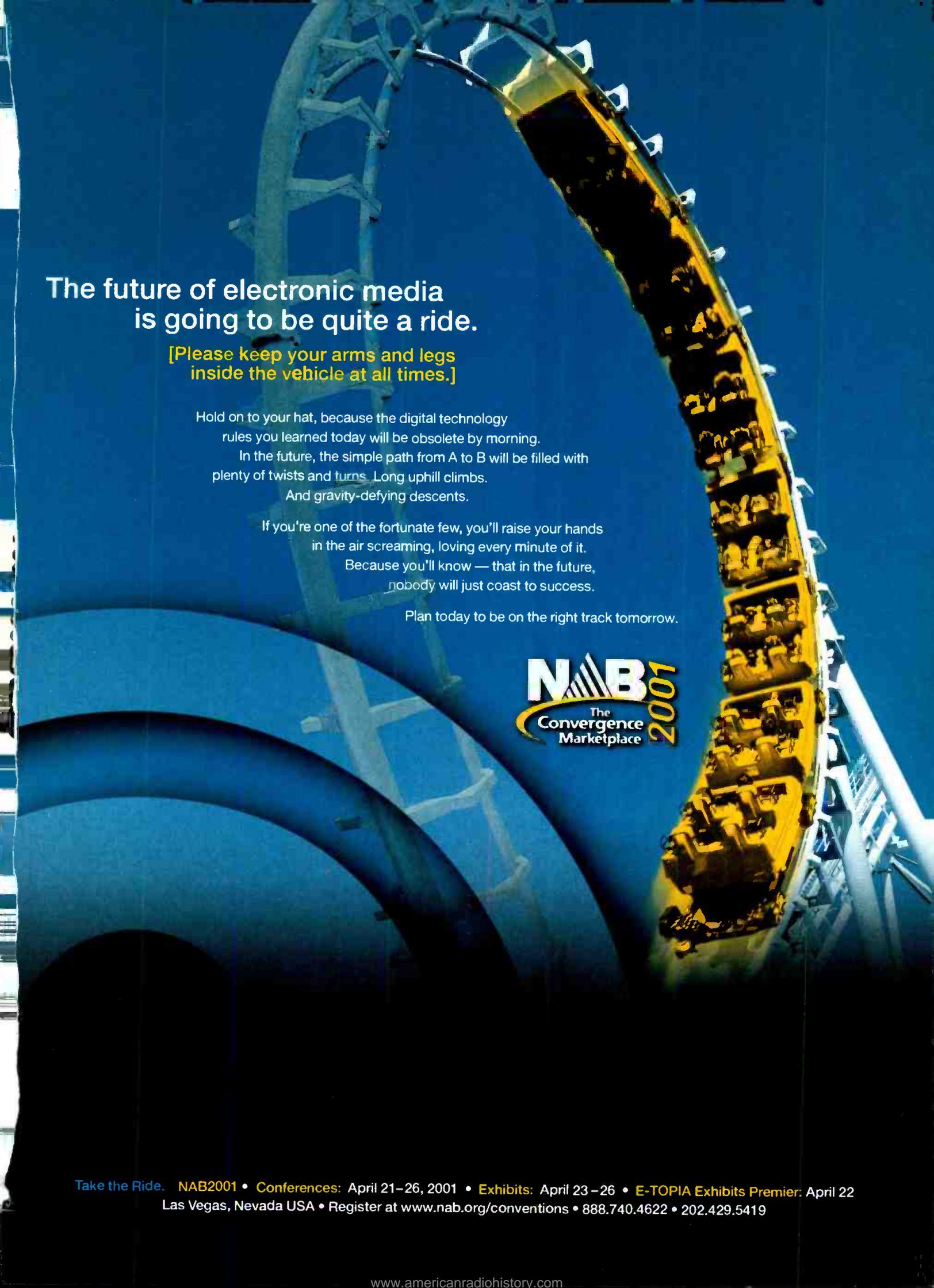
One of the oldest maxims in photography is that with lenses, you always get what you pay for. In placing glass on the front of your camcorder, this has never been truer.

One of the big changes in recent years with lenses has been the mating of specific lenses with specific CCD

chipsets. There was a time when it didn't really matter what you picked out for a lens, so long as it fit the front opening in the camera. Now, camera manufacturers and lens makers are working closely to optimize every part of the lens to squeeze every last drop of performance out of what has become a total optical system – lens, optical block, chipset and image processor.

The desire to have the switchable aspect camera has brought about a number of the recent changes in lens design. A camera maker must have a lens that will not crop or distort the image when the changeover is made between aspect ratios. Most lens makers accomplish this by inserting an aspect ratio diopter into the lens system. Similar in function to a 2X tele-convertor, the aspect diopter is rotated into place when the camera is operated in the 16:9 mode. The diopter ensures that the image falling on the CCD imager still contains the entire scene and doesn't crop areas out.

However, even cameras that are not switchable make use of lenses specific to the chipset involved. For HD camcorders, a larger objective element and higher light gathering capability are desirable, as are more accurate focus control and zoom-focus tracking. Even the basic non-switchable 4:3 camera



The future of electronic media
is going to be quite a ride.

[Please keep your arms and legs
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Hold on to your hat, because the digital technology
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may make use of a specially matched lens that is designed to mesh with that camera's DSP to achieve superior colorimetry, low light capability, and so on.

It is absolutely vital that a good match is achieved between your camcorder and its lens. Failing to work for this match, it is just as easy to buy a really awful \$25,000 lens as it is to get a superior \$18,000 lens. The good news is that the camera manufacturer will help with this, having lens-matching tables available for all the major lenses on the market.

The "corder" part of the camcorder

Tape or disk? Which tape? We aren't going to settle the tape fights here. We're going to assume that your company will choose a tape format based on some set of criteria that makes sense to the operation. Let's start by looking at portable disks.

Two manufacturers offer the ability to record direct to disk right now. The technology was introduced several years ago and has

quietly been undergoing steady improvements even though it's seen a fairly slow adoption rate in the field. This may be due to a perception of recordable disk packs being fragile, unreliable, expensive and

Decisions of tape format, and thus compression scheme, must be left to your eyes and the judgement of your photographers.

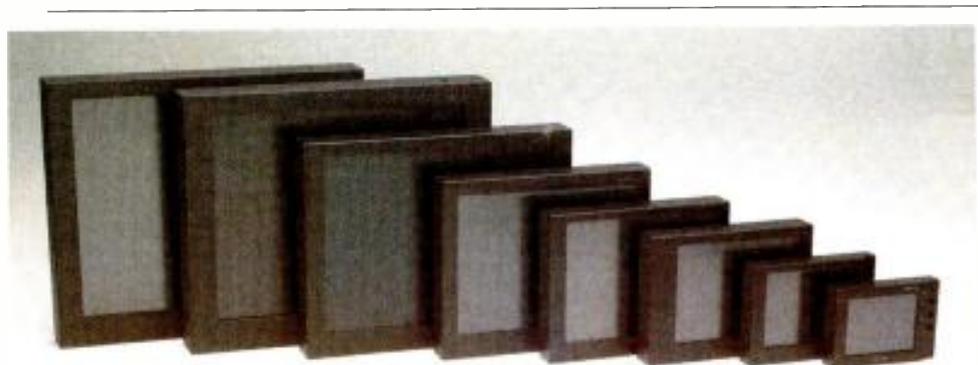
hard to work with. Users will tell you of the amazing ability to edit in the camera and come back to the newsroom with a nearly finished piece. They'll tell you about the ease of use and how after you get used to the idea of not having to mess with tape, you don't miss it. On the other hand, the companies that market disk-based cameras still market many, many more tape-based units. Tape-based camcorders are still

significantly less expensive than comparable disk-based units, if you ignore the long-term costs of videotape purchased for each camcorder in your inventory. The simple fact is that in most cases, it is far easier to get approval to purchase tape-based camcorders – especially given the current economic conditions throughout the broadcast industry. Reliability and predictability – nearly all the myriad tape formats have these two things in common. The modern videotape transport is simply a marvel. In case after case, speaking with user after user, the one thing that comes to the surface is the fact that you can very nearly abuse most major-name camcorders on the market and fully expect good, usable pictures to make it back to the newsroom or edit suite.

And in the 15th round?

Decisions of tape format, and thus compression scheme, must be left to your eyes and the judgement of your photographers. Obviously the finance people will weigh in as well. As we all know, each company performs the capital acquisition task in its own way. Perhaps you get your cameras shipped to you by the head office without discussion. Maybe you get what the GM says is most cost effective. There's even a chance that you'll hold a shootout and determine what's best for your operation based on seeing results. In the end, if you're like most of the rest of us, you'll strike that fine balance between the best technology that you can afford and what the photogs are willing to schlep around on their shoulders during a cold 10-hour day in the rain. ■

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



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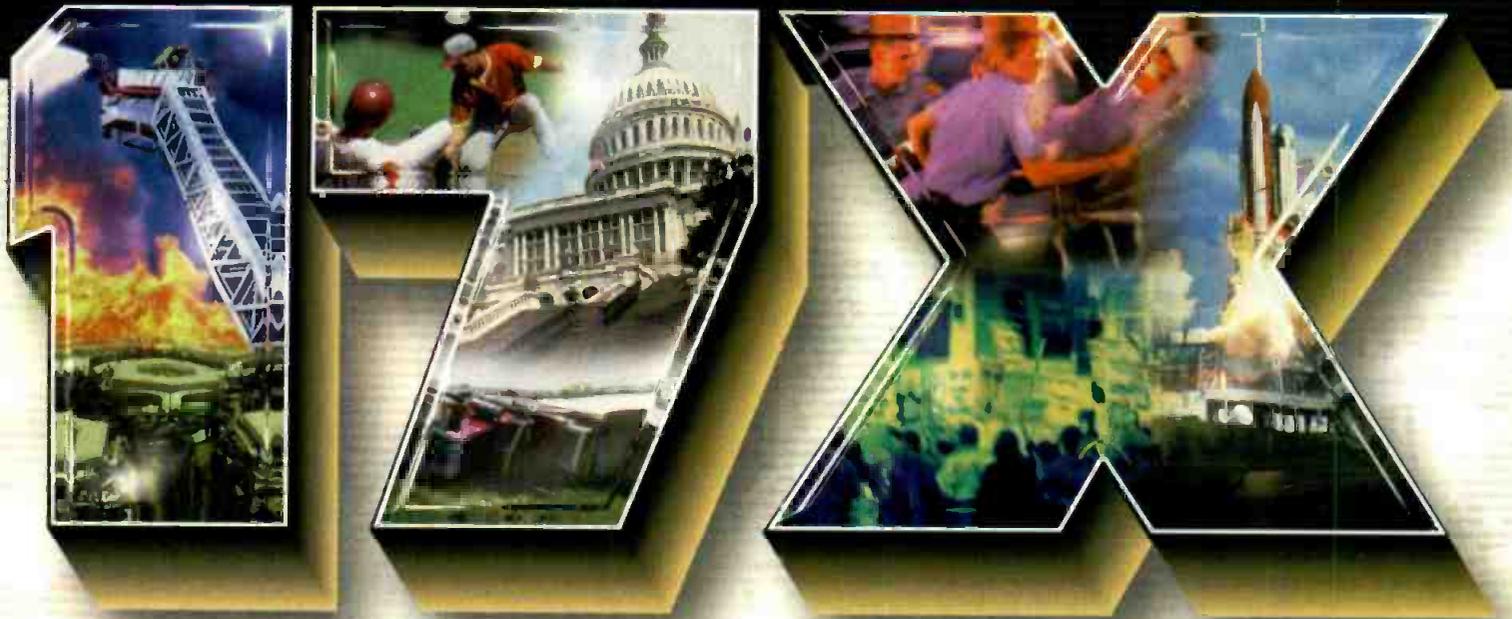
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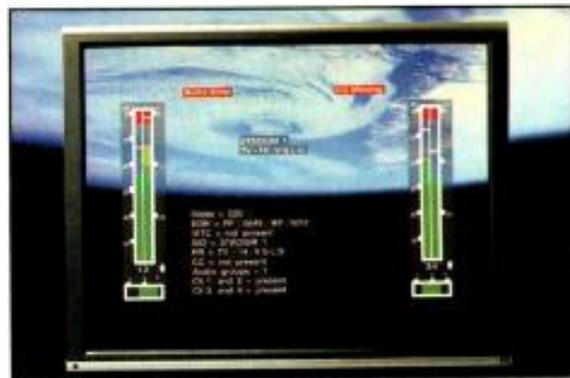
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Broadcast Video Systems DSA-100 SDI: generates and inserts all required safe action, safe title and center cross graticules in 4:3, 16:9 or any combination of aspect ratios; simulates letterbox and side panels and can store up to 10 custom patterns and graticules; the front panel control may be removed and remoted; 905-764-1584; fax: 905-764-7438; www.bvs.on.ca.

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AUDIO & VIDEO MONITORING/ CONVERSION SYSTEM

Evertz 7760 AVM SDI: series of plug-in cards offer solutions for monitoring video and audio signals with a modern broadcast facility; the units can be installed in the standard Evertz 3RU 7700 frame; offer a variety of choices for monitoring audio, video and data; features include: serial digital or composite analog outputs with superimposed, in-picture bar graph audio level meters; audio phase error indication; in-picture source-ID and in-picture status for V-Chip rating, closed captions and other decoded VBI data; to facilitate configuration, an on-screen menu is also provided with a choice of bar graph scales, translucency of display and position and a variety of alarm thresholds; 905-335-3700; fax: 905-335-3573; www.evertz.com.

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MODULAR FIBER OPTIC VIDEO SYSTEM

Telecast Fiber Systems Viper II: provides a modular platform for digital and analog production; integrates the same products and features as the original Viper with new innovations in electronics, electro-optics and packaging to provide a system that serves all video, audio and auxiliary communications; accommodates up to 16 transmitter or receiver modules in a 3RU, 19-inch frame with several power options (12 VDC source, 48 VDC single or dual redundant supplies, 90-240 VAC, auto-sensing single or dual supplies, AC power with alarmed UPS); houses the same functional modules for analog and digital as the original Viper and analog, digital and audio modules can be mixed and matched; designed for use in studio and campus facilities; pre-fibered facilities, studio-to-transmitter links, mobile field production and metropolitan video links; 508-754-4858; fax: 508-752-1520; www.telecast-fiber.com.

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FIBER OPTIC TRIAXIAL INTERFACE

Telecast Fiber Systems Cobra: links broadcast television cameras to camera control units over fiber optic cable instead of copper-based triaxial cable; is able to interface to a variety of triaxial-based television cameras without having to modify the camera, its control hardware or its supporting infrastructure; converts all the two-way signals, including component video, audio, intercom and data controls to optical signals on fiber optic cable and therefore eliminates the problems and restrictions associated with copper cables; 508-754-4858; fax: 508-752-1520; www.telecast-fiber.com.

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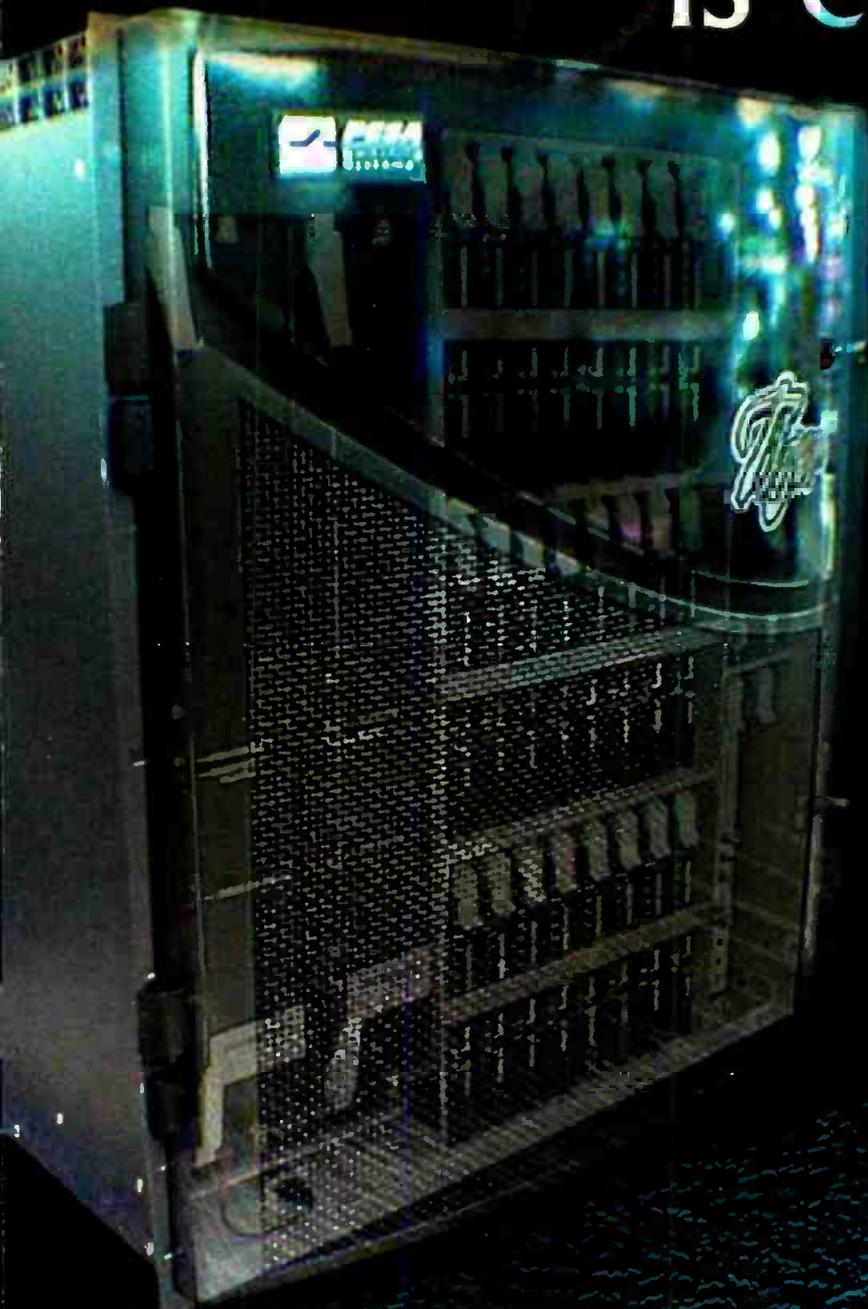


MINIATURE, PORTABLE FIBER OPTIC MODULES

Evertz 2405 series: provides comprehensive fiber optic signal conversion and new signal aggregation capabilities; wavelength conversion capability allows cost-effective wavelength conversion (e.g. 1310nm 1550nm) to be accomplished in a single module, allowing compatibility between incoming/outgoing feeds and native system wavelengths; available with and without side mount flanges to accommodate multiple mounting options; applications for these modules include link extension for portable equipment, backhaul from remote locations, low cost signal aggregation at indoor and outdoor events and security, surveillance and monitoring applications; 905-335-3700; fax: 905-335-3573; www.evertz.com.

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The *Tiger* Advantage is clear to see



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

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

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

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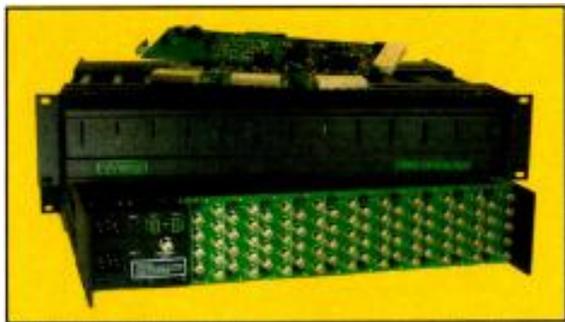
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RACK MOUNTING CARD FRAME

Ward-Beck Serialboxx: a new concept in connectivity; it comprises a versatile rack mounting card frame and a series of plug-in amplifier modules; the various amplifier modules are designed to handle analog and digital video signals; the plug-in models that will debut at NAB 2001 include: serial digital video, AES audio, analog video and analog audio modules; 800-771-2556; 416-335-5999; fax: 416-335-5202; www.wbsltd.com.

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CONTROL PANEL FOR AV SIGNAL ROUTING

AutoPatch Precis Remote X/Y Control Panel: offers compact, economical control for matrix switchers; designed to offer a cost-effective and powerful remote control interface; programmable panels utilize AutoPatch's XnNet(tm) communications architecture providing open topology and virtually any number of remote connections via twisted-pair; multiple control panels can be connected to a single matrix switcher; one-inch deep panels are available and weigh less than two pounds; ideal for applications in boardroom presentation systems, video conferencing, security, educational AV systems and command/control venues; 800-622-0246; 509-235-2636; fax: 509-235-2646; www.autopatch.com.

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SEAMLESS VIDEO SWITCHER

Extron SVS 100: a four-input, one-output video switcher that provides seamless vertical interval switching without the need to genlock the sources; makes glitch-free switches without using expensive genlocking equipment; eliminates loss of sync during switching and has color matching inputs; can be used in applications such as videoconferencing, distance learning, video editing and staging; features seamless video switching, switching effects, picture controls, audio switching, user presets, vertical blanking and genlock capability; compatible with NTSC or PAL signals and offers composite and S-video inputs; 800-633-9876; 714-491-1500; fax: 714-491-1517; www.extron.com.

Circle (357) on Free Info Card.

PRODUCTION SWITCHER

Pinnacle PDS 9000: a 36-input, 2.5M/E production switcher aimed at mid-market live production, specifically news and local interest programming; offers nine built-in 3D DVEs, 19 multipage framestores and RGB color correction; the multipage framestores can be loaded from Pinnacle's Lightning, Deko, Thunder and DVExtreme over a 100BaseT network; 650-526-1600; fax: 650-526-1601; www.pinnaclesys.com.

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INFRASTRUCTURE SOFTWARE FOR STREAMING MEDIA

Telestream FlipFactory: infrastructure software that eliminates streaming media's process of encoding and delivery by automatically "flipping" source files into user-specified formats and then forwarding these files to appropriate servers; supports both file-based media and live webcasts; is designed for corporate communications departments, the television and entertainment industries and Internet service providers; 877-CLPMAIL; 530-470-1300; fax: 530-470-1301; www.telestream.net.

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A/D-D/A CONVERTERS

Keywest Technology Big VooDoo A/D, D/A: small, rackmount (four across) digital converters; the BV2S A/D unit accepts composite, Y/C or component video and outputs serial digital video (SDI); the BVS2V D/A unit converts SDI into composite, Y/C or component, and both pass the vertical interval; same units are also offered in a smaller, in-line version called "Little VooDoo" as well as distribution amps and switchers for video, audio and RGB; 800-331-2019; 913-492-4666; fax: 913-895-7496; www.keywesttechnology.com.

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MASTER CONTROL SWITCHER

Oxtel Ltd 5.1 audio Presmaster: combines multiple transmission channel control, strong channel branding performance and easy-to-use operation; audio capabilities have been extended with a new stand-alone, fully-automated, embedded/AES audio mixer that provides multilingual performance and support for multichannel surround sound; +44 1491 820 000; fax: +44 1491 820 001; www.oxtel.com.

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MULTICHANNEL QUALITY MONITORING

Rohde & Schwarz DVQM Digital Video Quality Analyzer: allows simultaneous and independent quality monitoring of up to 12 digital TV channels; can be integrated into a 19-inch plug-in system and has a separate MPEG-2 decoder for each channel; MPEG-2 transport streams can be directly applied to the DVQM and monitored; analyzes digital TV signals in line with ATSC and DVB standards; (301) 459-8800; fax: (301) 459-2810; www.rsd.de.

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ENHANCED PRODUCTION SWITCHER

VideoTek Digital Prodigy: this digital/analog, video/audio production system adds new features for 601, including five serial digital inputs plus options for analog composite, component or additional serial digital; also features routing control, input expansion (to 18 inputs) and external key bus control; enhanced audio follow options are available for up to 16 channels of analog audio follow or 32 channels of AES/EBU or embedded digital audio; 800-800-5719; 610-327-2292; fax: 610-327-9295; www.videotek.com.

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AUTOMATION DRIVER FOR EVS MULTICHANNEL SERVERS

ETERE Video Server Interface: EVS multichannel video servers have a new interface, designed by ETERE, to improve their system; in addition to its automation system, ETERE offers solutions in areas such as: scheduling, traffic, media manager, music scheduling, fault tolerance, browsing, news, billing, statistics and the Web; the EVS servers' main features include a variety of available compression schemes, multichannel configurations from an entry-level dual channel production system to a full-blown 60-channel VOD powerhouse, raid redundancy, disk storage that can be configured in different ways to accommodate a wide range of applications, and mix and wipe transitions; 978-897-4240; fax: 978-897-9013; www.etere.com.

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WEB AUDIO PRE-PROCESSOR

Laird Telemedia four-Channel Web Audio Pre-Processor: supports four stereo audio channels simultaneously; balanced audio; digital VU meters; dynamic audio compression optimized for webcasting; two-Channel XLR (L/R) and 3.5mm stereo mini connectors; 800-898-0759; 914-339-9555; fax: 914-339-0231; www.lairdtelemedia.com.

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ANALYSIS SERVICE

Triveni Digital StreamDoctor: the service analyzes and reports problems with a station's DTV transport stream; helps DTV stations comply with the ATSC DTV standards, ensuring correct operation of DTV receivers; analysis focuses primarily on ATSC Program and System Information Protocol (PSIP) standard, audio and video buffer usage, and Program Clock Reference (PCR) frequency and jitter; 609-936-3419.

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MODULAR FRAME SYSTEM

VideoTek UNIFRAME: a frame and card system that includes modules for analog and digital signal processing and distribution; can be used in medium- to high-end studio, post-production and routing applications in markets including broadcast, educational, satellite and production; ability to interface to the system modules; offers a single 2RU frame that can simultaneously accommodate analog and digital video and audio processing and distribution choices; the 2RU frame accepts up to 12 modules and up to two power supplies; 800-800-5719; 610-327-2292; fax: 610-327-9295; www.videotek.com.

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MPEG-2 DIGITAL VIDEO SERVER

SeaChange International Broadcast MediaCluster: the digital video server system for play-to-air applications now delivers dozens of fault-resilient outputs at up to 50Mb/s of MPEG-2 4:2:2 video, each with four AES audio channels; is the first media server to utilize 72GB disk drives; designed to be Pro-MPEG compliant; available in various configurations to support small stations and the largest multichannel requirements, with incremental upgrade-as-you-grow capabilities; 978-897-0100; fax: 978-897-0132; www.schange.com.

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HIGH PERFORMANCE CABLE CLONE

Faraday Technology Cable Clone: can cope with HDTV component signal data rates to the required 1.5Gb/s; has an accurate loss v. frequency characteristic against cable over the significant frequency spectrum of the serial digital signal; can be used as a substitute for actual cable when installing equipment to ensure sufficient margin or head room is available, or to establish the maximum length of cable that the signal will remain usable over; maximum simulated length of 150 meters; +44 1782 661 501; fax: +44 1782 630 101; www.faradaytech.co.uk.

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DOLBY E COMPATIBLE AUTO ROUTING SOLUTION

Philips Venus 2001 AES Router: it can accept both synchronous and asynchronous audio signals simultaneously and handle them within the system, with no clicks or pops that are common when switching asynchronous digital audio signals; can swap, mix and shuffle AES signals within the router to create combinations of new AES signals that are limited only by the size of the router; is now capable of a fast V-fade which ensures a clickless switch between two signals; 800-962-4287; 818-729-7700; fax: 818-729-7710; www.broadcast.philips.com.

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Now Shipping

RENDERING SYSTEM SOFTWARE

Advanced Rendering Technology Version 2.5 of RenderDrive 3D:

now shipping; Version 2.5 of ART's RenderDrive 3D rendering system software; increased functionality to users of the company's advanced 3D rendering solution; included with the new version of the software are upgrades to RenderPipe MAX, RenderDrive's seamless interface to Discreet's 3d studio max and 3D Studio VIZ; new features include improved sampling of area lights and custom camera shaders; also includes additions to RenderDrive's RenderMan compliant interface; 650-254-7610; fax: 650-254-7615; www.art-render.com.

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MPEG SOFTWARE PACKAGE

Snell & Wilcox Mosalina: now shipping; Mosalina, a software package for MPEG file analysis; running on Windows '95, '98 or NT computers, Mosalina works faster than real time to analyze standard definition MPEG video (high definition video analysis is also available); the software is available in Basic, Advanced and Expert versions; provides automated quality assurance during all phases of video production, including creative DVD authoring, streaming, post production, broadcast and archiving; 408-260-1000; fax: 408-260-2800; www.snellwilcox.com.

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7.1 SURROUND METER

Logitek UV 71: now shipping; a 7.1 format surround sound meter; incorporates eight LED barographs packaged in a vertical configuration in a box designed to sit on a console overbridge; the units power supply is in a separate enclosure that can be located away from the console; the Ultra-VU display provides barographs with 62 tri-color LEDs each; operating modes, including loudness filter, fine resolution and image/phase display, are selectable; display brightness control allows matching the display to room lighting conditions; 877-231-5870; 713-664-4470; fax: 713-664-4479; www.logitekaudio.com.

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Business highlights from broadcast and production

BY STEPHANIE TWEITO, ASSISTANT EDITOR

NEC America Inc.'s parts and support division has moved. Full sales and support can be obtained at their new address: NEC America Inc. Broadcast Equipment Department; 6535 N. State Highway 161; Irving, TX 75039-2402; or by phone at the following numbers: 888-383-4DTV (toll free); 214-262-3642 (main); 214-262-3687 (fax).

Eugene and Colleen Johnson, president and vice president of **Ward-Beck Systems, Ltd.**, recently announced the establishment of their sister corporation, **Ward-Beck Sales Inc.** Located in Portland, OR, Ward-Beck Sales will function as a United States sales and marketing organization for the Ward-Beck Systems products. Ward-Beck hopes to increase the exposure of their products in the Pacific Northwest, West, Southwest and Midwest states, to re-establish contact with former clients and to develop a dealer network to service these regions. The new office, under the management of Michael Jordan, has been in operation since January.

Philips Digital Networks recently purchased broadcast editing Storage Area Networks (SANs) from **Ciprico** for implementation in news broadcast facilities worldwide, enabling high speed, nonlinear editing in the newsroom setting. The SANs offer a high-performance central storage solution that simplifies workflow and allows multiple broadcast editors access to the same files simultaneously.

A feature of the Ciprico broadcast editing SAN is its ability to create a tailored work environment through segment caching, which provides optimal management for fluctuating data streams. A broadcast editor can then edit a scene while the file is downloading and insert it within a project without affecting other scenes or losing digital picture quality.

Time Warner Cable recently selected **OmniBus Systems** to supply station-wide news automation asset and media management systems for use in the launch of four upcoming 24-hour local news channels. The channels, which provide news to Time Warner Cable customers, are expected to launch in the next 24 months. The OmniBus order is valued at more than \$6 million and includes using its systems for NY 1 News when it moves to its new headquarters this summer.

Time Warner placed its order following an OmniBus consulting project that analyzed the workflow, operations and processes at several of Time Warner's United States facilities.

Video Networks Inc. (VNI), a business-to-business provider of digital media content distribution and management services as well as related e-commerce applications, has changed its name to **Pathfire**. The name change reflects the company's ability to distribute and manage digital media. The name evokes the speed and efficiency that Pathfire's network of servers and leading-edge software applications bring to the management and exchange of digitized media assets in the broadcast, cable, Internet and entertainment industries.

HDV-5, a joint venture between WRAL-TV, DTV Resources and HD Vision, celebrated its first anniversary Dec. 2 at the 13th Annual Neiman Marcus / Adolphus Children's Parade. The 53-foot high definition mobile production truck was booked by WFAA-TV to cover the event. This was the eighth year WFAA-TV, an A.H. Belo Subsidiary, had produced and broadcasted the live event and, the second year it was shot in high definition television for standard and HD broadcast. The parade was captured using five cameras: two Sony HDC-700 Studio

Screen Shot

Fujinon HD lenses capture unique underwater species

BBH Exhibits Inc., with the Woods Hole Oceanographic Institution in Cape Cod, MA, produced a new interactive exhibit, "Extreme Deep: Mission to the Abyss" for the Liberty Science Museum in Jersey City, NJ. Fujinon's HA5.2x10EVM lenses were utilized with Sony HDC-750A cameras for the underwater high-definition video on display within the exhibit.

Woods Hole has been a long-time Fujinon customer, exclusively using their high-definition lenses for capturing life-like footage of oceanic life forms. In their research, the scientists at Woods Hole have discovered hundreds of new underwater species.

The "Extreme Deep" exhibit runs through February 2001.



High octane action in high definition

The shooting of the first action film on 24p high definition digital format was just completed by New York-based All In One Productions. *Manhattan Midnight*, was the first Chinese-produced motion picture in the world shot and finished on Sony's new CineAlta 24p HDCAM digital system. All In One Productions supplied the HD camera package and line-produced the high octane action film, which was budgeted for \$3 million, completed in a short 27-day schedule and directed by popular Hong Kong director Alfred Cheung.

and three Sony HDC-750 handhelds. Fiber optic technology allowed HD viewers to enjoy the parade in its native form.



Digital System Technology, Inc. (DST) announced the completed integration and deployment of an all-digital Internet Broadcast Operations Center (BOC) located in Seattle, WA, for Real Broadcast Network (RBN), the hosting solutions division of RealNetworks, Inc.

The new facility features state-of-the-art digital broadcast equipment and enables RBN to utilize full-bandwidth serial-digital video for signal acquisition and distribution within its facility. The design of the facility from conception to completion was done in 60 days and came in on budget. DST was fundamental in the integration of essential equipment—including digital encoding equipment—that allowed the facility to efficiently deploy a digital encoding and streaming system.

Richland Towers recently announced it would construct and operate a second 1635-foot AGL (2449-foot AMSL) broadcasting tower to serve the Dallas-Ft. Worth market. This structure will incorporate a 60-foot, top-mounted candelabra, similar to the current Richland tower, and will support over 90 tons of top-mounted dual-stacked antennas including a second Richland high-powered broadband DTV panel system.

The maximum height structure has received FAA approval and construction has been slated to begin in the third quarter 2001, with completion estimated in spring 2002. The new broadcast super tower is designed to accommodate 12 to 18 NTSC, DTV, FM and LPTV broadcasters in the Dallas Market.

In an effort to expand its innovative broadcast and post-production solutions to the United States market, **Miranda**

Technologies has announced the establishment of a new U.S. headquarters in Glendale, CA. The U.S. operation will do business under the name **Miranda MTI** and will provide additional product support to the company's U.S. distributors and end-users as well as facilitate sales, and enhance their ability to assess customer needs and encourage feedback.

In addition to its Glendale facility, Miranda MTI recently set up regional sales offices in Florida (representing Latin America), Atlanta and New York, with intentions to open additional U.S. sales offices within the next year.

da Vinci Systems has formed three new product groups, Color, Stor and Restor, to address the various industry applications served by the company. The three new groups will focus on color enhancement applications, uncompressed storage applications and film restoration applications respectively.

The organization of da Vinci's main products within the new groups is as follows: Color, the da Vinci 2K color enhancement system for SDTV, HDTV and data; Stor, the da Vinci Qf2 and HD2 uncompressed digital disk recorders with shared storage for standard and high definition and data applications; Restor, the da Vinci Rs2 automated film restoration system.

OxteI has installed an Imagestore for KERA, the public broadcasting organization for north Texas. KERA purchased the master control and channel

branding system to assist in its transition to a multichannel digital operation in addition to transmitting two analog program streams. KERA installed Imagestore in its master control. An additional unit is scheduled to be installed in the coming months. Imagestore's keying layers will be used for inserting logos and captions and the integral DVE will be used to accomplish picture-in-picture credit squeeze.

The Systems Group (TSG) recently completed the design, fabrication and integration of the new National Geographic Channel Digital Production Studio, located in Washington D.C. The facility includes all operations environments for acquisition, production, post-production, distribution and transmission of programming material for the domestic feed of the National Geographic Channel.

The studio is an entirely digital plant, based on a serial digital video and AES audio platform. The core
Continued on page 130.

TECHNICAL DIRECTORS TAKE CONTROL

When you really need fast and precise control, the essential key is DNF's Production Switcher Interface.

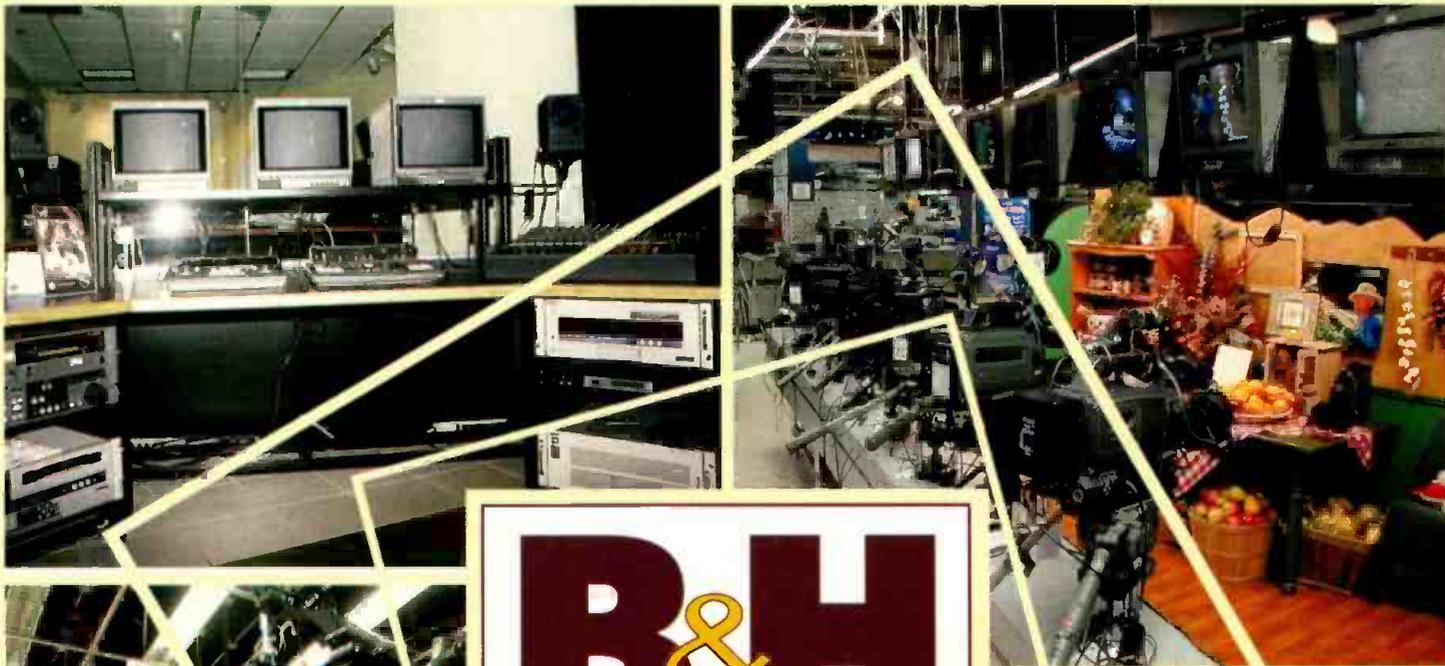
- Give your production switcher control of video servers, VTRs, DDRs, graphic and audio sources.
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- Access pre-programmed sequences with one button.
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- Create bullet-proof transitions.
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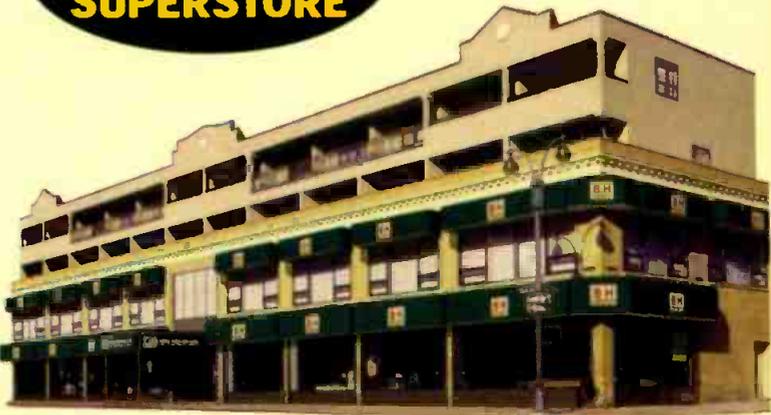
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SONY

DSR-PD150

3-CCD Mini DVCAM Camcorder

High quality acquisition in the DVCAM component digital format, as well as in DV, allowing up to forty minutes recording on one tape Mini DVCAM tape or over a full hour in the DV mode. Suited for Event Videography and Video Journalist applications. This compact camcorder features three newly developed 1/3 inch 380K pixel CCDs with increased resolution and sensitivity at reduced noise and vertical smear.

- Allows two scanning modes: 480 progressive (for still) or interlaced (for video).
- Complete Professional Audio functions with two built-in XLR inputs.
- Built-in electronic zoom lens features Autofocus and SuperSteadyShot with an MTF 12X high quality optical lens with manual Zoom, Focus and Iris control.



- Built-in slot for a flash memory card or Memory-Stick for still image storage. Up to 988 JPEG pictures can be stored in one 64 MB MemoryStick. The stored images can be mixed or keyed to the live image allowing logo insertion and/or mix effects.
- High resolution (500 lines) B&W viewfinder and a color swing out bright color LCD panel are included

Sony DSR-PD150 List Price\$4,000
 For B&H priceCall

DSR-250 3-CCD DV & DVCAM

Introducing everything you need in an event camera and more. The new completely digital DSR-250 from Sony is a high image quality reduced size camcorder which has been optimized for shooting events and parties. Every feature you could want is included in this revolutionary acquisition tool.

- Manual or automatic functioning: Focus, Iris, Shutter-speed, Zoom. Gain (3 positions and memory).
- Flip out 2.5" 200,000 dot LCD monitor, finally available on a professional camera • Time date stamp • Soft shoulder pad.
- 58mm lens with 12x optical zoom
- Advanced optical stabilization allowing for a high quality digital zoom out to 24x with a maximum digital zoom out to 48x
- Assignable time code (Rec Run, Free-run, User-bit)
- 16 bit 2 channel audio recording, or 12 bit 4 channel.
- Digital In/out (IEEE1394) and analog In/out.
- Still image capture onto memory stick • Upload graphics from memory stick or USB adapter, software included
- Phantom 48V power • Built in speaker • Directional microphone in pro mic holder, 2 XLR audio inputs • Wireless remote
- Built in edit controller. Equipped with an iLINK interface, allowing camcorder to serve as edit player or recorder.
- External 12V supply/Connection for light. The DSR-250 is equipped with light output (DC 12V, maximum 30 watts).

Sony DSR-250 List Price\$5,900
 For B&H priceCall

DSR-300A

3-CCD Digital (DVCAM) Camcorder

Inheriting many of the same features and functions as the DSR-130, the affordable DSR-300A actually extends operational convenience with a range of new features and peripheral products. Remarkably compact and lightweight, the improved DSR-300A provides high mobility without compromising picture quality and can be held comfortably on your shoulder through the longest shoots and gives videographers the ability to acquire their footage quickly and easily.

- LSI Digital Signal Processor (the very same one used by the DXC-D30 cameras) for a high signal-to-noise ratio of 62 dB.
- Both mini cassettes (PDVM series) and standard cassettes (PDV series) can be used with the DSR-300A. With PDV-164ME (standard), a maximum recording time of 184 minutes can be achieved. They can also play back tapes recorded in the consumer DV format
- For operational convenience while shooting, the Time Code is superimposed on the viewfinder screen or MONITOR OUT screen, even during playback
- DXF-801 viewfinder featuring variable peaking, 3 level light and a white LED light with 2 levels of intensity to illuminate the lens setting • IEEE1394 iLink (out only)

Sony DSR-300A List Price\$9,900
 For B&H priceCall



The 11-pound shoulder-style camcorder delivers many functions offered in Panasonic's most-popular DVCPROcamcorders, including a 4-position ND/CC filter, the ability to increase gain up to +36dB for shooting in dim light, User Scene Memory storage, and a 6-speed shutter with synchro scan for the flicker-free shooting of CRT displays

JVC

GY-DV500

1/2-inch 3-CCD Professional DV Camcorder

The GY-DV500 combines the convenience and cost-effectiveness of Mini DV with the performance and features you need. Incorporate three 1/2-inch 380,000 pixel IT CCDs for superior picture performance (equivalent to 750 lines of resolution) superb sensitivity of F11 at 2000 lux and minimum illumination of 0.75 lux (LoLux mode). Rugged construction with a rigid diecast magnesium housing. Extremely portable, compact and light weight (less than 11 lbs. fully loaded). Additional features like the menu dial and Super Scene Finder assure ease-of-use and shooting flexibility, while the IEEE1394 and RS-232C interface allow integration into various non-linear and post-production systems. A professional camcorder in every sense, the compact, lightweight GY-DV500 redefines acquisition for corporate, educational, cable and broadcast production, as well as wedding videography and multimedia applications.



- Applies JVC's DSP with advanced 14-bit video processing to bring out more natural details, eliminate spot noise, accurately reproduce dark areas, and restore color information in dark areas.
- CCDs are equipped with advanced circuitry to virtually eliminate vertical smear when shooting bright lights in a dark room.
- Black Stretch/Compress function ensures accurate reproduction of black areas. Advanced color matrix circuits gives difficult images a very natural appearance.
- Multi-zone iris weighting system gives priority to objects at the central and lower portions of the picture for accurate auto exposure under any condition, even if a bright subject moves into the picture.
- Adjustable gamma for adjusting the "feel" of the picture according to taste. Adjustable detail frequency for setting picture sharpness for a bolder or finer look.



GY-DV550U

1/2" 3-CCD DV Camcorder

Introducing the Versatile GY-DV550 from JVC. Designed by professionals, for professionals, the GY-DV550 is the world's first DV camcorder to offer studio camera capability. Thanks to the built-in 26-pin interface, you can connect the GY-DV550 to a CCU for remote-controlled studio operation or backup recorder in the field. But that's not all. It also comes with pool feed input/output, so you can transfer image data back and forth to another camera or cameras, making it ideal for special shooting situations such as press conferences, exclusive interviews, and sporting events. Records isolated camera views (ISO-Cam) during a live multi-camera shoot, making it ideal for parallel shooting at live concerts and other events. Naturally, we've made sure the GY-DV550 is equipped with all the other capabilities you need, including a standard 1/2-inch bayonet mount for use with a great diversity of professional lenses, bidirectional IEEE 1394 (NTSC), two 48 kHz 16-bit digital PCM audio channels, and a built-in SMPTE or EBU timecode reader/generator, as well as XLR microphone inputs, audio outputs, headphones output, and both composite and Y/C outputs. Maximum versatility, top-level performance, and superior cost-efficiency make the GY-DV550 the smart solution for producers who need a camcorder capable of doing double-duty in both the studio and the field.

Ready for EFP remote control (RM-LP57/LP55) The EFP remote connects directly to the GY-DV550 for precise control over the video parameters.

Return video output for Tele-Prompter Tele-Prompter capability assures full support for studio program production.

Genlocking function To meet the demand for systemization, the GY-DV550 is equipped with a genlocking function that includes SC lock to assure high-resolution pictures.

State-of-the-art 1/2" 3-CCD image pickup Incorporates three 1/2" 380,000 (NTSC)/440,000 (PAL) pixel interline-transfer CCD's. Each CCD is equipped with highly advanced circuitry that eliminates vertical smear when shooting bright lights in a dark room. Lag and image burn are also reduced to indiscernible levels, while high sensitivity of F11 at 2000 lux assures creative flexibility and simplifies lighting requirements.

SR-VS10U

MiniDV and S-VHS VCR Combo

The HR-VS10U is a unique all-in-one video solution combining miniDV and Super Hi-Fi Stereo in one VCR. The MiniDV deck allows direct playback of cassettes you've recorded on a MiniDV camcorder without any cables to connect. One easy solution!

- Mini DV Format & High Resolution Super VHS and VHS
- DigiPure Technology w/ TBC and 4MB Frame Memory
- PCM Digital Audio (DV) and Hi-Fi VHS Stereo with MTS Decoder • Jog/Shuttle on Remote
- VCR Plus+ with "Cable Eye" Cable Box Controller
- Insert Editing with Flying Erase Head • Plug & Play
- Audio Dubbing • Auto Index and Index Search



- DA4(Double Azimuth) Head Helical Scan System
- Digital AV Tracking • Express Programming • Auto SP-EP Timer Recording • Active Video Calibration • Multi-Brand TV/DBS Compatible Remote with Jog / Shuttle
- S-Video Input on Front / Back Panel • Two S-Video Output on Back Panel • Rear AV INPUTS, Gold Plated Front Inputs
- DV Playback Component Video Output, Two A/V Outputs

Panasonic

AG-DVC10



Mini DV 3-CCD Camcorder

This lightweight unit uses the mini-DV format, large diameter lens, and a 3-CCD image sensor to deliver the high recording quality needed for professional use.

- 12x Optical zoom
- Gain Up to +12dB
- Neutral Density Filter
- Manual Focus, Manual Iris
- New Shoulder-Type Design
- Excellent Shooting Stability
- Light weight weighing approx. 6 lbs. • Extremely mobile
- i-Link (DV IEEE1394) Terminal

Panasonic

AG-DVC200 Full Size DV Camcorder

The industry's first DV camcorder to utilize large DV cassettes

The AG-DVC200 1/2" 410,000-pixel IT 3-CCD DSP camcorder records for an astounding 4-1/2 hours (270 minutes), and offers an interchangeable bayonet mount lens that permits users to use their favorite 1/2" lenses. With the incredible ability to shoot at F11 in lighting as low as 0.5 lux, the AG-DVC200 delivers an outstanding 800 lines of horizontal resolution, an IEEE 1394 interface, a signal-to-noise ratio of 62dB, and very low smear

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Anton Bauer HyTRON 50 Battery

Weighing a mere 31oz (880 grams) and packing 50 Watt-hours of energy - enough to operate a typical ENG camcorder for two hours, the HyTRON 50 is the most advanced lightweight battery in the industry.

- Made Possible by recent advancements in a cell technology originally designed for the mobile computing industry, it incorporates nickel metal hydride cells that provide the highest energy density of any rechargeable cylindrical cell available. High performance is further assured through the integration of Anton/Bauer InterActive digital technology.
- Equipped with an on-board "fuel computer" which monitors energy input and output as well as critical operating characteristics and conditions. This data is communicated to the InterActive charger to ensure safety and optimize reliability.
- In addition, remaining battery capacity information is available by means of an LCD display on each battery and in the view-finder of the most popular broadcast & professional camcorders.
- Special low voltage limiter prevents potentially damaging overdischarge.

Specifications: 14.4 V, 50 WH (Watt Hours)
 5-3/4" x 3-1/2" x 2-1/4", 1.9 lbs (880g)
 Typical runtime 2 hours @ 25 Watts 3 hours @ 17 Watts

QUAD 2702/2401 Four-Position Power/Chargers

The lightest and slimmest full featured four position chargers ever, they can last charge four Gold Mount batteries and can be expanded to charge up to eight. They also offer power from any AC main in a package the size of a notebook computer and weighing a mere four lbs! The 40 watt 2401 can charge ProPacs in two hours and TrimPacs in one. Add the Diagnostic/Discharge module and the QUAD 2401 becomes an all purpose power and test system. The 70 watt QUAD 2702 has the module and is the ultimate professional power system.

IDX NPH-50 50 Watt Nickel Metal Hydride Batteries

Packed with 50-watts of power, these batteries provide long run times, using them as you would a traditional Ni-type battery. Equipped with IDX's proprietary SF technology, they can even be charged in existing Negative Delta V style chargers, like the Sony BC1-WD, or any IDX nicad battery charger. Both batteries are identical except that the NP-H50DX adds a power indicator.

- High capacity NiMH cells • Standard thermal and short circuit protection, extra thermal fuse for safety, special plastic design for added strength.
- Environmentally safe • High efficiency/low temperature module • Capacity: 50Wh (13.2V/ 3.8Ah) • Camera run time: 115min @26 Watts

NP-H50 129.95 NP-H50DX 149.95

JL-2 PLUS 2-Position Multi-Format Charger/Power Supply

Universal charger/Power Supply. 2-channel sequential quick charger and power supply for Lithium-Ion. NP/BP-type NiCad and NiMH battery packs.

SONY 800 SERIES UHF WIRELESS MICROPHONE SYSTEMS



Consisting of 5 handheld and bodypack transmitters and 6 different receivers, Sony's UHF is recognized as the outstanding wireless mic system for professional applications. Operating in the 800 MHz band range, they are barely affected by external noise and interference. They incorporate a PLL (Phase Locked Loop) synthesized control system that makes it easy to choose from up to 287 operating frequencies, and with the use of Sony's pre-programmed channel plan, it is simple to choose the correct operating frequencies for simultaneous multi-channel operation. Additional features, like space diversity reception, LCD indicators, reliable and sophisticated circuit technology ensure low noise, wide dynamic range, and extremely stable signal transmission and reception. Ideal for broadcasting stations, film production facilities, and ENG work.

SONY DSR-20/40 DVCAM Player/Recorders

The DSR-20 and DSR-40 are versatile DVCAM VCRs with compact chassis and a variety of convenient functions for recording, playback and simple editing. They feature Auto Repeat Playback, Power-On Recording/Playback, multiple machine control interfaces and i.Link (IEEE1394) input and output. And, of course, they offer the stunning image and sound quality inherent to the DVCAM format.



- **i.LINK** They both offer i.LINK (IEEE1394) input/output. In addition, in the "Digital dubbing including TC Copy" mode, full information of video, audio and time code of the original tape can be copied to another tape. Especially useful when making working copies of the original.
- **Inputs and Outputs** They provide a full range of analog video inputs and outputs for integration into current analog-based systems. They both offer composite and S-Video input/output, while the DSR-40 (only) offers a component output as well. The DSR-20 is equipped with analog audio inputs and outputs (RCA), the DSR-40 with RCA inputs and XLR-balanced output. These connections in combination with their i.LINK interface allow a smooth transition to an all digital system in the future.
- **Record/Playback Functions** Automatic repeat function for repeated playback. After reaching the end of the tape, the DSR-20/40 automatically rewinds the tape, then starts playing back the segment again.

- They are capable of searching for Index Points, which are recorded on the tape as "in-point" marks every time a recording starts. They can also search for photo data recorded on a DVCAM cassette by the DSR-200A/300/PD-100, or where the recording date has been changed.
- **Reference Input** External sync input enables synchronized playback with other VCRs. Especially important in A/B Roll configurations. In addition, the DSR-40 also allows adjustment of H-synch and SC phase via the menu.
- **Control S Interface** The DSR-20/DSR-40 have a Control S input allowing control via the optional DSRM-20 Remote Control.

DSR-20 Only

- The DSR-20 can be powered by AC or DC.
- Equipped with Control L interface, the DSR-20 can perform simple Time Code-based editing when connected to another DSR-20 or other similarly equipped VCRs/cameras.

- In addition to Control L, the DSR-20 also incorporates an RS-232 interface for remote control of basic VCR functions from a PC.
- Supplied with the RMT-DS20 Wireless Remote for control of basic VCR functions.

DSR-40 Only

- Equipped with an RS-422A interface, it can perform as the editing player in A/B roll or cut editing system.

- The DSR-40 is not equipped with a synchronization capability, the editing accuracy is performed by pre-roll and play.

DSR-30 DVCAM Digital VCR

The DSR-30 is an industrial grade DVCAM VCR that can be used for recording, playback and editing. DV standard 4:1:1 sampling digital component recording with a 5:1 compression ratio provides spectacular picture quality and multi-generation performance. It has a Control L interface for editing with other Control L based recorders such as the DSR-200A DVCAM Camcorder or another DSR-30. It also has a continuous auto repeat playback function making it ideal for kiosks and other point of information displays.



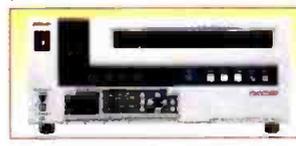
- Records PCM digital audio at either 48kHz (16-bit 2 channel) or at 32kHz (12-bit 4 channel).
- Equipped with Control L, capable of SMPTE Time Code based accurate editing even without an edit controller. Built in editing functions include assemble and separate video and audio insert.
- By searching for either an index point or Photo Data recorded by the DSR-200A camcorder, the DSR-30 drastically cuts the time usually required for editing. The DSR-30 can record up to 135 index points on the Cassette Memory thanks to its 16k bits capability.
- Audio lock ensures audio is fully synchronized with the video for absolute precision when doing an insert edit.

- Built-in control tray has a jog/shuttle dial, VCR and edit function buttons. The jog/shuttle dial allows picture search at 1/5 to 15X normal speed and controls not only the DSR-30 but also a player hooked up through its LANC interface.
- DV In/Out (IEEE 1394) for digital dubbing of video, audio and data I/O with no loss in quality.
- Analog audio and video input/outputs make it fully compatible with non-digital equipment.

Sony DSR-30 List Price \$4,475
 For B&H price Call

UVW-1200/UVW-1400A Betacam SP Player • Player/Recorder

The UVW-1200 and UVW-1400A are non-editing VCRs which deliver Betacam SP quality and offer features for a wide range of playback and recording applications. RGB and RS-232 interface make them especially ideal for large screen, high quality video presentation, scientific research and digital video environments.



- Ideally suited for work in computer environments, because RGB signals can be converted into component signals and vice versa with minimum picture degradation.
- 25-pin serial interface allows external computer control of all VCR functions based on time code information. Baud rate can be selected from between 1200 to 38,400 bps.
- Built-in Time Base Stabilizer (TBS) locks sync and subcarrier to an external reference signal as well as providing stable pictures. High quality digital dropout compensator further ensures consistent picture performance.
- Equipped with two longitudinal audio channels.
- Auto repeat of entire or a specific portion of the tape.

- Built-in character generator can display VTR status, time code, self-diagnostic messages, set-up menu, etc.
- Both read LTC (Time Code) and UB (User Bits). The UVW-1400A also generates LTC and UB (Free-Run/Rec-Run).
- Control of jog, shuttle, playback, record, pause, FF and RW with the optional SVRM-100A Remote Control Unit.
- Composite and S-Video as well as component via BNCs which are switchable to RGB output. The UVW-1400A has two switchable sync connectors and a Sync on Green.
- Built-in diagnostic function and hour meter.

UVW-1200 List Price 6,200 ... For B&H price, Call
 UVW-1400A List Price 8,400 ... For B&H price, Call

UVW-1600/UVW-1800 Betacam SP Editing Player • Betacam SP Editing Recorder

The UVW-1600 and UVW-1800 are the other half of the UVW series. They offer the superiority of Betacam SP with sophisticated editing features. They feature an RS-422 9-pin interface, built-in TBCs and Time Code operation. Inputs/outputs include component, composite and S-Video. All the features of the UVW-1200/1400A PLUS—

- Optional BVR-50 allows remote TBC adjustment.
- RS-422 interface for editing system expansion.
- Two types of component output: via three BNC connectors or a Betacam 12-pin dub connector.

- Frame accurate editing is assured, thanks to sophisticated servo control and built-in time code operation.

UVW-1600 List Price 9,600 ... For B&H price, Call
 UVW-1800 List Price 11,300 ... For B&H price, Call

PVM-14M2U/14M4U & 20M2U/20M4U 13-inch and 19-inch Production Monitors

Sony's best production monitors ever, the PVM-M Series provide stunning picture quality, ease of use and a range of optional functions. They are identical except that the "M4" models incorporate Sony's state-of-the-art HR Trinitron CRT display technology and have SMPTE C phosphors instead of P22.

- HR Trinitron CRT enables the PVM-14M4U and 20M4U to display an incredible 800 lines of horizontal resolution. The PVM-14M2U and 20M2U offer 600 lines of resolution. M4 models also use SMPTE C phosphors for the most critical evaluation of any color subject.
- Dark tint for a higher contrast ratio (black to white) and crisper, sharper looking edges.
- Each has two composite, S-Video and component input (R-Y/B-Y, analog RGB). For more accurate color reproduction, the component level can be adjusted according to the Input system. Optional BKM-101C (video) and BKM-102 (audio) for SMPTE 259M serial digital input.
- Beam Current Feedback Circuit
- 4.3/16:9 switchable aspect ratio.
- True multi-system monitors they handle four color system signals: NTSC, NTSC 4.43, PAL & SECAM

- External sync input and output can be set so that it will automatically switch according to the input selected.
- Switchable color temp: 6500K (broadcast), 9300K (pressing picture). User preset (3200K to 10000K).
- Blue gun, undercan and HV delay capability



PVM-14M2U List Price 1,265 ... For B&H price, Call
 PVM-14M4U List Price 1,570 ... For B&H price, Call
 PVM-20M2U List Price 2,525 ... For B&H price, Call
 PVM-20M4U List Price 2,920 ... For B&H price, Call

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ST-30	6.99	ST-60	7.49
ST-120	7.99		
M221 Hi 8 Double Coated			
Metal Particles		Metal Evaporated	
P630HMP	4.49	E630HME	7.69
P650HMP	6.29	E660HME	10.49
P6120HMP	8.49	E6120HME	13.99
M321SP Metal Betacam (Box)			
05S	10.99	10S	11.99
20S	13.99	60L	20.99
90L	32.99		
DP121 DVC PRO			
12M (Med.)	7.49	23M	8.79
33M	10.99		
63M	19.99	66L	22.50
94L	30.99	126L	39.99

maxell

Broadcast Quality Hi8 Metal Particle			
P6-30 HM BD	5.39	P6-60 HM BD	6.09
P6-120 HM BD	7.99		
P/1 PLUS VHS			
T-30 Plus	1.69	T-60 Plus	1.99
T-90 Plus	2.09		
T-120 Plus	2.19	T-160 Plus	2.69
H6X-PLUS VHS (Box)			
HGXT-60 Plus	2.69	HGXT-120 Plus	2.99
HGXT-160 Plus	3.99		
80 Broadcast Quality VHS			
T-30 BO	3.89	T-60 BO	3.99
T-120 BO	5.99		
80 Professional S-VHS (In Box)			
ST-31 BO	6.79	ST-62 BO	6.99
ST-126 BO	7.45	ST-182 BO	13.99
Betacam SP			
B30MSP	13.49	B60MLSP	19.99
B90MLSP	27.95		

Panasonic

Mini DV Tape	
AY DVM-30	5.99
AY DVM-60	6.99
AY-DVM80	12.99
AY-DV123EB	20.95
DVCPRO	
AJ-P12M (Medium)	7.99
AJ-P24M	9.99
AJ-P33M	11.49
AJ-P66M (Large)	20.99
AJ-P94L	29.98
AJ-P126L	38.95

SONY

Hi-8 Professional Metal Video Cassettes			
P6-30 HMPX	4.79	P6-30 HMEX	11.99
P6-60 HMPX	6.79	P6-60 HMEX	8.99
P6-120HMPX	8.99	P6-120HMEX	15.99
PR Series Professional Grade VHS			
T-30PR	2.39	T-60PR	2.59
T-120PR	2.79		
BA Series Premier Hi-Grade Broadcast VHS (In Box)			
T-30BA	3.69	T-60BA	4.19
T-120BA	4.99		
MQ Master Quality S-VHS (In Box)			
MQST-30	7.49	MQST-60	7.69
MQST-120	7.99		
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KCS-10 BRS (mini)	8.99	KCS-20 BRS (mini)	9.99
KCA-10 BRS	8.99	KCA-20 BRS	9.49
KCA-30 BRS	10.69	KCA-60 BRS	14.99
XBR 3/4" U-matic Broadcast Master (In Box)			
KCS-10 XBR (mini)	9.79	KCS-20 XBR (mini)	11.29
KCA-10 XBR	10.29	KCA-20 XBR	11.79
KCA-30 XBR	13.29	KCA-60 XBR	17.39
KSP 3/4" U-matic SP Broadcast (In Box)			
KSP-S10 (mini)	10.49	KSP-S20 (mini)	12.29
KSP-10	10.99	KSP-20	12.69
KSP-30	14.29	KSP-60	18.59
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BCT-5M (Small)	11.99	BCT-10M (Small)	12.49
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BCT-30M (Small) (10 Pack)	ea.	12.99	
BCT-30ML	14.99	BCT-60ML	21.99
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Mini DV Tape			
DVM-30EXM w/Chip	12.79	DVM-60EXM w/Chip	16.99
DVM-30EX "No Chip"	11.99	DVM-60EX "No Chip"	12.99
DVM-30PR "No Chip"	7.99	DVM-60PR "No Chip"	9.75
Full Size DV Tape with Memory Chip			
DV-120ME	24.99	DV-180MEM	26.99
PDV Series Professional DVCAM Tape			
PDVM-12ME (Mini)	14.49	PDVM-22ME (Mini)	15.19
PDVM-32ME (Mini)	15.49	PDVM-40ME (Mini)	15.99
PDV-94ME (Standard)	32.99	PDV-124ME (Standard)	37.99
PDV-184ME (Standard)	44.95	PDV-64N	24.95
PDVN-124N	31.95	PDVN-184N	39.95



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Trinity



Live Digital Component Production Switcher, Chroma Keyer and Still Store

The heart of Trinity's live production capabilities, the powerful digital component switcher lets you mix up to eight video sources, two still stores, and a matte generator in real time at full D1 resolution. In addition to traditional dissolves, fades, and color correction, Trinity offers capabilities like soft edged organic wipes, animating 24-bit graphics, recursive digital decays, and color remapping effects. Pull the T-Bar to instantly control the wipe and matte generators, graphics alpha channel, upstream and downstream keyers, still store and organic wipe patterns. The Chroma Keyer generates sharp, crisp keys with key color spill suppression providing perfect realism for blue/green screen effects. While meeting the highest broadcast quality specifications, it preserves soft-edged shadows and allows arbitrary color luminance ranges to be simultaneously defined for the best key possible.

- High-resolution chroma keyer with advanced key color spill suppression
- Border types include matte colors, graduated colors, bitmap graphics and live video sources
- Infinitely variable color space remapping effects including solarization, posterization, color swapping and sepia tone
- Expands to multiple simultaneous key outputs
- Output program or key in four or more different formats simultaneously
- Dual channel still store can recall CCIR-601 frames in less than a half second
- Operate still store with mouse, key pad or automatically via preset timeline
- Still store imports/exports standard image formats including BMP, JPG and TIFF
- Software control of overparameters like comb filter adjustments and chroma H/V shift
- Support for tally lights and bi-directional GPI triggers

3D Digital Effects

Trinity's Warp Engine can duplicate any visual effect ever created, but is becoming known for consistently pushing visual effects to unprecedented heights: such as the ability to map live video onto multiple arbitrarily complex user-defined 3D animating objects, with colored highlights, true video reflections, photo-realistic texture maps, variable transparency and soft shadows. Based on custom chips, Warp Engine is a massively parallel video geometry engine capable of manipulating live video streams into stunning visual effects far beyond the reach of any existing system regardless of cost.

- Performs all 2D effects with perspective including flip, push, pull, squeeze, zoom, tile mirror, tumble, spin and rotate
- Create real-time 3D effects with live video mapping on animating user-defined objects such as logos, products or human faces
- Includes Personal FX application for custom effect creation
- Semi-transparent colored light sources generate highlights on warped video and cast soft-edged shadows in real-time
- Integrate graphic elements into or on top of video effects including over-the-shoulder and picture-in-picture treatments
- Apply true 3D procedural distortions to live video, including waves, ripples and peels

Time Machine Non-Linear/Linear Online Editor

Time Machine is a stunning achievement in non-linear editing, providing the superior image quality and true random access normally associated with systems costing over \$200,000. Fully integrated into Trinity, Time Machine brings non-linear video and audio streams to editing, compositing, paint, animation and live production, all without dropping a frame. Using a next generation Wavelet-based compression algorithm, Time Machine visibly outperforms the older M-JPEG technology. The addition of Time Machine transforms Trinity into the ultimate video production powerhouse. Time Machine requires Trinity 2.0 software, and works with a variety of hard disk drives.

- Use video from tape decks and optional disk storage systems on the same timeline
- Simple drag-and-drop operation for visual editing
- View video clips, effects, graphics and titles instantly by dragging through the timeline
- Interactive trim, slip, and roll clip controls
- Four built-in RS-422 VTR controllers for A/B/C roll editing with support for common VTRs
- Timeline fully supports optional real-time audio mixer for pan, fade, mute, effects send/return and three band parametric EQ
- Independent color correction settings for each clip, or on a tape by tape basis
- Performs ripple and non-ripple style editing
- Supports sequential and checkerboard style auto-assembling

PINNACLE SYSTEMS CinéWave

CineWave Includes • Commotion Pro • Hollywood FX

Pinnacle Systems CineWave is the revolutionary new non-linear editing package that delivers the power of true uncompressed video with Apple's Final Cut Pro. Using Pinnacle's new HUB3 video processor, the CineWave combines infinite layering, incredible effects, advanced compositing tools and accurate motion tracking with all the major video formats in compressed or uncompressed video. Based on the new dual processor Apple G4's, CineWave delivers the world's first scalable desktop video system capable of outputting both Standard Definition and High Definition simultaneously. CineWave delivers compressed or uncompressed video and balanced or unbalanced audio ranging from NTSC/PAL.

CCIR-601 or HD, YUV or RGB, 4:2:2 or 4:4:4, interlaced or progressively scanned, using aspect ratios of 4:3 or 16:9 to output to tape, CD, DVD or streaming media files using Pinnacle's unique memory-centric architecture. The CineWave also has real-time 3:2 pull down for 24-30fps conversion. At the base of this system is Pinnacle's new Targa Cine Engine with two Digital Tether ports for plug and play capabilities to easily upgrade the CineWave from analog to serial digital or from standard definition to high definition with optional breakout boxes.



Avid / IBM Xpress DV On IntelliStation

Avid Xpress DV on IntelliStation is a turnkey digital video solution designed to give professional content creators in corporations, education and government institutions, the power to communicate with video. The solution consists of IBM's award-winning IntelliStation M Pro workstation, and Avid's Xpress DV digital video content creation software. Simply plug your DV camera into the IntelliStation workstation, launch Xpress DV and begin assembling a video. Using the high-powered and reliable able IntelliStation M Pro and intuitive Xpress DV software, you'll be creating professional-looking video and multimedia content for a wide variety of uses including sales and marketing videos, training videos and web-based teaching solutions in no time.



The Hardware

The completely redesigned IBM IntelliStation M Pro features a high-speed Intel 840 chip set, 600/733 MHz Pentium III processor, 133 MHz Front Side Bus, a Canopus DV Raptor, and a Matrox display card.

Designed with the Intel 840 chipset, the IntelliStation M Pro supports high-speed ATA-66 disk drives, as well as up to 1GB of high-performance ECC memory. The solution is pre-installed with the Matrox millennium G400 4X AGP graphics card (capable of 1GB/per second transfers) with 16MB of on-board memory, and the Canopus DV Raptor Adapter IEEE1394 Interface for DV I/O. It also includes two Ultra2 SCSI hard drives: a 9.1GB drive for the operating system and programs, and an 18.2GB drive for capturing data.

The Software

Avid Xpress DV software combines powerful video and audio editing tools, digital mastering, and extreme ease of use. Xpress DV captures and edits DV video, adds effects, mixes audio, and outputs the finished results over IEEE1394 FireWire for impressive video. Or transcodes the content to all major new media formats: MPEG-1 (for CD-R), MPEG-2 (for DVD-ROM) QuickTime or AVI for computer based presentations or for streaming on the web. As a member of the Avid Xpress Family, The Xpress DV offers the Avid graphical user interface (GUI) based on the 3.1 version, offering powerful audio and video tools including:

- 4 tracks of nested video tracks with single track transitions
- 8 tracks of audio with real-time mixing
- Batch digitizing, and RS-422 deck control.
- Integrated EDL support with built in logging
- Thirty-two levels of undo/redo, making changes painless!
- Tight timeline with precise timecode editing.

- Real time 3-band EQ, real-time rubber band gain adjustments.
- 32 and 48 kHz sampling rate, with down sample to 22 and 11 kHz for multimedia.
- Over 50 transitions, including dissolves, motion & color effects, superimposition, horizontal and vertical wipes, chroma and luma keys, picture in picture, flips, flops, resizes, spins, peels, pushes, squeezes, and many more.
- Integrated, anti-aliased timing tool
- Export to MPEG1, 2, Microsoft Windows Media (ASF), AVI, QuickTime, or RealMedia

The Service

IBM is maintaining a server where you can obtain disk space for approximately five hours of compressed streamed video, where your client can download your video from a customized web page, at no charge to you for the first three months (after three months it is fee based). This service eliminates small businesses from having to devote their own resources to set up and maintain their own servers.

- IBM IntelliStation M Pro (6868-92U/94U).
- 733/933 MHz Pentium III processor.
- 256MB Full Speed ECC memory.
- Matrox Millennium G400 4X AGP with 16MB of RAM.
- Ultra2 SCSI 9 GB (7200 rpm) drive for operating system.
- 18/36GB drive for video and audio storage.
- CD-ROM (20x-to-48x)
- Windows NT 4.0 with Service Pack 5.
- Complete system integration and testing.

All for the Unbelievable price (733 MHz) 6,599.95 or (933 MHz) 6,999.95

Pioneer

DVR-S201 DVD-Recordable Drive

The DVR-S201 is a DVD-Recordable (DVD-R) drive designed for industrial DVD authoring and long-term data archival. It provides write-once capabilities to DVD discs allowing storage for any type of data including video, audio, images, text, or multimedia programs. Compatible with version 1.0 of the DVD-R standard, the drive offers 4.7GB GB capacity - roughly eight times more than a CD-R disc.



With its relatively low cost per megabyte, compact design and portability, it is ideal for short-run, desktop DVD authoring and long-term data archiving. An external SCSI-2 device, it writes and reads both 4.7GB or 3.95GB media. Writing at 1X and reading at 2X speeds, a complete 4.7GB disc can be written in approximately one hour and is compatible with existing DVD playback devices including DVD-ROM drives and DVD-Video players. Whatever your data storage requirements are, video, imaging, graphics—the DVR-S201 is an affordable way to record discs compatible with DVD-ROM drives and DVD-Video players.

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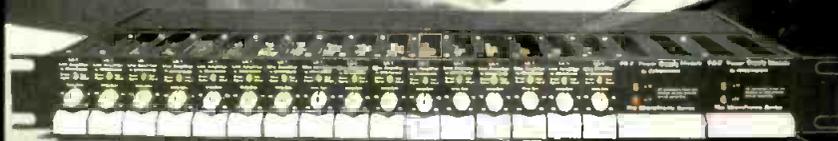
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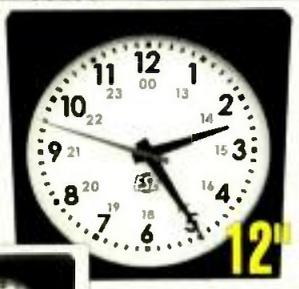
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Business Wire

Continued from page 123.

infrastructure including the cabling, connectors and the Phillips router are wideband capable and can support a future transition to HD television.

Avid Technology, Inc. announced it acquired the remaining 50 percent ownership stake in iNews, LLC. Avid and the Grass Valley Group had each held a 50 percent stake in iNews. Terms of the transaction were not disclosed.

iNews is a provider of broadcast news software solutions for television, radio and the Web. The Madison, WI-based company, which formed in 1998 from the combination of Avid's Avid-News and Tektronix' NewStar news production systems, now becomes part of the Avid Media Solutions division (AMS). iNews will retain its headquarters in Madison.

Sundance Digital, Inc. a provider of television automation systems in the greater Dallas area, has expanded operations with a move to larger headquarters. The new facility, which houses administration, manufacturing, sales, technical support and accounting is located at 4500 Fuller Drive, Suite 205; Irving, TX 75038; and can be contacted at 972-444-8442 (phone) and 972-444-8450 (fax).

People

CRI. Systems, Orban and CRI have named **Steve A. Claterbaugh** the company's North American sales manager and **Greg Ogonowski** to the new position of vice president of product development.

Harry Vesanen has been appointed Digital Vision AB's new managing director.

Pixel Power Inc. has appointed **Bruce Levine** to the position of vice president of sales.

Benjamin Timpauer has been named to DSP Media's sales department as its western regional sales manager.

Fairlight Inc. has promoted **Shaun Kerrigan** to the position of president, FairlightUSA, the company's Hollywood-based sales and support organization.



Glen Towater

Trompeter Electronics recently announced that **Glen Towater** has joined the company as regional sales manager for the Southeast.

Oxtel Inc. has named two new vice presidents. **Michael Molinaro** and **Casey Linnemeyer** will jointly manage Oxtel's North American office as vice president of sales and vice president of business operations respectively.



Casey Linnemeyer

Penn Fabrication has named **Frank Riordan** to their newly created position, national sales manager, lighting and audio division.



Joy Mossholder

Joy Mossholder has been appointed marketing manager of Videotek, Inc.

Ronald Bentley Stewart, director of technical services for the KUAT Communications Group in Tucson, AZ, and former KET Deputy Executive Director died Jan.



Ronald Bentley Stewart

10 in Tucson following a brief illness. Before joining KUAT, Mr. Stewart designed and was responsible for the technical operation of the Kentucky Educational Television Network from 1963 to 1975. An engineering visionary, Mr. Stewart overcame the technical problems inherent in eastern Kentucky's mountainous terrain and designed a system of transmitters that provided service to the entire state, making KET the largest ETV network in the United States, second only to NHK in Japan as the world's largest TV network. ■



TURNER STUDIOS

Turner Studios is a state of the art digital television complex serving the production needs of the Turner Networks in Atlanta, Georgia. We are seeking qualified, client service oriented Engineers to support our growing facility.

Systems include high-end non-linear editing equipment digital production switchers and routing systems, studio and EFP cameras, monitors, character generators, still store systems, and VTR's. Experience in a post-production or broadcast environment, Windows NT, Unix, Avid and networking is highly desired. Candidates should expect to work closely with clients to resolve technical issues, and must interact well with other individuals.

Please send resume to Jeff Sharpe
 Director of Technical Operations
 Fax - 404/885-4485
 Email - jeff.sharpe@turner.com

CHIEF ENGINEER WANTED: KADY-TV, Channel 63, Oxnard / Camarillo, CA seeks hands on Chief Engineer. Responsibilities include maintenance of Acrodyne 60 Kw transmitter, multiple microwave systems, Leitch VR300 spot playback unit and Phillips BTS router. FCC General Class license required. Must be a team player with excellent communication skills. Send resume to Judy Dykeman, 950 Flynn Road, Camarillo, CA 93012 or fax to 805/388-2694.

KESQ-TV, the ABC affiliate in beautiful Palm Springs, California, is seeking a Director of Engineering. Our station is also home to FX, Telemundo and WB LPTV's, and radio enterprises. Our new Director of Engineering will have great technical and people skills, a get-it-done attitude and the ability to lead a quality staff. If you have at least 5 years experience in a technical management or supervisory role, 5 or more years' formal training/experience in all aspects of broadcast technology, including RF, and the desire to work in a beautiful facility where you will make a difference, please send your resume to: Bob Allen, Executive Vice President KESQ-TV, 42-650.Melanie Place, Palm Desert, CA 92211. BAILEN@KESQ.COM

DIRECTOR OF ENGINEERING: KVBC-TV, Las Vegas is just completing an all-digital, fully automated facility and is seeking an experienced technical manager to oversee all broadcast operations and maintenance. Applicants should possess substantial experience in broadcast engineering including maintenance, production, operations, design, and installation. Knowledge of physical plant construction and systems as well as applicable laws and regulations necessary. Interested applicants should possess excellent verbal and written communications skills and should have prior experience in budgeting and capital planning. We offer a competitive wage and a benefits package. Apply in person at, mail resume to, or e-mail resume: KVBC, Channel 3. 1500 Foremaster Lane, Las Vegas, NV 89101. NO PHONE CALLS PLEASE Hr@kvbc.com E.O.E.

TV CHIEF ENGINEER. Trinity Broadcasting Network stations in various cities. Experience in maintenance and repair of UHF transmitters, studio systems and personnel supervision and training. SBE certification a plus. Send resume to Ben Miller, P.O. Box C-11949, Santa Ana, CA 92711. E-Mail: bmiller@tbn.org Fax: (714) 730-0661 EOE.

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BROADCAST ENGINEERING is edited for corporate management, engineers/technicians and other management personnel at commercial and public TV stations, post-production and recording studios, broadcast networks, cable, telephone and satellite production centers and networks.

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THE WORLD'S
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EMAIL PREFERRED, no phone calls please!

Candidate should have an Associate degree (or equiv.) in electronics and 4 years minimum experience as a Maintenance Engineer working in television. Computer and Networking skills, and a strong knowledge of TV systems are highly desirable. Must be able to perform electronic repair and maintenance to the component level. SBE Certification a plus!

STUDIO MAINTENANCE ENGINEER:

Must be able to perform the following duties: install and maintain studio transmission equipment including video switchers, audio consoles, DVE, CG, SS, cameras, and robotics. Familiarity with automation systems and master control environment. Should possess a general computer/networking background. Must be able to work on a rotating shift schedule. Candidate should have an engineering degree or equivalent technical training. SBE/FCC certification a plus. If you want to be a part of the exciting transition to HDTV in the most exciting city in the world, please send your resume and cover letter: Kurt Hanson, Chief Engineer, WABC-TV, 7 Lincoln Square, New York, NY 10023. No telephone call or faxes please. We are equal opportunity employer.

TELEVISION CHIEF ENGINEER, NORWALK, CT LOCATION: Excellent opportunity for individual to head up Engineering Department at News 12 Connecticut. Candidate must have experience with full range of production equipment including ENG cameras, VCRs, switchers, routers, video file servers, non-linear editing, computer systems and networking. Ability to prioritize and oversee engineering jobs a must. Design skills and ability to implement new equipment and technology a plus. **SR. VIDEO ENGINEER, OPPORTUNITY ALSO AVAILABLE.** We offer a competitive compensation & bnfts pkg. Send resume, which must include REF# #0201BE2892KMF in cover letter, to: Rainbow Staffing, Attn: KMF, 1111 Stewart Ave, Bethpage, NY 11714, Email: careers@cablevision.com (Include REF # in subject line of email). EOE.

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Telemundo, the fastest growing Hispanic broadcast network, seeks: Master Control Operators who are currently working in an automated master control environment for immediate full time openings. Prior experience with manual switching operations a must. Bilingual (English/Spanish) a plus. Various shifts available. We offer an excellent benefits and compensation package, great working environment, and an enhanced pay scale that will commensurate with your work experience. Please send all resumes and salary requirement to:

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e-mail: gxorejas@telemundo.com**



EARTH STATION ENGINEERS

Turner Teleport in Atlanta has career opportunities for experienced Satellite Communications Engineers. These positions demand an extensive background in fixed based and SNG engineering. Equipment maintenance and operational experience is required. Please mail or fax your resume and cover letter to:

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

Phone: 404-827-1638
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Obfuscation through labels

BY PAUL MCGOLDRICK

Putting labels on things is a way to identify what the objects are; applying labels to tell you what things might become is at best confusing – and, at worst, misleading. The Consumer Electronics Association (CEA) is doing the industry a great disservice with its latest venture into the world of definitions and labels for digital television products.

I am certainly not a supporter of the “HDTV-Ready” and “DTV-Ready” tags that have been hung on products in retail stores, but the new advice for the industry is also difficult for me to swallow, and in some cases I think it downright misleading. The CEA (a sector of the Electronics Industries Alliance) starts the right way with a resolution that “allows consumers to clearly differentiate between the new DTV sets and analog-only televisions. The resolution states that analog-only televisions (televisions/monitors with a scanning frequency of 15.75kHz) “should not be marketed or designated to consumers as having any particular DTV capability or attributes.”

That is a fine statement. But, as you will see, the spirit of the resolution is followed less in the fact of the labels.

To define the categories of the various component elements of a display system, the CEA resolved to divide the performance into three categories: High-Definition Television (HDTV), Enhanced Definition Television (EDTV) and Standard Definition Television (SDTV). I have problems with each category.

HDTV components are defined as those that will receive ATSC *terrestrial* digital transmissions and decode all of the Table 3 standards. Display scanning for HDTV must be 720p or 1080i and must offer a 16:9 display with at least 540p, 810i or higher in the viewable area. Excuse me? HDTV receivers do not have to have a native 16:9 aspect ratio? And *terrestrial*? What

happened to the need for alternate modulation schemes than 8VSB for cable systems that are using QAM?

EDTV is a new, confusing, category. It has only marginal relationship to the government-defined Extended-Definition Television (EDTV in document FS-1037C), which described improvements

480i SDTV receiver? And can you imagine some of the butchery that is going to take place to get all of Table 3 standards down to SDTV displays?

“Consumers can buy with confidence knowing that the DTV products they purchase do indeed have DTV capability and are upgradeable to a specified

Different cable systems will not necessarily be able to bring their receivers with them.

to the NTSC system but still resulted in signals being fully compatible with NTSC receivers. The CEA’s version of EDTV calls for a terrestrial (again) reception and decoding of all of Table 3 with a display of at least 480p; there is no definition of aspect ratio. So, a 480i off-air receiver with a Table 3 decoder and fitted with a scan doubler would qualify as an EDTV receiver – and the doubler can be bypassed with 480i received signals and still be EDTV.

Down in the SDTV definition we have the really misleading situation. An SDTV receiver is required to receive the terrestrial (again) signals and decode all of Table 3 “and produces a useable picture.” No aspect ratio is defined and the display scanning format “has active vertical scanning lines less than that of EDTV.” Now let’s see: What standard is there that is less than 480p? My, maybe 480i? So an SDTV receiver is “digital” by CEA definition simply because it is capable of receiving the terrestrial signals and decoding them to a “useable” picture. Sure, that’s not analog because it’s not receiving analog transmissions. But in the first resolution of the CEA an analog receiver is defined as a “television/monitor with a scanning frequency of 15.75kHz.” Am I missing something about the line scanning frequency of a

level of DTV performance,” remarked Gary Shapiro, CEA President and CEO. “This new terminology, developed by the TV manufacturing members of CEA, will give consumers a ‘good – better – best’ choice when shopping for digital TV products.”

These new tags will give consumers a confidence that is not justified and will create major problems for cable users who will, after all, be a major portion of DTV viewers. We will even have the situation where people moving between different cable systems will not necessarily be able to bring their receivers with them.

Downgrading HDTV to allowing 4:3 displays to be used is disgraceful; inventing a marginal display standard in EDTV is really unfortunate, and creating an analog receiver with a tuner for digital channel reception in SDTV is marketing at its worst. The previous definitions agreed upon between CEA and the National Cable Television Association (NCTA) did include cable, but the television industry balked about using them. Now we can see why – there is a preference to sell the consumer short by labels that promise more for less. ■

Paul McGoldrick is an industry consultant based on the West Coast.

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