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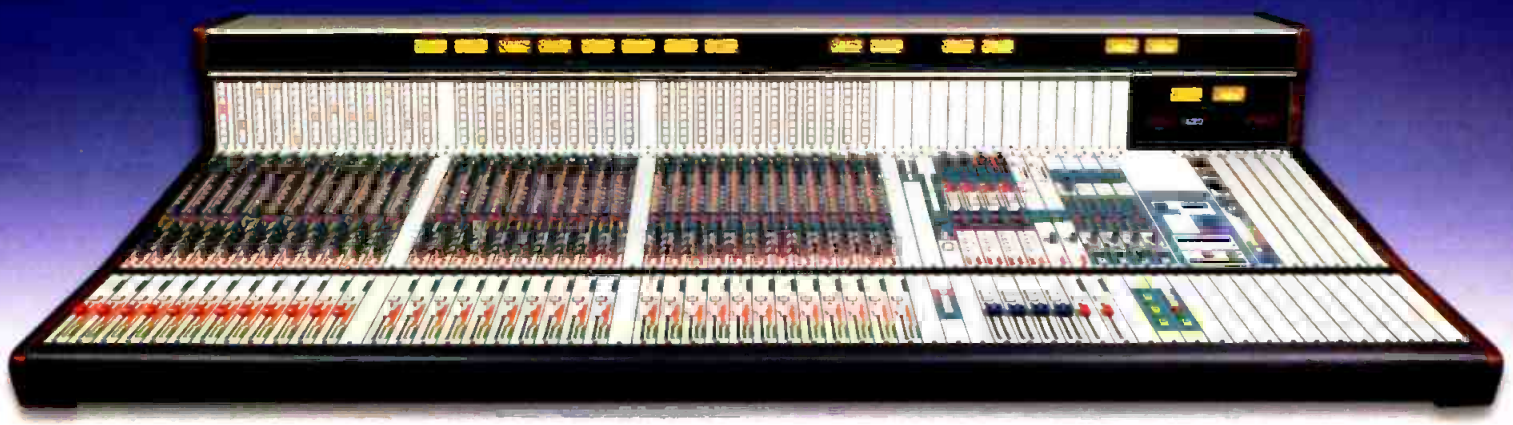

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October 2000
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IN THIS ISSUE

Features

Beyond the Headlines

Digital Handbook

(continued on page 6)

Today it's the news at 6:00.
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ON THE COVER: *Today's post-production suites often must incorporate a range of analog and digital signals. Successful implementations provide both flexibility and adaptability. Photo credit: Aker/Zvonkovic Photography, Houston.*

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FREEZE FRAME

A look at the technology that shaped this industry.

Pre-DVDs

In May 1970, *Broadcast Engineering* carried an article on a new Panasonic device for video tape duplication. The article stated, "... one day soon (video tape recording) will become a practical home activity with pre-recorded video tapes being marketed economically because of the ____." What was this device called? Supplying the generic name is sufficient. Selected correct entries will receive a *Broadcast Engineering* T-shirt. Submit entries marked "Freezeframe" to: brad_dick@intertec.com. All entries due by Nov. 30, 2000.

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Editorial

City of thieves – déjà vu

I'm back from IBC. Another trip to the City of Thieves—and it lived up to its reputation, but more about that later.

The IBC has become a truly international exhibition, one with a few attributes that NAB would do well to adopt. Not the least of which is a civilized exhibition schedule and refreshments in many of the booths. The show opens at 10 a.m. and closes at 6 p.m. Also, the IBC show organizers treat the press like human beings instead of like flies at a picnic.

The IBC isn't a show that's big on new product announcements. Much of what's shown is the actual embodiment of products that were announced at NAB, but really weren't real. By IBC time many are actually shipping. IBC has also turned into a show where deals are announced. You've probably heard about the acquisition of Pluto by Avid. Leitch bought DPS. Avstar became iNEWS, and the list goes on.

At NAB, the keyword was *streaming*. At IBC, the keyword was *broadband*. With Europe's focus on digital television instead of HD television, the integration of data, and now broadband delivery, has been far less controversial. The result has been the development of a wide range of products, features and services. From simple media delivery to full interactivity via terrestrial, satellite and cable, Europe has gotten its collective act together with regards to datacasting. America would do well to follow suit or risk getting left behind.

I mentioned the City of Thieves in my introduction and Amsterdam again lived up to that reputation. By the way, lest my European readers be offended by the characterization, the term is what the Amsterdam Police Department uses. I know firsthand.

Many of you may recall my previous experience of being robbed in front of the Crown Plaza Hotel in Amsterdam a couple of years back. Well, this year wasn't as catastrophic but infuriating nonetheless. I had hidden some gifts from my friends at Tektronix, SGI, Harris and the Grass Valley Group in our exhibit booth. The next day, I went back to the booth to pack them for shipping back home. Sure enough, I'd been ripped off. They left the IBC tote bags, guess they already had enough of them. They only took the good stuff! Other exhibitors had similar experiences.

Some local cab drivers were operating their own scam. Twice I found them instructing me on how a 20 guilder fare from a 50 guilder note equals 20 guilders change—always provided in two 10 guilder notes. New math, right?

On a more positive note, one characteristic that sets IBC apart from NAB is the party scene. Canal boat tours, trips to the beach and exquisite parties in impressive historical museums are often part of IBC. NAB's version of culture is Plastic Paris, Cement Caesars and Naugahyde New York. However, nothing I've attended previously at IBC holds a candle to one soiree at this year's convention.

To protect the guilty, I won't mention the company's name. Some said that clothing was optional, but that applied mainly to the hired female staff. Naked it wasn't. Almost naked it was. Wild and crazy it was. And next time you're thinking about serving fruit, you could consider (or not) how this company "served up its refreshments." I can only leave this to your imagination. After all, this is a family magazine.

BTW, I'm looking for a full-time technical editor. Broadcast, video and web knowledge is required. And, you have to be able to communicate well. If you're interested, drop me a note.

Brad Dick

Brad Dick, editor

Send comments to:
direct: brad_dick@intertec.com
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Solving the Digital Puzzle

Miranda

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Reader Feedback

Kill the 8VSB Frankenstein

Dear Editor,

Right on! The defenders of 8VSB are rightly named as Zenith and politicos who have much to lose. The rest of the world is wrong, and the now obsolete ATSC tests are the last word?

The only way the FCC can make 8VSB go anywhere is to force cable to carry it and even then it will only reach the cable-attached sets. How many homes have a second or third or fourth set not on cable? Ubiquitous use of over-the-air requires simple set-attached antennas.

The only compelling problem I have heard is that the allocations are complicated by such a change. I would like to know how difficult that problem is. On-channel repeaters might be of interest to those with coverage problems.

And what really amazes me is the set manufacturers have not realized that they can't sell DTV as it is.

David Glover
Chief Engineer
University Television/CTN
Wayne State University

Dear Editor,

Regarding your editorial in Broadcast Engineering, August 2000, RIGHT ON!

I've been standing here with pitchfork and torch in hand hoping that someone with a more powerful voice (and technical expertise) would speak the truth. I remember seeing a picture of the Scala array receive antenna used in the Charlotte, NC, ATSC tests way back when and realizing we were in big trouble. 8VSB (and maybe the whole motivation for DTV) is driven by patent holders, politicians, and vendors (not public demand). I remember AM stereo and this smells about as bad. I remember something that Thomas Edison was supposed to have asked when he evaluated ideas: "Will it sell?" Has anyone ever shown us a business model of DTV that is realistic?

On another note, it is my understanding that in Europe broadcasters send their program stream to a common transmitter where their channel is encoded along with others using COFDM, then on-channel boosters are used to fill in the coverage area. I am told COFDM is very forgiving when the on-channel interference is the same signal. If this is true then it is exactly what the doctor ordered for broadcasters. Nothing is going to make the viewing public turn nasty faster than spending money on a new TV (because their NTSC channels that worked just fine went away) and not getting a picture, especially when his friend just down the road gets a perfect picture. We are going to need on-channel boosters.

TV Chief Engineer
Name withheld by request

Save the beast!

Dear Editor,

Your editorial seems biased enough that I almost believe Sinclair must have you on their payroll.

With over 150 stations broadcasting, and receivers and STBs in greater numbers than you wish to admit, a change now would have a significant impact on the industry. You say "consumers don't want it." All but a few consumers don't even know the difference between 8VSB and COFDM. They care about getting a good picture, and the facts are that 8VSB is offering that for the majority of current users. You cite a "junkyard of technology," but you fail to acknowledge that 8VSB is a modern technology, loosely based on an older technology. Like many other facets of modern digital technology, there will always be advances and improvements. If you wait for the "best" solution, you will always be one step behind the technology, and never able to commit to a standard, because there will always be something better on the horizon.

You should at least acknowledge that in most unbiased testing, the differences between 8VSB and COFDM are minimal. Perhaps 8VSB may require a bit more antenna tweaking than COFDM, but that is offset by 8VSB's better immunity to certain interference sources. As far as mobile service, I wonder how significant the market share is of viewers who are in their cars. Besides when watching from a car, the reduced coverage of COFDM vs. 8VSB will make watching a show difficult even with the "better" technology, as the signal fades. When it comes to the fundamental purpose of television broadcasting, mobile service shouldn't even be mentioned.

Is 8VSB perfect? No, but rarely is anything in life.

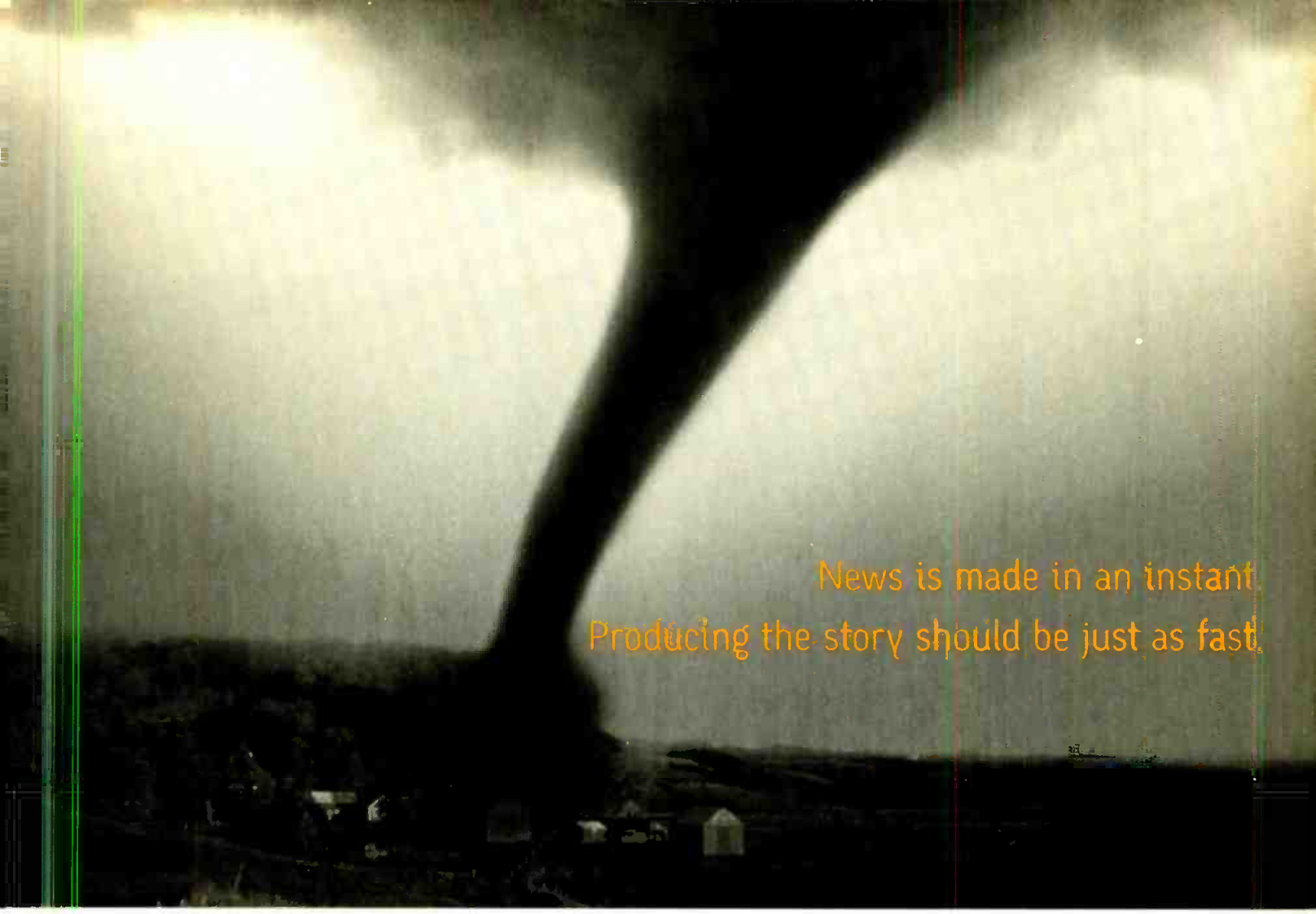
Paul Stavrou
Manager
Technology Marketing
Mannesmann Rexroth

Freezeframe winners

July's question: Name the two companies that introduced ¼-inch VTRs at the 1983 NAB. The answer is: Hitachi Densi and Bosch-Fernseh. If you'd like a copy of the entire article published in the June 1983 issue, e-mail me. The following readers each win a *Broadcast Engineering* T-shirt for their correct answers.

David Telles, Las Cruces, NM
Michael Nerenberg, CKAL-TV
Tom Alderson, KHQ-TV
Richard Greenstine, CBS, Los Angeles

Check out this month's Freezeframe question on page 6. Answers must be received by Nov. 30 to be eligible for the *Broadcast Engineering* T-shirt. You must include your affiliation and location. ■



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COMPLETE THE PICTURE

News

Changes in the satellite landscape

LARRY BLOOMFIELD

Recent indications that Hughes DirecTV may be on the market point to the growing interest in satellite service providers.

DirecTV is being courted by a number of DBS and other media companies, including EchoStar and ViaCast. Harry Pearce, chairman of General Motors, parent company of Hughes, said GM will decide whether to retain Hughes within the next few months.

Hughes is developing new satellite facilities that it hopes will create two-way transmission not only with television sets but also with personal computers and other devices. Becoming a part of the online revolution is not out of the question.

The key to all this is quality of service (QoS). One can expect to see the same quality program at lower bit rates, but there is the option of shipping better quality in the same bit rate over a period of time. That could extend up into the DTV and HDTV ranges.

A good indication of how this can happen is the significant number of local-into-local television services that have been added over the last several months since the implementation of the new Satellite Home Viewers Improvement Act.

Also, don't forget the recent announcements by Sprint and others to leverage the low-power television spectrum for all kinds of media (and Internet) services. There is no reason why TV content cannot run over that.

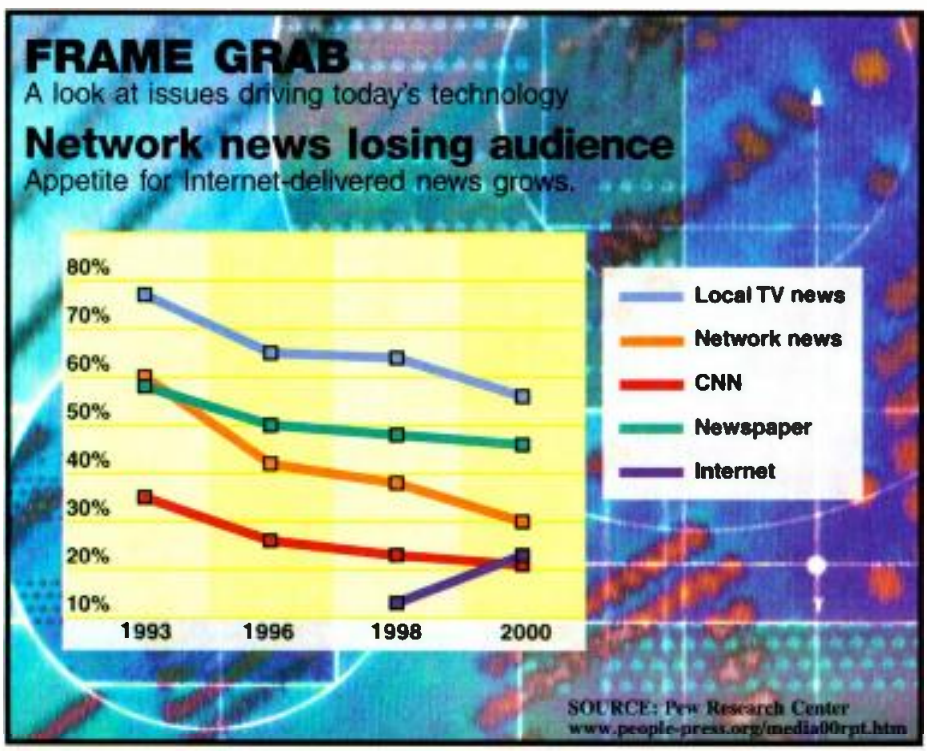
With consolidation taking place in cable, we can probably look forward to one DBS company and one cable company.

You've already seen the announcements by Gilat and others to provide bi-directional Internet services via satellite (watch your local Radio Shack this fall). Think of it as a broadband cable modem in the sky. This is certainly not for everyone, but just the ticket for some consumer segments, demographics and geo-specific locales.

As for cable competition with the above, it is strong and getting stronger.

The satellite guys won't just sit back and bask in their newfound glory. They'll be staying on their toes, and the consumer will be the beneficiary in terms of new products, programming, services and choice.

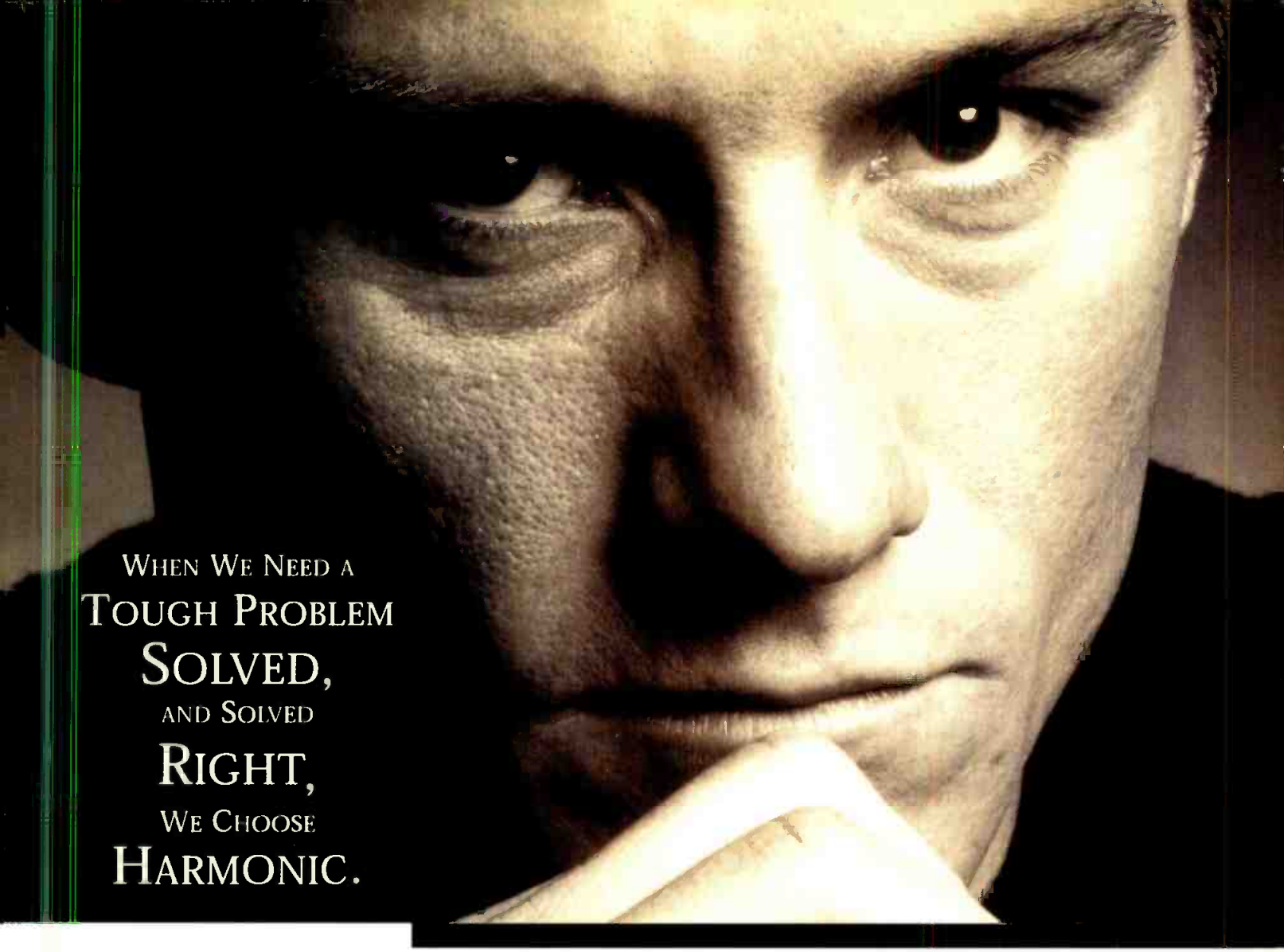
On the other side of this coin, if DirecTV and EchoStar merge, some see no chance of higher quality images or any other improvements in customer services or the control of price increases. The idea that cable is a real competitor only holds water in communities where both serve the market. With consolidation taking place in cable, we can probably look forward to one DBS company and one cable company declaring the era of free market competition officially over.



Exit AOL

Antitrust officials may ask America Online to divest its $1.5 billion stake in Hughes Electronics as a condition of approving the online giant's acquisition of Time Warner.

The FTC is concerned about AOL's domination of high-speed access, whether through satellite or cable. During reviews of the merger proposal by various federal agencies, AOL has said it will open cable systems and high-speed lines to competitors.



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Even the FCC is getting into the AOL/Time Warner act by demanding that America Online and Time Warner provide documents to back up claims the companies made at a recent FCC hearing.

The Commission sent a letter to the firms, asking that they produce any and all documents related to the issue of open access to Time Warner's cable lines and AOL's instant-messaging network.

The letter — the third time the FCC has asked for more information regarding the merger — comes soon after the chairmen of both AOL and Time Warner testified at a commission hearing.

Time Warner's chief Gerald Levin told the commission that his company had every intention of offering consumers high-speed access to multiple ISPs on its cable lines, just as soon as it could rework an exclusive agreement it has with the Road Runner Internet service.

The AOL eviction notice would certainly impact the Hughes/AOL alliance, which includes work with DirecPC. DirecPC is intended to help deliver AOL-Plus services and DirecTV, which is collaborating with the online company for its AOLTV interactive product.

Gas and Internet

Ever since DirecTV's lackluster DirecPC came onto the scene a year or so ago, there have been many different efforts to find out if anything was salvageable. Praise the gas pump and pass the dipstick: a use may have been found in, of all places, Germany. So if your Volkswagen, BMW or Mercedes comes away from the pump a bit melancholy, here's why.

A new service between HOT Telecommunications, the European unit of Hughes Network Systems, and UnitedScreens will offer an innovative service to gasoline stations through HNS' DirecPC service. During the four minutes it takes to pump an average tank of gas, German drivers will be entertained by TV screens with the latest audio-visual communications and advertising at the point of purchase. Programming will be supplied by UnitedScreens and transmitted via DirecPC. It will be installed at 800 Shell Select Shops and selected gas and convenience stores throughout Germany by autumn.

The reason for mentioning this here is that it would seem to be a possible profit center for a local digital television station to offer slow bit rate advertising via this method of display, distributing it terrestrially rather than via satellite into their own market. Why stop with gas stations? ■

New imaging technology

Many in Hollywood feel HDTV could someday replace film. Today, HDTV has almost two million pixels per frame in a 16:9 1920x1080 HD picture. You need at least 2000x4000 pixels to re-create the 35mm film experience for a typical movie theatre, to give answer print quality, and that's the minimum. That's about four times the resolution of today's HDTV.

The sensor is about three times the resolution and almost three times the data of the six megapixel CCD sensors found in today's high-resolution professional digital cameras.

In the latter part of August, Eastman Kodak announced a chip able to capture digital images with a resolution of 4096x4096 picture elements — or pixels — per square inch. That, by some measures, is about twice the resolution of 35mm film.

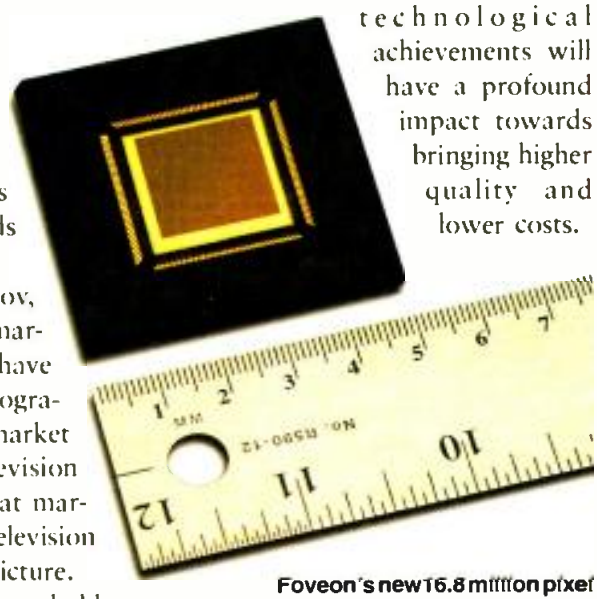
Not two weeks later, Foveon, a Silicon Valley pioneer chip designer, announced an image-sensing device capable of the same resolution as the Kodak chip, but made using a technique that could be much less expensive.

Carver Mead, Foveon's founder said: "We're headed to flat-out replace the film camera." Mead, a pioneer of the chip industry, became a Silicon Valley legend in the 1970s by helping develop techniques that for the first time enabled chip engineers to create circuits containing tens of thousands of transistors.

According to Eric Zarakov, Foveon's vice president of marketing, "The tests, to date, have been done using still photography. Since there is a bigger market for still cameras than television cameras, we're pursuing that market first." Zarakov did say television is certainly not out of the picture.

What makes this device remarkable is that the 16.8-million pixel (4096x4096) image sensor represents resolution and quality advances that were previously seen as unachievable for CMOS sensors. It is the first CMOS-based image sensor that exceeds the resolution and quality of Charge-Coupled Device (CCD) sensors.

"Foveon has worked closely with National Semiconductor Corp., its principal investor and manufacturing partner, to achieve breakthroughs in image sensor resolution, CMOS image sensor quality and CMOS imager manufacturing," Zarakov said. These technological achievements will have a profound impact towards bringing higher quality and lower costs.



Foveon's new 16.8 million pixel image sensor.

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According to Foveon, its 16 megapixel image sensor represents a leap ahead of the entire CCD and CMOS image sensor industry in both resolution and quality. The sensor is about three times the resolution and almost three times the data of the six megapixel CCD sensors found in today's high-resolution professional digital cameras. It is also more than 50 times the resolution of the most commonly manufactured CMOS image sensors found in today's low-end consumer digital cameras.

What has made this all possible is a breakthrough in CMOS process technology. Current CMOS image sensors are made with a 0.35 or 0.50 micron process, and it has been generally accepted that 0.25 represented the next round of product offerings.

What sets Foveon's 16 megapixel sensor apart is that it is the first image sensor of any size to be manufactured with a 0.18 micron CMOS process technology. The use of 0.18 micron processing enables more pixels to be packed into a given physical area, resulting in a higher resolution sensor.

To bring this all down into familiar photo-type specifications, the 4096x4096 sensor measures 22mm x 22mm and has an estimated ISO speed of 100 (similar to film with an ISO rating of 100) with a dynamic range of 10 stops. With proper lighting, there is no reason this device couldn't be used for motion. It has shutter speeds of from 2 to 1/8000th of a second, using an integrated fully-electronic shutter that ensures the exposure for all 16.8 million pixels is terminated at precisely the same moment so there would be no lag between rows, columns or subset regions of the imager.

The new 16.8 million pixel device has seven active transistors for each pixel. The benefits include less interference, better focusing and more precise exposure times. "When the pixels get smarter," Mead said, "that translates into better image quality."

Mead said that because of fundamental size limits in the wavelengths of light, it is unlikely that future digital sensors will gain much additional resolution. Instead, shrinking semiconductor circuit sizes will make it possible for companies like Foveon to add more and more intelligence to their digital-imaging systems, perhaps simulating more of the image-enhancement functions of the human brain. ■

One billion pixels per second breakthrough

A Santa Clara, CA, company claims to have broken the one billion pixel per second barrier.

Huy Nguyen, product-marketing manager at NVIDIA, said, "Our company has introduced the most powerful 3D graphics processing unit (GPU) ever produced. Our chip is the first that will decode all 18 formats of ATSC digital television. You need to have video processing power to handle

high-definition resolution, which is two to five times larger than DVD resolution.

The heart of this device is a high-definition video processor (HDVP) that enables a variety of crystal-clear HDTV solutions when combined with a mainstream CPU and a low-cost DTV receiver. Don't be surprised if these components are already included in the newer digital television sets. The HDVP allows mainstream high-performance processors to support all 18 ATSC formats with a simple, cost-effective DTV receiver card.

The transform and lighting engines provide over 31 million sustained triangles per second. Its advanced rendering subsystem provides an unprecedented fill rate of up to one billion pixels per second, and two to three times the pixel processing power of any graphics processor.

NVIDIA's new tuner chip can translate the 18 ATSC formats and may have applications in computer-centric displays.

Nguyen said his company has been working on high-definition displays for the past 12 to 18 months, and that "this latest development has the horsepower to handle and decode high-definition formats. It has all the required video scaling capability without degrading quality when handling high-definition contents."

With the slowly growing number of computer-centric television displays, it is not difficult to understand and look to this industry and all of its second cousins for developments within our own industry. Improved graphics means better quality display video from a technology that enables advanced per-pixel shading capability, permitting per-pixel control of color, shadow, light, reflectivity, emissivity, specularity, gloss, dirt, and other visual and material components. ■

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FCC Update

New FCC rules for descriptive programming

BY HARRY C. MARTIN

After five years of study, the FCC has adopted rules requiring all television stations to accommodate the needs of the visually-impaired audience.

Stations which report emergency information must ensure that information such as an emergency telephone number is accessible to people with visual disabilities. Also, stations which provide emergency information via a "screen crawl" or "scroll" now must accompany the information with an audible tone. Many newscasts already comply with these new rules by the nature of their reporting. However, these procedures are now a federal requirement.

Beginning in the second quarter of 2001, ABC, CBS, FOX and NBC affiliated stations in the top 25 markets will be required to broadcast video description during a minimum of 50 hours of programming per quarter. The most frequently used technology is a "closed" video description, similar in nature to closed captioning, that transmits on an additional audio channel accessible to viewers who own multiple audio channel television sets. It provides an audible description of events and visual elements during natural pauses in the regular programming audio.

All stations (not only those in the top 25 markets) must comply with new FCC video description rules if they are affiliated with any television network that broadcasts network programming containing video descriptions, provided their broadcasting and transmission equipment can process the information.

Dateline

Biennial ownership reports will be due for commercial and NCE-TV stations in 2001, beginning on Feb. 1. The first group of states required to file (on Feb. 1) will be Arkansas, Kansas, Louisiana, Mississippi, Nebraska, New Jersey, New York and Oklahoma.

DTV closed captioning rules

To maintain service to hearing-impaired viewers during the transition from analog to digital television, the Commission has amended its rules to require manufacturers to build closed-caption compatible DTV sets by July 1, 2002. All programming prepared or formatted for DTV broadcast after July 1, 2002, must be closed-captioned no later than Jan. 1, 2006.

The FCC's order updates rules adopted in 1991 governing closed captioning circuitry on analog television sets. Under the order, DTV must adhere also to the eight-year phase-in schedule for closed-captioned programming outlined in a 1997 order for analog receivers. The amended rules also require that 100 percent of non-exempt new programming have closed captioning by the Jan. 1, 2006, deadline.

The order adopts additional rules for digital receivers that do not apply to analog closed-captioned programming, including requiring that decoders support different caption sizes, fonts and colors. Cable providers and other multichannel video programming distributors must transmit captions in a format that will be understandable to this decoder circuitry.

The additional requirements sparked dissent from Commissioner Harold Furchtgott-Roth, who complained that imposing new rules for closed-captioning features exceeds Commission authority under the Television Decoder Circuitry Act of 1990 (TDCA). The TDCA requires that television receivers contain circuitry to decode and display closed captioning and requires the Commission to ensure that closed captioning service remains available to consumers as new technology is developed. However, the TDCA does not address whether the Commission may mandate additional features for closed-captioning services, and the new decoder rules exceed the industry's recommended practices for decoder manufacturers.

These rules apply to digital television receivers with picture screens measuring at least 13 inches diagonally and receivers measuring 7.8 inches or larger vertically. Converter boxes used to display digital programming on analog receivers must continue to deliver the analog caption information to the attached analog receiver.

New registration number system

In July the Commission began implementing the Commission Registration System (CORES) to assign registrants a 10-digit FCC registration number (FRN) for use on all applications or payments sent to the Commission. The FRN eventually will be used in all Commission financial, authorization of service and enforcement activities. Right now, use of the FRN is voluntary.

Stations which filed auxiliary applications in the Wireless Telecommunications Bureau's Universal Licensing System prior to June 22, 2000, will receive an FRN automatically by mail. Otherwise it will be necessary to use the CORES registration system. Instructions for registration were included on page 2 of the FCC's FY 2000 Mass Media Regulatory Fees instruction packet or can be obtained from the FCC's website www.fcc.gov (click on the CORES link). ■

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

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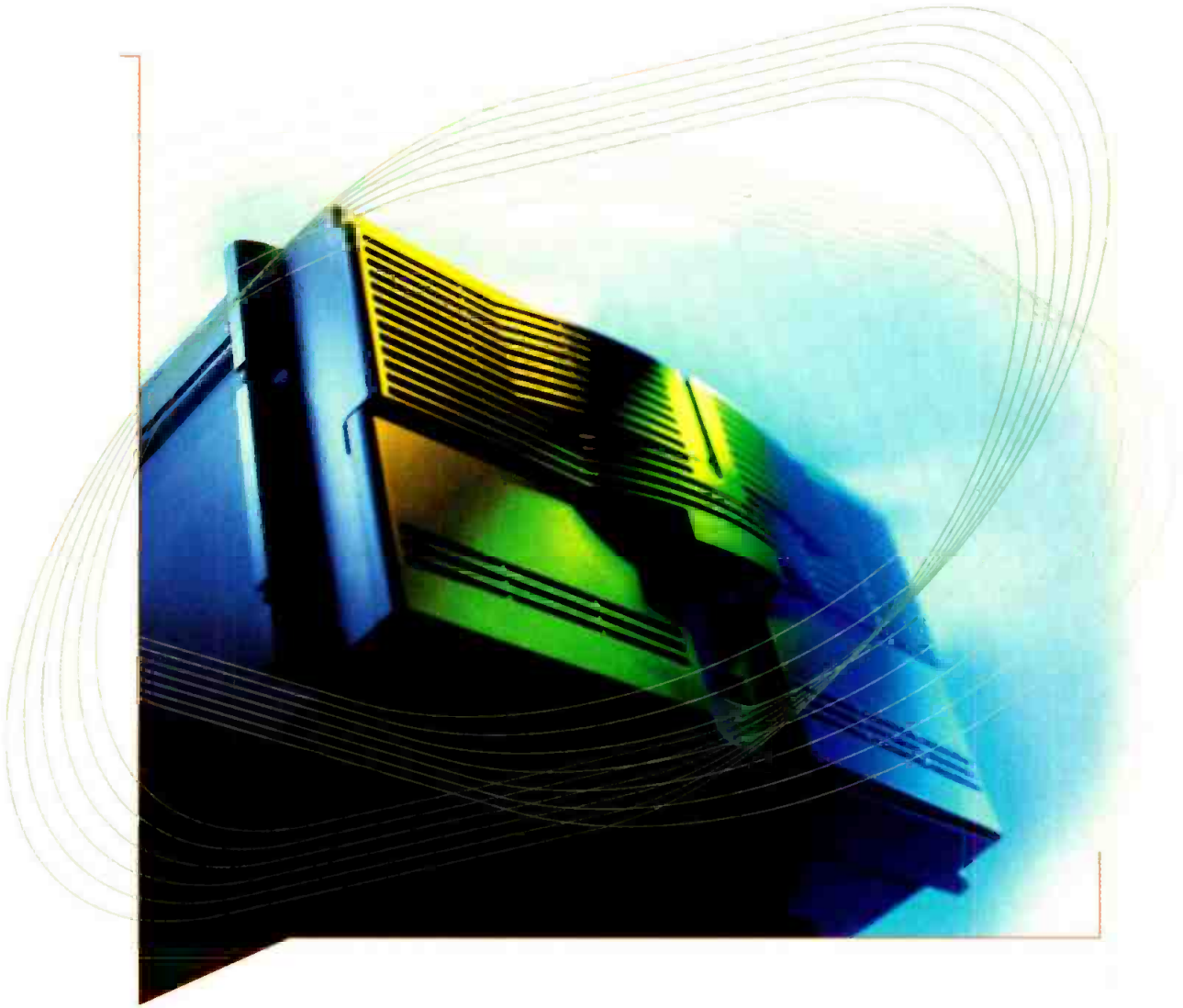

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Transitioning transmitters to COFDM

BY JIM SALADIN, SENIOR ASSOCIATE EDITOR

With the continued debate over 8VSB and COFDM, making a transmitter purchase decision has become even more difficult. Perhaps it is time to take a minute to ask, "What if?" Can stations that have already invested in an 8VSB transmitter simply swap out an exciter and go about their business, or is there another shoe to drop? It's important to know the longer-reaching effects of any possible change, especially one that comes at a make-or-break point for the entire industry.

Toward that end, we posed several questions to two industry leaders, Geoff Mendenhall, vice president of advanced product development for Harris Broadcast, and Don Markley, *BE*'s own *Transmission & Distribution* columnist and president of Markley and Associates. The questons were as follows:

"Suppose the FCC did allow COFDM, what effect would that have on transmitters already purchased? Can modern DTV transmitters be converted to COFDM operation? Will there be a power penalty? Are there other long-term issues to consider if a station needs to make the transmitter decision now? Should I wait or buy now?" ■

VENDOR

Geoff Mendenhall, Harris Broadcast

In light of the continued debate over 8VSB and COFDM, should I wait to order a transmitter?

No. If you wait until the last minute, you may jeopardize your ability to meet the FCC's mandated on-air date; making logistics much more difficult for your station, and end up paying more than you would by moving ahead on a realistic implementation schedule. To this end, we would recommend going ahead and getting on the air now with 8VSB. In the unlikely event the transmission standard changes, you can convert your transmitter to COFDM. We don't believe there will be a standards change in the U.S., but if you are concerned, you may want to size key RF components for the peak power required by COFDM as a precaution. This would support conversion to COFDM if necessary, with minimum risk, while preserving the major portion of the initial investment. The cost of replacing the DTV exciter will be small compared to the overall cost of the transmitting facility, and Harris transmitter architectures are scaleable.

• Suppose the FCC did allow COFDM, what effect would that have on transmitters already purchased?

If COFDM were permitted in the U.S., VHF and UHF transmitters already installed and operating with 8VSB could be converted by changing the 8VSB exciter to COFDM while maintaining the current peak RF power output within the ratings of the current transmitter. It may also be necessary to adjust some metering, control and power amplifier parameters of the transmitter.

• Could today's 8VSB transmitters be converted to COFDM operation?

Yes, by replacing the existing 8VSB exciter with a 6MHz COFDM exciter and making other miscellaneous adjustments including the linearization of the RF power amplifiers for the different peak-to-average ratio of the COFDM signal. Harris is a leading supplier of COFDM transmission equipment to the European DVB-T market and has significant expertise in COFDM. All Harris solid-state and IOT DTV transmitters have been laboratory tested with COFDM modulation and are compatible with both 8VSB and COFDM modulation.

• Would there be an RF power penalty in switching from 8VSB to COFDM?

Yes. Assuming that it is important to replicate existing analog coverage, there will be a significant power penalty. COFDM has higher RF power peaks than 8VSB. Harris has confirmed that even after the application of aggressive crest factor reduction techniques, the peak-to-average power ratio is at least 2dB greater for COFDM. This means that a transmitter running at full power with 8VSB will deliver 2dB *less* average power after conversion to COFDM.

• Using the same antenna, how much more RF power would a COFDM transmitter need to generate to replicate the same coverage as an 8VSB transmitter?

Ignoring interference limitations, the transmitter size would have to be increased by four times (or +6dB) to maintain the same coverage in the fringe of the service area. The receiver noise threshold is based on average power and COFDM requires 4dB more average power near the receiver threshold than 8VSB. Changing out only the 8VSB exciter will result in 2dB less transmitter power output plus the 4dB threshold penalty, for a total receiver threshold loss of 6dB.

• What about interference protection ratios?

COFDM requires greater digital-to-digital and digital-to-analog interference protection ratios than 8VSB. The SFT/ABERT field test data supports the Harris analysis that co-channel COFDM-to-COFDM will require about 4.8dB more protection than 8VSB-to-8VSB. Co-channel COFDM into analog interference will require about 1.0dB more protection than 8VSB into analog. Considering the tighter co-channel interference protection ratios

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required by COFDM, if the transmitter power was increased to provide the same coverage as 8VSB, the FCC table of channel allotments would have to change to maintain the current protection ratios. Even if the transmitter power was not increased, acceptable protection ratios cannot be met with COFDM. This will create large areas of interference where the signal cannot be received and could significantly delay the introduction of DTV within the U.S.

•Would changing to COFDM increase AC power costs?

Yes. The AC power costs for a 50kW 8VSB IOT transmitter operating 24hrs/day would typically be about $175K/yr. To replicate coverage, a 200kW COFDM IOT transmitter would be needed, with typical power costs of $586K/yr. The European approach to broadcasting, which uses many low power transmitters, is not impacted as much by the higher peak-to-average ratio required by COFDM.

• Are there other long-term issues to consider if a station needs to make the transmitter purchase decision now?

Yes. If the broadcaster wants to replicate analog coverage as the FCC planned for 8VSB, the digital transmission plant would have to provide about 6dB more peak effective radiated power (ERP) for COFDM. This could be accomplished by planning for a larger transmitter, a higher gain antenna, or a combination of both. ■

Geoff Mendenhall is vice president of advanced product development for Harris Broadcast Communications.

EXPERT

Don Markley, Markley & Associates

If the FCC were to make the decision to change to COFDM from 8-VSB, the final impact might make that perfect storm of recent fame look like a gentle summer zephyr.

In the simplest of scenarios, existing DTV stations would only have to replace their encoders and exciters. Not a trivial amount of cash, but nothing that would put them off the air. The only problem is that they would sacrifice a great deal of coverage if there were no additional change to the facility. First, look at the ratio of peak to average power for the two systems. For 8VSB, the ratio is 4.5 to 6.5. With current encoding/compression practices, the number of four has been found to be livable. For COFDM, we have been advised that the measured value is closer to 15. Even if this were to be held down to eight by improved encoding or compression methods, the transmitter would have to be doubled in peak output power capacity to maintain the same average power.

Next, the carrier-to-noise ratio is different for satisfactory COFDM reception. This calls for another 4dB in signal level to maintain the same service area. The overall result is a necessary increase by a factor of at least five to maintain the same service area. If the station is now running a transmitter with 100KW peak power output, the increase would be to 500KW peak power output. The power bill would be interesting, but that big long row of IOTs would be pretty.

On the good side, based on some of the highly publicized tests, there would be a significant improvement in reception in moving vehicles and when using simple non-directional antenna systems. If you have an overpowering need to download a stock market quote to your palm pilot, you have a winner. On the other hand, without a significant increase in the transmitter facilities, kiss your rural audience good-by. Unless that increase in transmitter power is made, the station's service area will decrease significantly. The smaller audience would no doubt show up in what advertisers would pay, especially those in the agricultural industries who have to reach the rural markets. However, those wanting to deliver data to mobile users may pay more. Just think, by watching a dashboard display, it would be possible for a driver to crash at the same time as he sees his company's stock do the same.

Next, what about the allocation scheme for the country? The good news is that one manufacturer advises that COFDM does not cause a serious change in interference when the power levels are the same. Interference appears as an increase in background noise rather than a more annoying beat pattern. However, when the needed power increase is taken into account, the amount of interference received by NTSC stations will increase by several dB. If that isn't acceptable, the allocation plan will have to be revisited and new channels assigned. For a station that has already purchased a new antenna and where that antenna is a slot type radiator, it will probably be necessary to replace the antenna. The transmission line will be satisfactory unless the power increase exceeds the rating of the line, in which case the used equipment vendors will be extremely happy. Forget about selling the old antenna. Unless you happen to find someone who wants the same pattern for the same frequency, a used slot antenna becomes an interesting lawn ornament to place behind the transmitter building next to the model of the color wheel TV receiver the old chief engineer made years ago.

If the station is willing to accept the reduced service area, they will have a whiz-bang signal into portable receivers and cars – sort of. One report indicates that COFDM does a wonderful job of compensating for reflections with a delay up to about 15μs. Above that, it crashes. As an example, stations transmitting from the Hancock building in Chicago have a reflection of more than 15μs in their received signal to the area northwest of the Sears Building. Does that mean that there will be a dark area in a nice sized wedge north of O'Hare Field? It probably wouldn't be anything to worry about as it shouldn't involve more than 500,000 viewers. There still would be plenty left, especially when all the cars are added up. If this is problem is found to be a reality, it should be addressed prior to changing the system. It's possible that it can be solved by the coding geeks in the back room. That still leaves the significant problem of the required power increase to be solved.

On the other hand, this writer is not a policy maker but only a simple country engineer. Let the big boys figure out what to do and we will live with it. But please quit second-guessing every decision. ■

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

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Transition to Digital

Audio synchronization

BY MICHAEL ROBIN

Analog audio is difficult to handle. There are frequency response problems, distortion problems (harmonic and intermodulation), noise problems, and wow and flutter. Then there is the signal level monitoring with two opposing concepts: the VU meter and the PPM. Not surprisingly, analog video is also difficult to handle. There are linear distortion problems (poor frequency response, chrominance to luminance delay and gain inequality to name a few), nonlinear distortion problems (including luminance nonlinearity, differential gain and differential phase) and noise problems.

In the NTSC world, picture information is transmitted in a synchronized manner. Each picture requires precisely the same amount of time to be transmitted. The analog audio accompanying the NTSC video signal is continuous, and, like the analog video, is transmitted in real time.

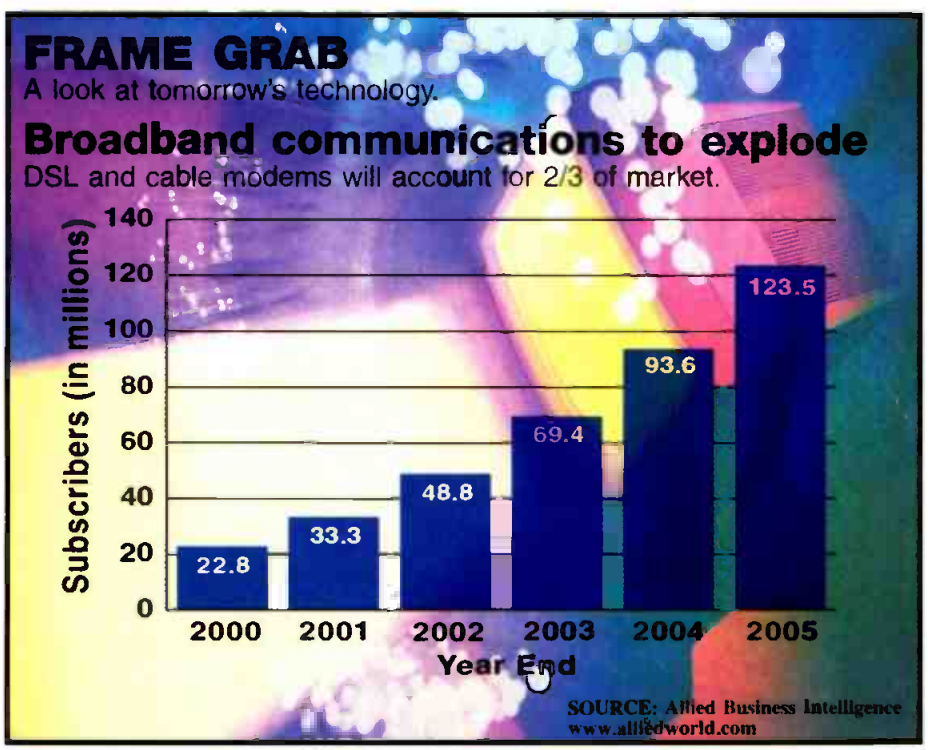
Early television production had no lip-sync problems. They started appearing with the use of video frame synchronizers. These devices introduce a 33.3 msec, or more, video frame delay with respect to the accompanying audio. This is barely noticed by the viewer and was ignored by the broadcasters. Apart from lip-sync there were no audio synchronizing concerns.

A concatenation of several digital processing elements can introduce considerable delays, which manifest themselves as loss of lip sync.

Digital signal processing, recording and distribution eliminates many of the cumulative distortions affecting the analog audio signals. 20-bit digital audio equipment provides a 120dB dynamic range, guaranteeing excellent SNR and 20dB of headroom, allowing the use of any level indicator, including the infamous VU meter, while avoiding clipping. 48kHz sampling guarantees a 20kHz bandwidth without aliasing.

Digital audio equipment can consist of an assembly of digital black boxes connected using analog I/O ports. In this case, there is no need for synchronization of the digital equipment. This analog approach, however, results in multiple conversion artifacts and should be avoided.

The AES/EBU digital audio interconnect standard eliminates the multiple conversion problems and ensures faultless, secure and reliable equipment interconnections, especially when 75Ω coaxial cable is used. Digital interconnection of digital audio equipment in an audio studio, including the digital audio mixer, requires all audio equipment be synchronized to a common reference. With signal sources using sampling frequencies other than the standard 48kHz, audio standards converters are required. External digital audio signal sources need to be passed through an audio frame synchronizer locked to the local reference signal before further processing. These requirements are relatively easy to satisfy and problems are not normally encountered, other than learning the basics of synchronization, a topic unheard of in analog audio environments.



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ensures secure and reliable digital video equipment interconnections.

Using digital audio production facilities in a digital video studio requires that the 48kHz audio sampling frequency be coherent with the 27MHz 4:2:2 time division multiplexing frequency, i.e. derived from a common reference. This is required to allow the embedding of the digital audio into the digital video datastream. In addition to synchronizing the audio and video sampling frequencies, an additional problem occurs in North America. This has to do with the fact that an integer number of audio samples (8008) occurs only once every five video frames. Ideally, all digital audio sources have to be synchronous and timed according to the five-frame sequence. (See Figure 1.) This poses some problems when embedded audio signal sources have to be switched "live" using an embedded routing switcher. Because the five-frame timing sequence cannot be easily and inexpensively controlled, the live switching of non-timed embedded audio/video signal sources is often accompanied by audio clicks. The problem can be solved either by using a V-fade type switch or by routing video and audio digital signals separately.

Along with synchronizing and audio/video timing considerations, video equipment latency also has to be considered. Digital video production switchers, especially in combination with a DVE, introduce video signal delays known as video latency. A concatenation of several digital-processing elements can introduce considerable delays, which manifest themselves as lip-sync loss. For instance, a frame-synchronizer-processed external video source passing through a DVE can acquire a video latency on the order of 66.6 msec. Currently, the lip-sync problem is treated in one of three ways:

- The signals pass uncorrected. This approach is used quite frequently and leads to significant video latencies.
- A fixed correction is applied, such as delaying the audio signal to match the video delay. This method can be used when the video signal path is unchanging and where the delay can be measured and is generally known. Alternately, when frequently changing operational configurations occur resulting in a variety of video latencies, a fixed audio delay may offer a compromise solution.
- The audio delay is caused to track the video delay. In this case, the audio delay tracks the difference in the timing of the input and the output video signals across an item, such as a frame synchronizer or a standards converter. Several manufacturers offer video frame synchronizers and standards converters with slaved audio delay units.

Consider the problems associated with locking a timecode generator based on NTSC 59.94 interlaced fields per second to a 1920x1080 HDTV VTR operating at 60 interlaced fields per second.

Clearly, the first approach is inadequate. The other two require the installation of many audio delay units. Unfortunately, these methods only compensate for the locally introduced video latencies and cannot correct for video latencies existing in the incoming signal. When the incoming signals exhibit time-varying lip-sync problems operators may be assigned to manually adjust the audio delay. This is time consuming and costly.

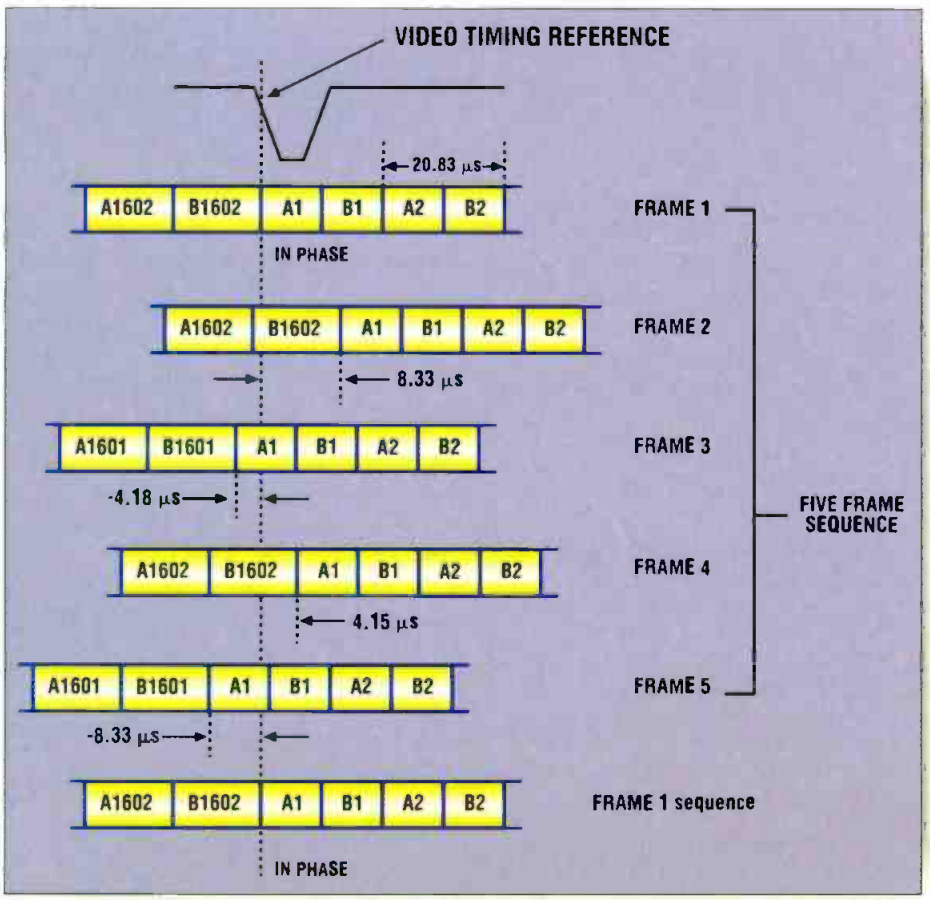

Figure 1. Using digital audio in a digital video studio requires that the audio and video sampling frequencies be synchronized to the same reference using the five-frame sequence shown above.

MPEG-2 and lip-sync problems

In the compressed digital world the amount of data transmitted to represent I, P and B pictures is variable depending on a large number of factors. The compressed digital television world lacks the concept of synchronism between display and transmission. To address this problem, MPEG-2 provides for the transmission of decoder timing reference information in

think conversion

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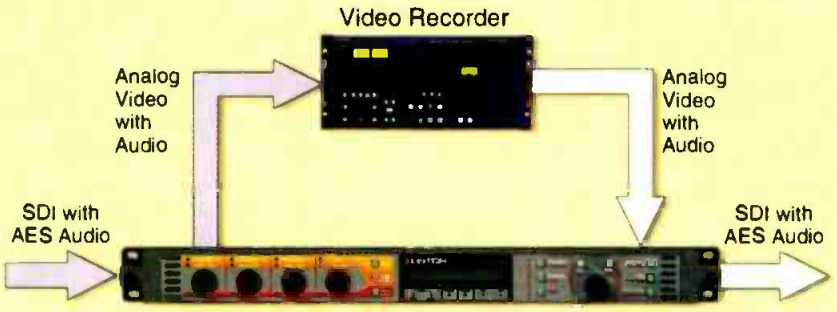

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the adaptation headers of selected packets. The system clock is 27MHz, samples of which are transmitted in the Program Clock Reference (PCR) field. The decoder audio and video sample clocks are derived from the system clock derived from the PCR.

MPEG-2 features a timing model that guarantees the accumulated delay from the MPEG-2 encoder to the MPEG-2 decoder is kept constant. The decoder can thus be designed to compensate for this delay. The contributing factors are:

- the encoding process (DCT, VLC, RLC);
- encoder buffering;
- multiplexing;
- transmission;
- demultiplexing;
- decoder buffering;
- the decoding process; and
- presentation.

DTV contributes to the lip-sync problem because early DTV implementations require numerous video format conversions. The various types of format conversions may not always be predictable. Among the various scenarios will be HDTV to SDTV and SDTV to HDTV conversions including a variety of aspect ratio conversions. As each of these conversions will generally require a frame memory, the resulting accumulated video latencies, if not eliminated or at least reduced, will prove to be unacceptable to the viewing public.

Additionally, the type of format conversion and the equipment used will vary from location to location. It is expected that network origination centers will use a limited and predictable number of format conversions and will thus be able to predict and control lip sync. The operational configurations and equipment used by network affiliates vary, so each location will have to apply specific means of lip-sync control. When you realize that a great deal of signal sources and destinations will still be analog for the foreseeable future, requiring a great number of ADCs and DACs, it is evident that DTV will increase the occurrence of lip-sync problems.

The DTV standards provide for the transmission of six audio channels (5.1). Current HDTV VTRs can handle only four discrete audio channels (two AES/EBU bitstreams). Handling six audio channels is quite a challenge. One possibility is to use compression to increase the carrying capability of one AES/EBU datastream. Another possibility is using a multichannel external digital audio tape recorder. This audio tape recorder will have to be slaved to the VTR using timecode. Consider the problems associated with locking a timecode generator based on NTSC 59.94 interlaced fields per second to a 1920x1080 HDTV VTR operating at 60 interlaced fields per second. It should be clear that it is quite impractical to operate a single teleproduction center simultaneously with 59.94 and 60 fields per second. Don't forget that we also have the choice of using the 1280x720 format featuring 60 progressive frames per second. Undoubtedly solutions will be found and this scenario will fade into oblivion. But, in the meantime, we will have to train our ear/brain mechanism to accept ever increasing lip-sync problems. ■

Michael Robin, former engineer with the Canadian Broadcasting Corporation 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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Bandwidth management

BY BRAD GILMER

Bandwidth management is a relatively new topic for many of us. Routing a VTR to a monitor does not involve a calculation to determine if the router has sufficient bandwidth to make the connection. This is because, in an existing television facility infrastructure, the router guarantees a full-bandwidth point-to-point connection between any two points in the system. However, computers and their associated networking architectures are finding their way into the broadcast production chain. (See Figure 1.) Many computer networks do not guarantee a full-bandwidth connection from one place to another. This can be a problem if these computers are in mission-critical applications. Managing bandwidth in critical computer networks is something that will become more familiar as computers become more entrenched in broadcast facilities.

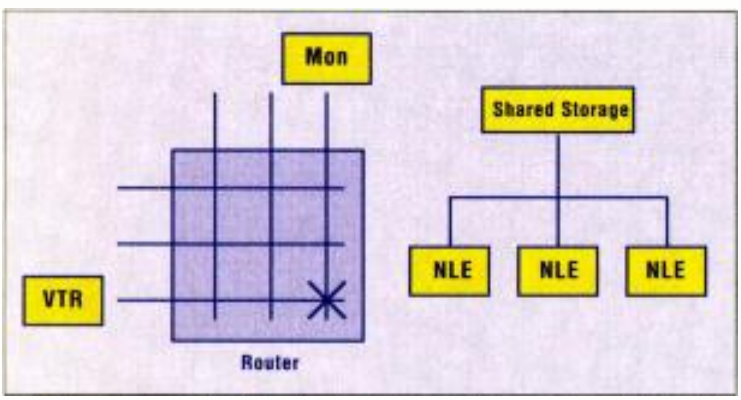

Figure 1. Routers provide dedicated point-to-point connections, while computer networks communicate using a common, bandwidth-limited network fabric.

This month, we will explore issues surrounding bandwidth management inside a single broadcast.

What's the problem?

Most broadcast content moves around facilities using analog or perhaps Serial Digital Interface (SDI) routers. However, some video and audio content in your facility probably travels on computer networks. As network speeds increase, it becomes more and more feasible to send content across these networks. One might wonder why someone would choose to move video across a network rather than using a conventional broadcast router. One answer is that when using a Non-Linear Editor (NLE) connected to central storage, the network connection becomes the obvious choice for moving content. Another common network application is moving content between servers in a large server-based play-to-air system. In these environments, it is easier and quicker to move content using the computer network. As these systems become more common, the consequences of a bandwidth-starved network become more serious.

Many computer networks do not guarantee a full-bandwidth connection from one place to another.

One way to head off this problem is to implement bandwidth management. Bandwidth management systems manage network bandwidth, avoiding network slow-downs and blocking. Bandwidth is allocated to applications as needed, if bandwidth is available. If bandwidth is not available, the application must wait. Various priority schemes are in place to allow a high-priority transfer to get the bandwidth it needs.

This sounds like a great solution. There is only one problem — while bandwidth management systems and protocols have been developed, these solutions have not been widely implemented. Proprietary systems are available, but they do not work well (or at all) in mixed-vendor environments.

Bandwidth management today

The most popular high-capacity networking architectures in use today for moving rich media content are ATM, Gigabit Ethernet, Fibre Channel and 1394 Firewire.

Ethernet: The most likely solution to bandwidth management in Ethernet systems is the Resource Reservation Protocol (RSVP). RSVP is a network-control protocol that enables applications to obtain special qualities of service (QoSs) for their data flows. RSVP allows an application to specify three different traffic types: delay sensitive, best effort and rate sensitive. A device requesting a streaming transfer across Ethernet would specify both rate-sensitive and delay-sensitive, since streaming video is disturbed by changes in rate and changes in delay along the transmission path. Once a rate-sensitive session has been established, the RSVP protocol will not grant a subsequent RSVP request that would cause the network to provide less than the required rate to existing rate-guaranteed sessions. While RSVP would appear to be a solution, implementation has been slow and availability of equipment implementing RSVP is limited.

Fibre Channel: Fibre Channel networks can be set up as either point-to-point connections or as a switched fabric. Bandwidth is not an issue in point-to-point applications as there are only two devices connected to the network. However, bandwidth management is an issue in switched fabric networks.

Fibre Channel has several classes or

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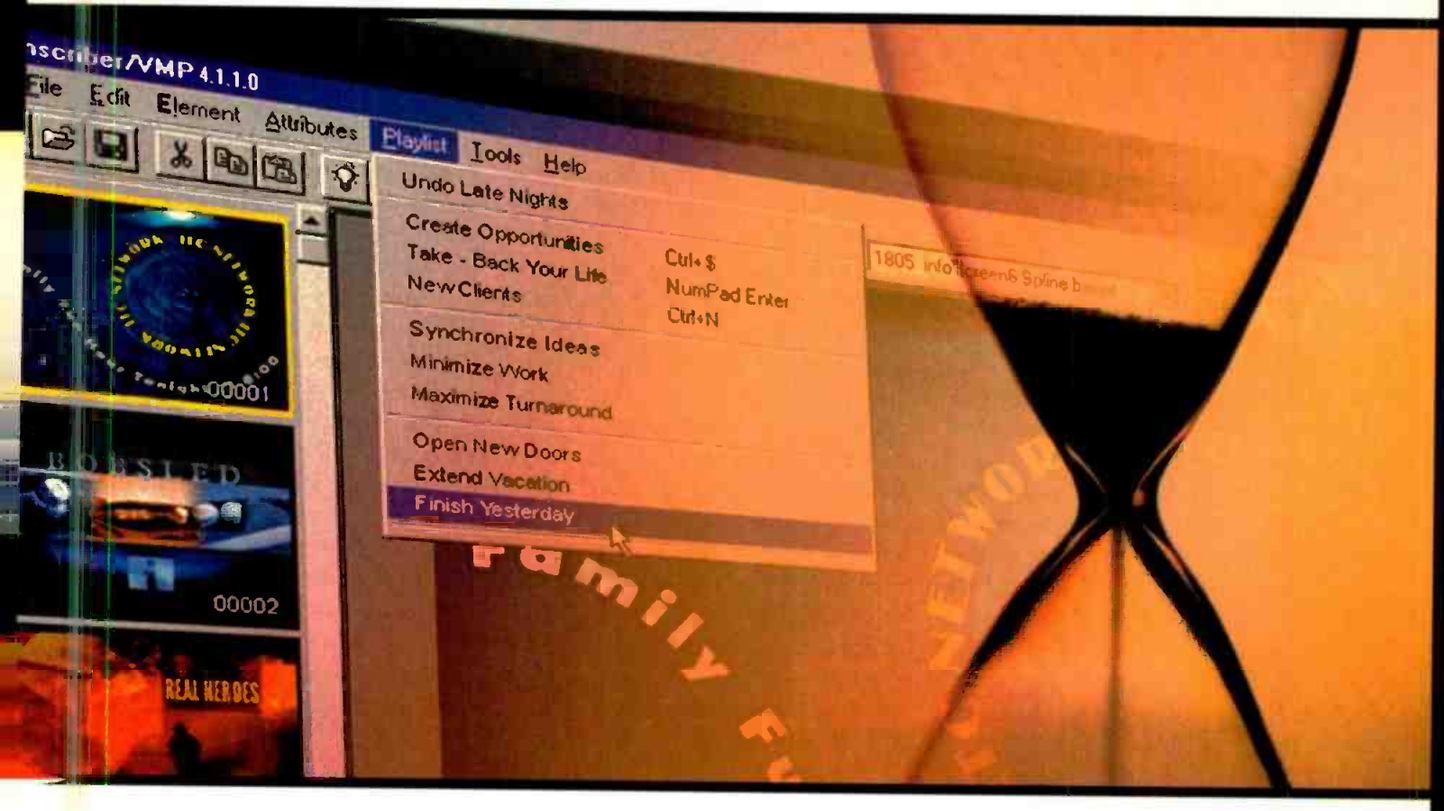

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operating modes. Class 1 is connection-oriented without acknowledgement, much like a router, offering a direct connection via a switch from one device to another. Unfortunately, Class 1 was not widely implemented. Class 2 is a connectionless service with acknowledgement, which is used primarily for tape devices. It is not generally used to move content between servers. Class 3 is connectionless without acknowledgement and is the most widely implemented version of Fibre Channel. In Class 3, a central switch customer requests a Constant Bit-rate (CBR) connection and the rate is successfully negotiated through the ATM switch or switches, then a guaranteed amount of bandwidth will be available.

Potential solutions

Given that there are issues with many network technologies discussed above, this leaves users with several choices:

1) roll their own bandwidth management system;

2) buy all of their network-connected devices from a single vendor who has not allow for interoperability in a multivendor environment, many of these systems have been developed to meet specific user needs. Frankly, standards organizations have been somewhat slow to address this area, and proprietary systems are a response to user demand before appropriate standards are in place.

A third way for the user to deal with bandwidth is to build a lot of overhead into the system and move on. This argument has its merits. First, high-speed hardware is becoming plentiful and

Ask Dr. Digital

Parts, parts, my kingdom for the right part

BY STEVE EPSTEIN

I enjoy reading your column each month. Often your advice has helped me find solutions and ideas for solving some of my own technical problems. In the past you have offered help locating a one-of-a-kind part — well, I need one.

I have a Zenith front projection television, Model 865P. These units are often seen hanging in auditoriums or sports bars. I also have a VCR with an S-VHS output. The Zenith projector has an RGB high-definition input, but to use it with S-VHS you need a Zenith S-43 S-VHS adapter. This optional module converts the S-VHS input to RGB and is added to the front of the projector above the three CRT guns on a seven-pin edge connector.

Zenith (now AON) no longer has any of these. I have also come up empty searching the Internet. Would you or your readers know of any parts depot or AV shop which might have one of these lying around?

Rick Garofalo
Staff Engineer
WGN TV

That one's going to be tough. It is likely that if someone has one, they already use it in their installation. I've done some searching, and haven't found anything other than another person's posts on the Internet looking for one. Maybe a BE reader has one lying around or knows where to find one.

Short of finding one, it might be easier to simply convert the S-VHS signal external to the projector and use the existing HD-RGB inputs. There are several boxes on the market that provide scan conversion from manufacturers such as Communications Specialties and Extron. If your projector can accept and lock to external scanning frequencies, you could take advantage of that and likely convert the S-VHS signal to any frequency the projector locks to.

I read your August 2000 column and can relate to the fact that there are still some 529s that haven't been modified. What I would like is a source for the CRTs used in the 528s and 529s. Tektronix no longer supports the product. The last one I bought from them five years ago was $500. (I tried rejuvenating one but it didn't work.) Does anyone know someone in China that we could send one to so they could duplicate the product?

Lou Johnson
WGCL-TV

I am not entirely sure those tubes could be duplicated without Tektronix's permission but, considering that they are no longer supporting the scopes, I would think it should be fairly easy to get the rights to manufacture them. Unfortunately, almost all CRT production worldwide has ceased, unless of course, it is for picture monitors. Tube manufacturing outside of picture monitor CRTs and high-power transmitting tubes is almost a thing of the past. As technology races ahead, it sometimes seems that the older equipment lasts longer than much of the new stuff. The faster things change, the more this problem grows, and it is one this column has touched on before.

Certainly no one would expect a manufacturer to continue to support products that are nearly 50 years old. However, if the products are still doing the job, maybe there is a niche for someone to step in and provide parts and support. This has happened with many of the classic automobiles that continue to operate. I am currently researching a problem concerning another manufacturer that is no longer supporting a product that is of a much more recent vintage. I hope to have that ready to publish in the next issue. If anyone reading this has any additional information regarding either of these older parts, or other pieces of broadcast hardware that are no longer being supported (the newer the better, as that is where the strongest case can be built), please send it to me at drdigital@compuserve.com. ■

Tube manufacturing outside of picture monitor CRTs and high-power transmitting tubes is almost a thing of the past.

Steve Epstein is a freelance broadcast consultant based in the Midwest.

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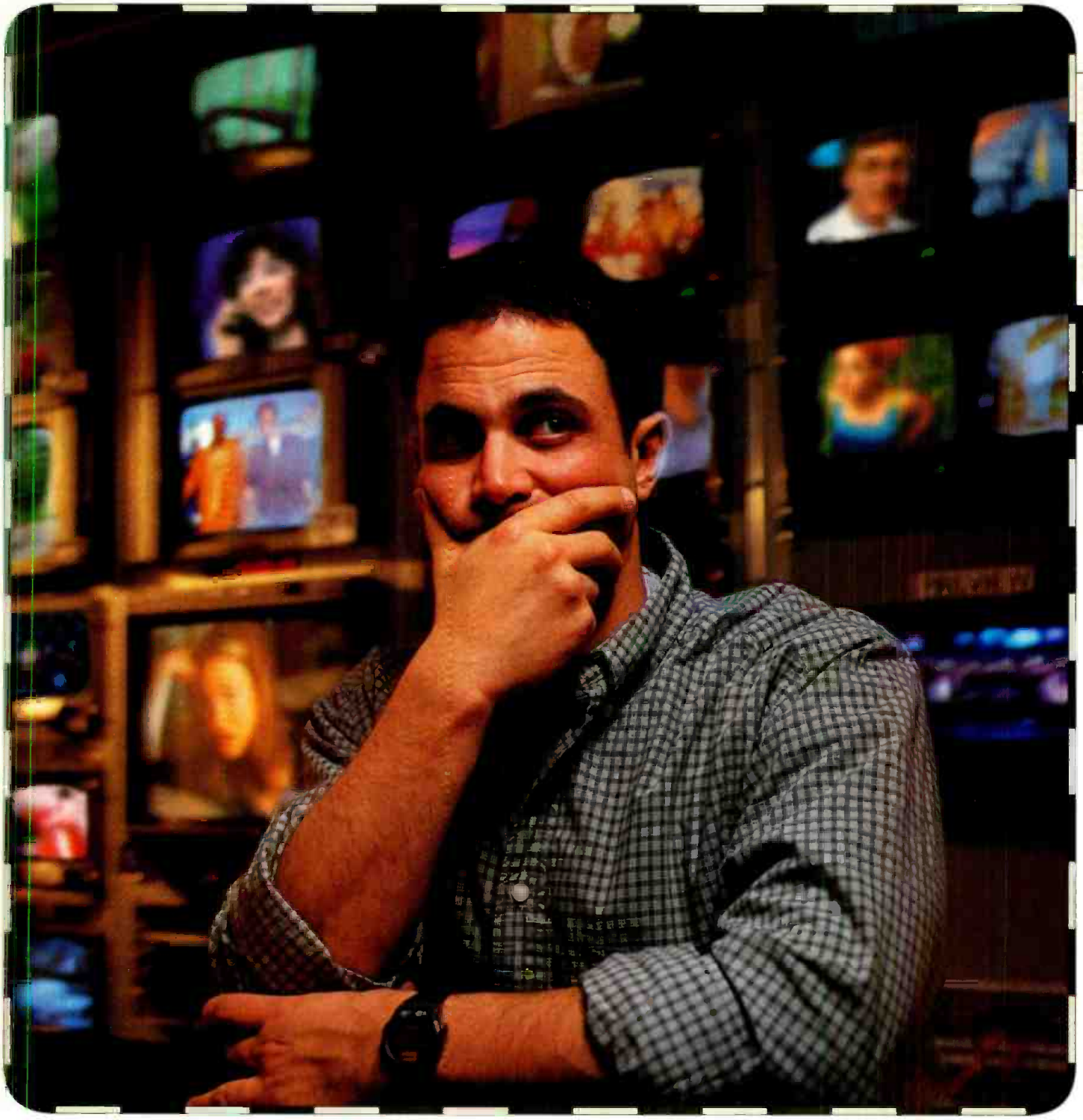

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SYSTEMS DESIGN SHOWCASE

XETV's live news and sports broadcasts are produced using integrated newsroom systems in the station's new San Diego facility, which houses the studio shown above, featuring five Hitachi SK-2700 digital cameras. The broadcasts are then transferred to master control in Tijuana.

XETV's Interoperable Newsroom System

By Stephen D. Rosen,
Gus Allmann and Bob Anderson

XETV, a Fox affiliate owned by Televisa, provides English-language programming to the San Diego market, with transmitter and master control in Tijuana, Mexico.

Fox network feeds have landing rights to be downlinked by satellite directly to Tijuana, but syndicated programming and commercials are bicycled across the border from San Diego. The live news and sports broadcasts are uplinked by satellite to Tijuana to be integrated with commercials in the master control.

A live newscast such as XETV's — with fast-paced graphics, animation and sound effects — can only be done with tightly integrated systems. That is exactly what XETV has installed in its new facility, a brand new building constructed on its San Diego property.

as a virtual edit suite by assigning any combination of machines, video, audio, machine control and TBC control to that room. With the Profile servers set to BVW-75 control protocols, as many as 10 available channels of Profile can also be utilized in this capacity if desired.

Three Profiles with DV codecs are used — one for play-to-air of the finished news pieces, and another as a news edit and ingest Profile and as a mirrored backup of the first. Both of these have DVCPRO50 codecs and nine hours of recording storage. Another Profile, with a DVCPRO25 codec, is used to record satellite, microwave, fiber and off-air feeds on a 12-hour continuous loop. Before it reaches the end, the material is transferred to the editing system or moved to tape, depending on the material.

Manual Profile control is handled by a VDR remote control panel located with each Profile in the central equipment room and in News TOC.

The TOCs manage incoming and outgoing feeds from the facility. News TOC handles incoming feeds from ENG microwave, off-air, off-satellite, fiber and network. Sports TOC manages the sports feeds, while Operations TOC manages syndicated programs and incoming commercials.

Production Control Rooms A, B and C on the third floor are used for promotion/production and graphics and were relocated, expanded and re-integrated from XETV's other facility. All of these can share resources from each other and the rest of the plant.

Additionally, the station was future-proofed, allowing for expansion without additions to the core infrastructure.

Integrated newsroom workflow

The second floor newsroom contains eight pods, each with four journalists' workstations. Additional iNEWS computers are located at the assignment desk, sports and weather offices, and in the news director's office. Adjacent to the newsroom, edit suites employing NewsCutter editing systems are used for news and sports.

The station's ENG trucks use Panasonic DVCPRO50 ENG camcorders for field acquisition. When feeds are microwaved to the station, they are received in the News TOC and recorded onto the newsfeed Profile or DVCPRO50 and transferred to NewsCutter if needed. Feeds can of course be taken live as well.

In addition, San Diego is heavily wired for fiber optics, allowing feeds to be sent to the station via fiber. ProChannel and cell phones provide IFB communications from the newsroom to the ENG trucks.

Tapes brought back to the station can be inserted directly into storage for editing or into the news edit Profile for low-res browse and then to storage. Voice-overs are usually done right in the edit rooms.

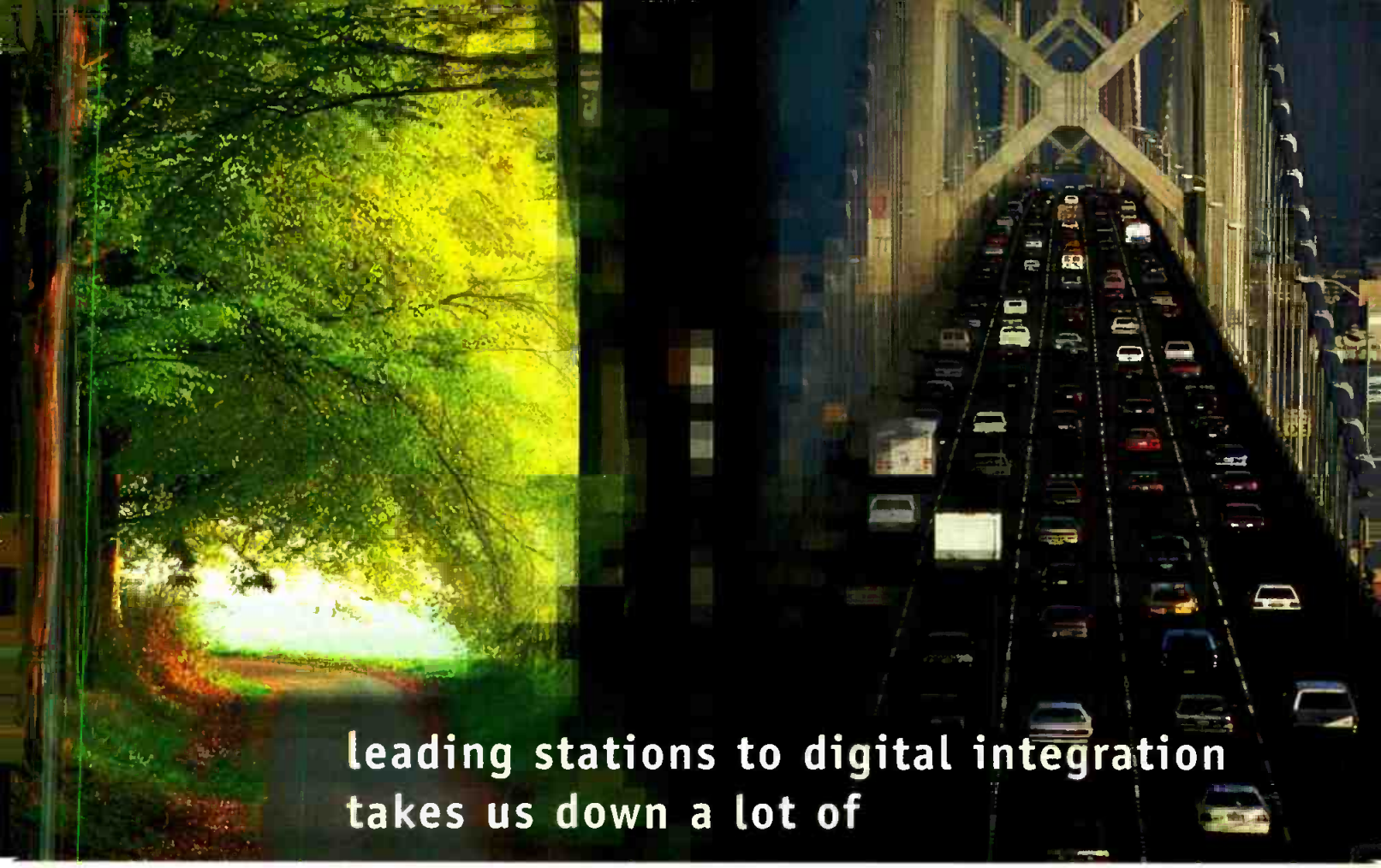
After a story is edited, the DV file is pushed to the play-to-air Profile via copper and optical Fibre Channel. At the same time, the clip name created in the editing system is carried through to the Profile and to the automation system, where it is available to be entered into and controlled by the show rundown.

The audio control room features a Wheatstone TV-80 analog audio console with over 350 inputs available to 22 mono channels and 10 stereo channels.

Meanwhile, in the newsroom, the journalists write their stories on PC workstations running Windows NT, all connected via LAN to the news server, a Compaq Unix server and the automation server.

During the newscast, BCS is used to control the playback of the play-to-air Profile clips and maintains a dynamic link with the news rundown. If there are any changes in the rundown (including story deletions), the clips are automatically re-ordered.

While BCS can be used to control the Profiles to actually roll the clips, XETV employs a clip operator for that purpose. The clip



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operator works in the News TOC and can use a remoted Profile VDR control panel there to manually call up and play clips if needed. Three channels are used from the play-to-air Profile and two from the mirrored Profile.

The system also controls one channel of the character generator and is controlled by the CG operator. In the future, it will control the still store using MOS protocol.

room, where commercials are inserted. During the news, XETV uses the intercom to make an international telephone call between the news control room and master control room to coordinate commercial insertion. The ENG/SNG truck is being used for the satellite uplink until other arrangements can be completed.

Expansion plans

The functionality of the iNEWS system will be expanded with the addition of Media Browse 2000 and new NewsCutter software later this year.

San Diego is heavily wired for fiber optics, allowing feeds to be sent to the station via fiber.

The Sunday Sports Show uses the same setup as news. The sports rundown and associated playlist are loaded during a 90-second break after news, facilitating a seamless transition into the sports show.

The live newscast is uplinked by satellite to the Tijuana master control

This will allow the journalists' workstations to function as cuts-only editing stations for simultaneous browsing of incoming feeds, raw footage and field coverage in real time. An upcoming Media Browse release will allow XETV to stream edited news packages to the Web.

The central equipment room at XETV houses a Venus routing switcher which routes parallel video paths as one to allow easy transion between analog and digital in XETV's operations.

The success of the integration of XETV's newsroom systems has allowed the station to expand its news offerings. Additionally, the station was future-proofed, allowing for expansion without additions to the core infrastructure.

Although most of XETV's news staff have had no previous experience with server-based newsroom and nonlinear editing systems, their creativity and the flexibility of the overall systems and design enabled them to quickly start pushing the system capabilities.

The system's flexibility and interoperability continues to result in the creation of exciting and unique newscasts. ■

Stephen D. Rosen is president, and Gus Allmann is executive vice president of TV Magic, Inc. Bob Anderson is operations manager of XETV.

Project team and equipment list

Barbrow, Thomas and Associates (BTA), Architects

BYCOR, Building Contractor

TV Magic, Inc., Systems Integrator and Project Management

Stephen D. Rosen, President/CEO and Project Manager

Gus Allmann, Executive Vice President and Director of Engineering and Design and Project Engineer

Major Systems/Equipment

iNEWS NRCS

Compaq newsroom servers

iNEWS BCS

4 Avid NewsCutter editing systems

Philips Venus router

5 Hitachi SK-2700 cameras

Philips DD35 news production switcher

Pinnacle DV Extreme DVE

Pinnacle Lightning still store

Pinnacle FX Deko CG

3 Profile video servers

9 Panasonic AJ-D950 VTRs

Sony BVE-2000 edit controller

Sony BVM series digital monitors

ENG

Panasonic AJ-D910WA camcorders and AJ-LT85 laptop editors

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SYSTEMS DESIGN SHOWCASE

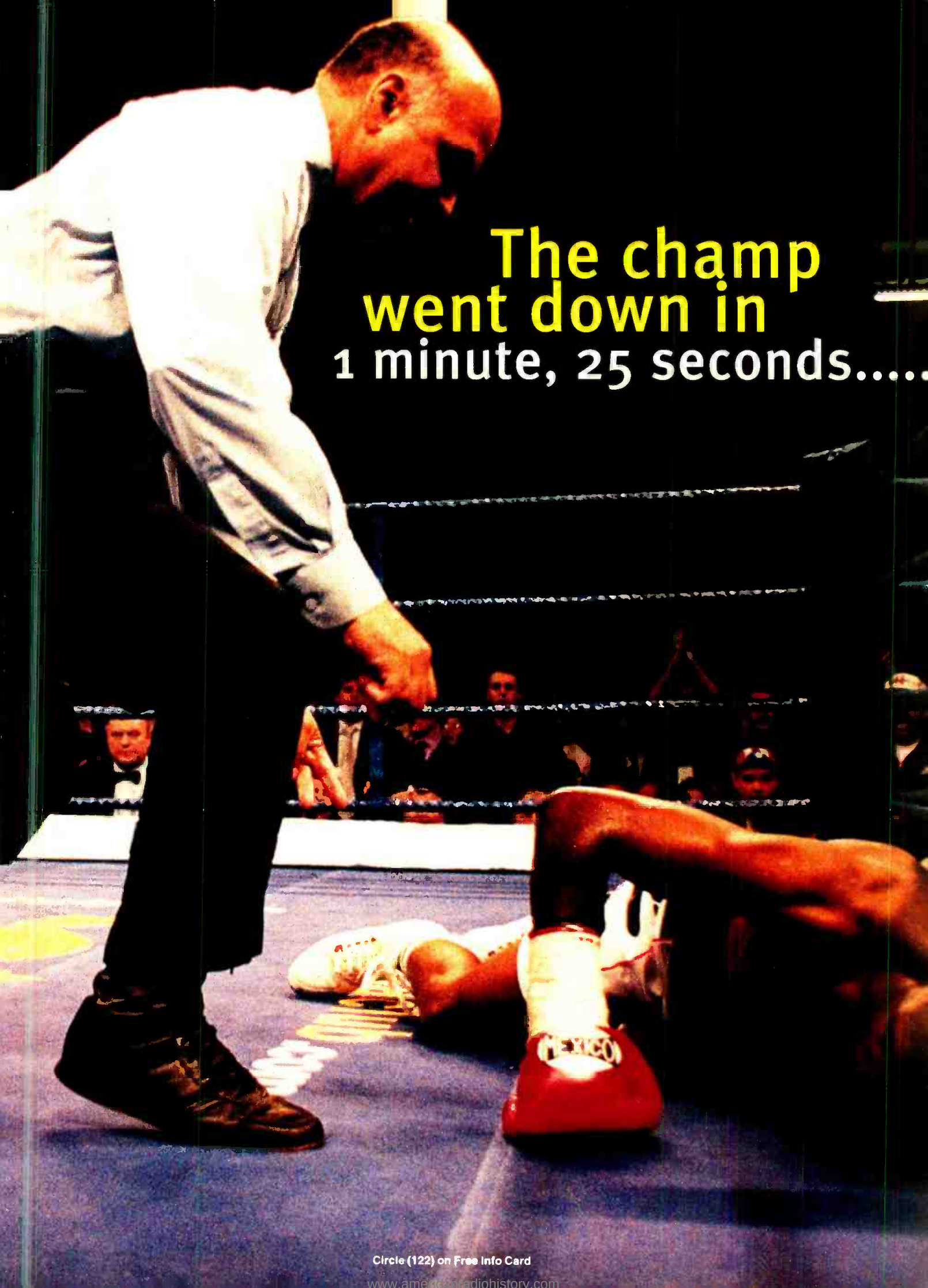
ACKERLY GROUP'S CENTRALIZED TECHNOLOGY

BY MARK SIEGEL

A few years ago, Digital System Technology (DST), developed its "Station In a Box" methodology, which defined a consolidated, multi-channel, automation-based content delivery system. Soon after, DST presented this concept to the Ackerley Group, a broadcast group that operates 17 television stations in California, Oregon, Washington, Alaska and New York. Interested in the concept from the start, the Ackerley Group adopted some of DST's philosophies in this area and added its own angle: regional broadcasting that would link any number of stations to one central server through what they branded "Digital CentralCasting."

KCBA-TV, a Fox affiliate, recently went online as an Ackerley CentralCasting station, feeding programming to Ackerley Group stations in Northern California and Oregon.

This strategy, first deployed at Ackerley's New York Station Group hub WIXT-TV in Syracuse, NY, and then Central



ACKERLY GROUP'S CENTRALIZED TECHNOLOGY

California Station Group hub KGET-TV in Bakersfield, CA, was more recently implemented in the master control room at KCBA-TV and KION-TV in Salinas, CA. Both stations are housed at one facility in Salinas, which utilizes a central server for Ackerley's North Coast Regional Station Group. This group of stations includes KVIQ-TV, Eureka, CA; KMTR-TV, Eugene, OR; and KFTY-TV, Santa Rosa, CA. While KION-TV's master control room houses a Digital CentralCasting server, its program material is controlled through the CentralCasting hub in Bakersfield.

DST completed the integration within KCBA and KION in November 1999. While the building itself is not new, the broadcast capabilities are vastly different in comparison to its previous broadcast environment. To confirm the system would work, DST integrated and tested the system in its Irwindale, CA, headquarters prior to delivery.

The biggest technical challenge of installing the new Digital CentralCasting system, which involves switching from analog to digital master control, was keeping the on-air integrity of the existing manual analog master control online with the traditional cart machine and VTR delivery system during the integration of the system. One of the benefits of the system is the small footprint needed in relation to a traditional system. Only one-fifth of the space of the existing analog master control operations is needed to operate a single Digital CentralCasting channel.

Once installation was complete, the regional stations were gradually added to the central server, officially called Ackerley's CentralServer+. With the system in place, the Ackerley Group can feed an expanding number of television stations in any given region from the central server.

Because of the open architecture of the server, expansion is simply a matter of adding more encoders, decoders and additional storage to the system's automation package. Expansion at a gradual pace is important because, as with any

Only one-fifth of the space of the existing analog master control operations is needed to operate a single Digital CentralCasting channel.

KCBA utilizes Sundance Digital automation, DPS A/D converters and a SeaChange Broadcast MediaCluster for short-form programming.

.....Unfortunately, the signal went down in 1 minute, 23.

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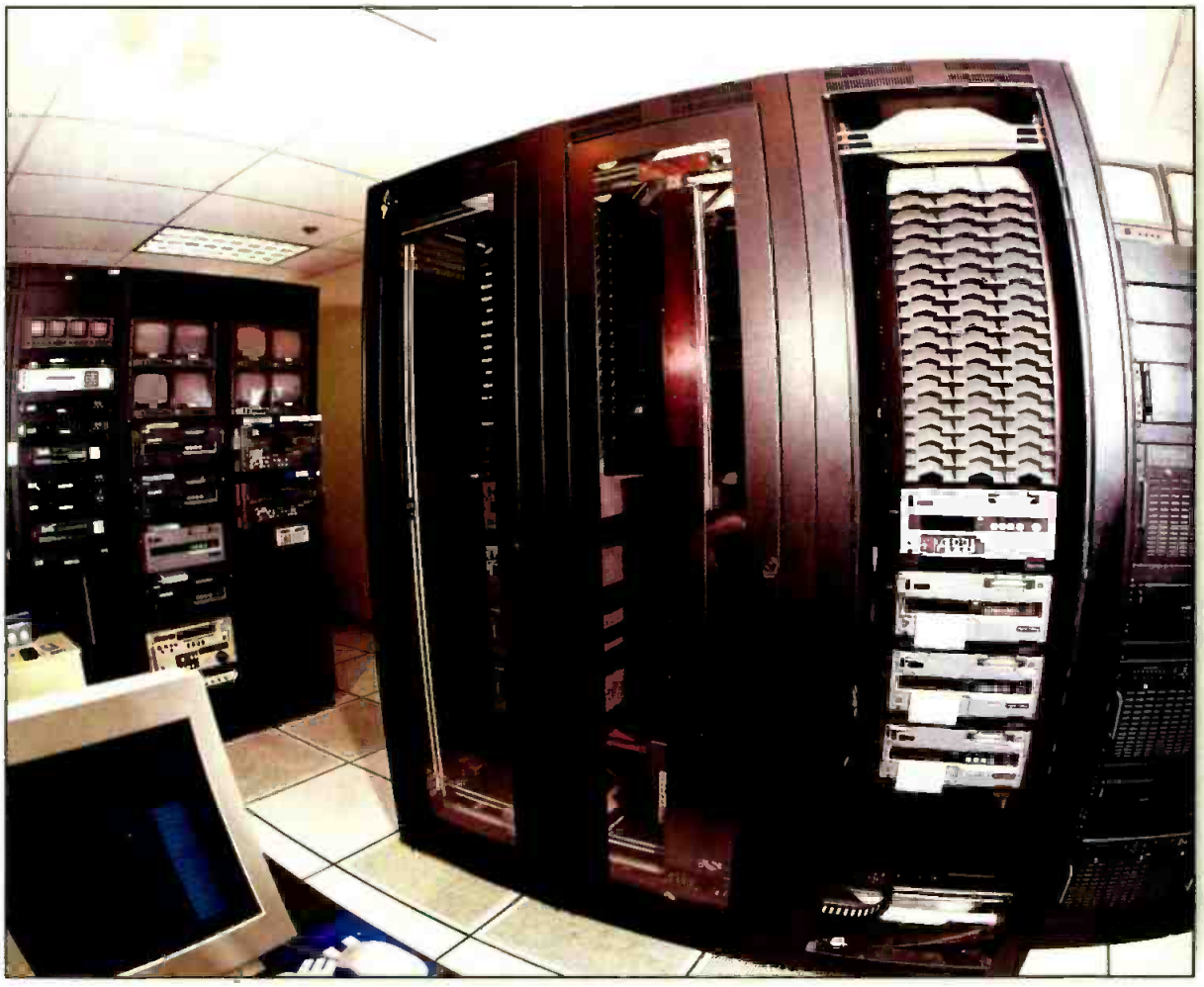
ACKERLY GROUP'S CENTRALIZED TECHNOLOGY

new technology, unexpected challenges arise and solutions must be provided. As with most hardware expansions, the corresponding software must also be upgraded to accommodate the additional channels.

As part of our turnkey services, DST also provided Ackerley with all the necessary equipment for the Salinas, Syracuse and Bakersfield facilities. These complete turnkey solutions, which included equipment selected by the Ackerley Group through discussions with DST, were chosen due to cost effectiveness and interoperability. While the final call for equipment rested within the Ackerley Group, it was our job to help guide them to what we believed would best meet their application needs.

Ackerley uses a SeaChange Broadcast MediaCluster MPEG-2 digital video server, chosen for its ability to store 130 hours of digital video with digitally embedded audio and record and store all short-form programming for all Regional Station Group facilities. A Tilt Rac V-300 Video Library Manager records and stores all long-form and archived programming for Regional Station Group facilities. An SDV 64x64 digital router provides I/O routing of digital video and audio signals from the central server to all Regional Station Group stations. Sundance Digital automation, considered the "brains" of the system, allows for automated or manual control of any or all stations within a Regional Station Group and imports traffic, billing and scheduling information into the system via its VCI traffic software. DPS A/D converters convert analog material to digital video and embedded audio for storage, eventually to be used for playback within the system.

After evaluating a number of competitive products in all product areas, this turnkey solution was considered the best all-around choice for the Ackerley Group's needs. Beyond the equipment installation, we provided the system's connectivity. At the Salinas facility (as well as within the Syracuse and Bakersfield facilities), all commercial and local insertion, as well as network programming are delivered to the regional stations via Digital CentralCasting through fiber. KCBA in Salinas is unique because it is extremely accessible to local fiber, which allows for a



Ackerly's CentralCasting employs a TiltRac V-300 Video Library Manager for its long form and archived program for its regional stations.

> Because of the open architecture of the server, expansion is simply a matter of adding more encoders, decoders and additional storage to the system's automation package.

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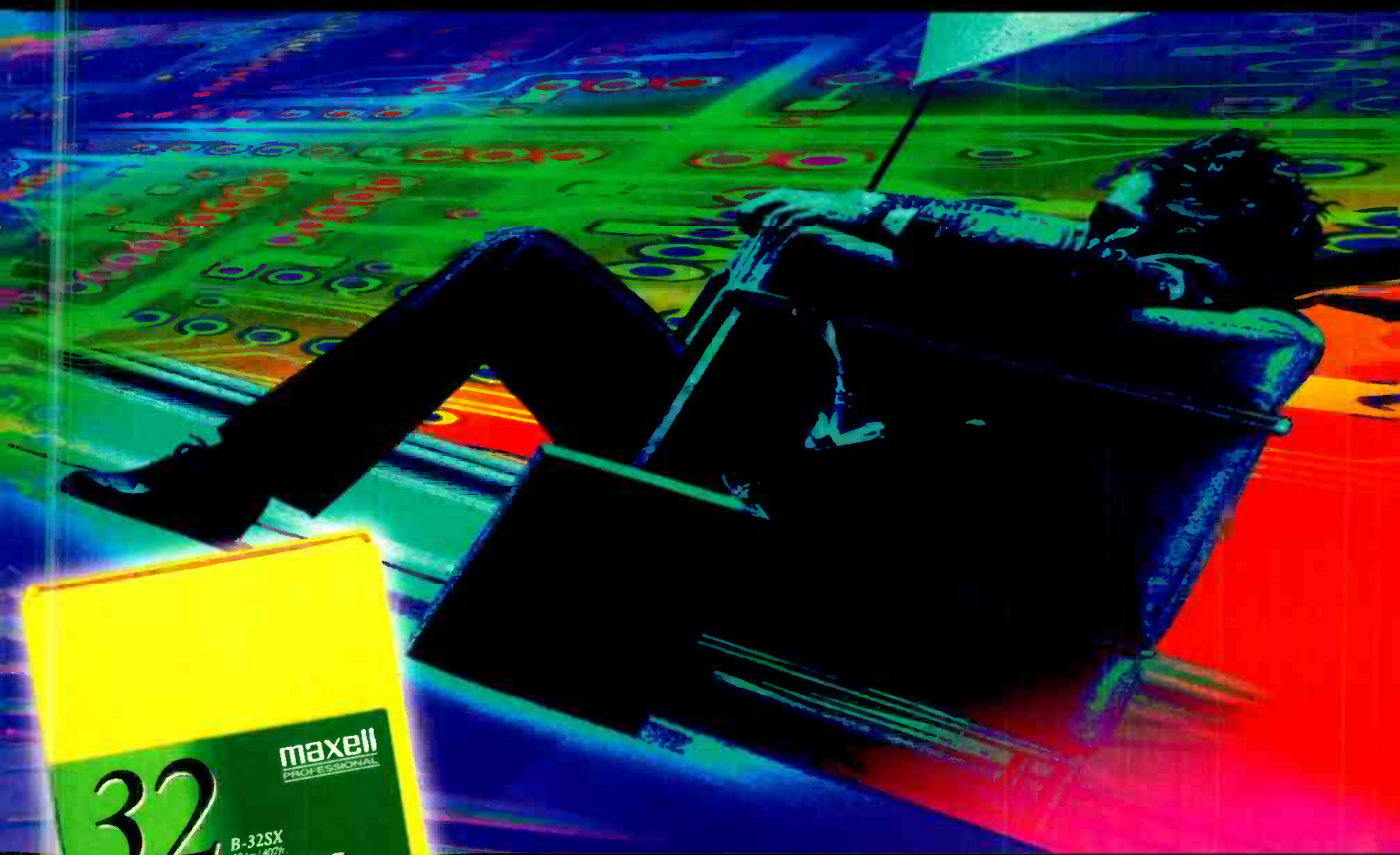

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ACKERLY GROUP'S CENTRALIZED TECHNOLOGY

wide range of connectivity solutions. Because the most expensive part of using fiber can be the cost of the last mile, KCBA is one step ahead with its proximity to an abundance of fiber, therefore further reducing overall costs.

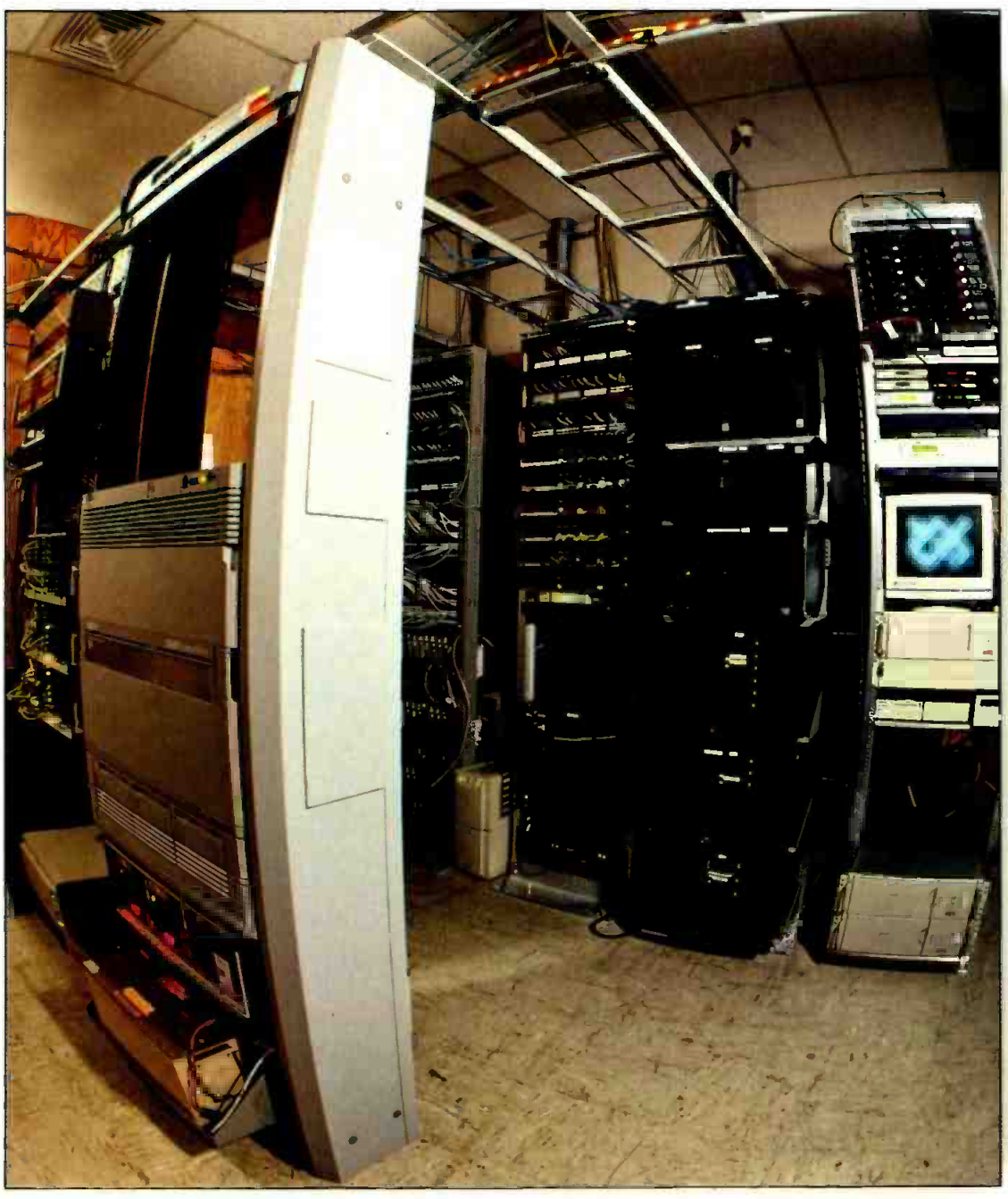
The fiber optic link transports all digital programming material from the Salinas hub at KCBA to each of the stations in its Regional Station Group for airing, also integrating bi-directional video, audio, transmitter telemetry, monitoring, data networking and sales reporting. The news departments at each station in the Regional Station Group can cross-feed news material.

Connectivity issues caused a few snags when Digital CentralCasting was officially launched at KCBA. The company providing the fiber hook-up was not used to dealing with broadcasters and didn't quite have everything set up as needed. This raised some issues, mostly in the area of redundancy. In the event a backhoe accidentally dug up some of the fiber, what contingency plans were in place? Issues such as these necessitated further education from the Ackerley Group and DST to the company providing the fiber connection.

One of the jobs of the systems integrator is to be the customer's advocate and make sure the equipment is designed specifically to meet the needs of the facility. Some of the products designed for the Salinas facility needed to be customized. DST worked closely with the manufacturers to perform the necessary changes. Full diagnostics are remotely controlled, with everything IP addressable, providing easy access into the server, automation system and archival units.

Of course, the biggest challenge isn't always technical. While integrating an automation system into a previously non-automated master control room is a very large task, it is even more of a challenge to alter the mindset of the people within the organization from a non-automated environment to an automated environment. DST, along with Point B, a solutions group that serves as a consulting firm to assist clients in closing projects, worked with the Ackerley Group in implementing the workflow at KCBA, as well as WIXT in Syracuse and KGET in Bakersfield.

By designing the Salinas facility to handle Digital CentralCasting through a central server, the Ackerley Group has essentially eliminated master control at all North Coast regional television stations. Through KCBA, the Ackerley Group delivers digital programming to six television stations for the price of slightly more than one complete digital system, thereby reducing costs across the spectrum. ■



KCBA uses fiber optic links to transport digital programming to its regional group stations.

Mark Siegel is vice president for DST, Washington.

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The MPEG-2 engine for Digital CentralCasting: SeaChange Broadcast MediaCluster

BY JOHN PITTAS

A key enabler of Ackerley's Digital CentralCasting strategy is SeaChange's Broadcast MediaCluster multichannel MPEG-2 server system. A third-generation video server architecture, Broadcast MediaCluster combines multiple Windows NT-based video servers, or 'nodes,' into one 'virtual' server, enabling Ackerley to gain significant new efficiencies in the management of its video assets.

Introduced in 1998, the Broadcast MediaCluster eliminates the replication and caching of media files between multiple machines to achieve fault-resiliency and multichannel I/O.

As a network of directly connected nodes requiring only a single file copy of any asset to serve multiple streams, the Broadcast MediaCluster acts as one computer. But unlike a single large computer, the MediaCluster nodes can fail independently, thereby increasing fault resilience. With its ability to scale in both storage and I/O capacity, it allows many channels to be recorded or played from one machine.

With up to 12 disk drives in each server node, a seven-node Broadcast MediaCluster can store more than 4.2TB of video. It supports up to 42 I/Os each delivering 30Mb/s MPEG-2 4:2:2 long-GOP video, with two 24-bit uncompressed AES audio channels. Or, alternatively, it can deliver 28 I/Os at 50Mb/s MPEG-2 4:2:2 I-Frame video, with each output providing four 24-bit uncompressed AES audio channels.

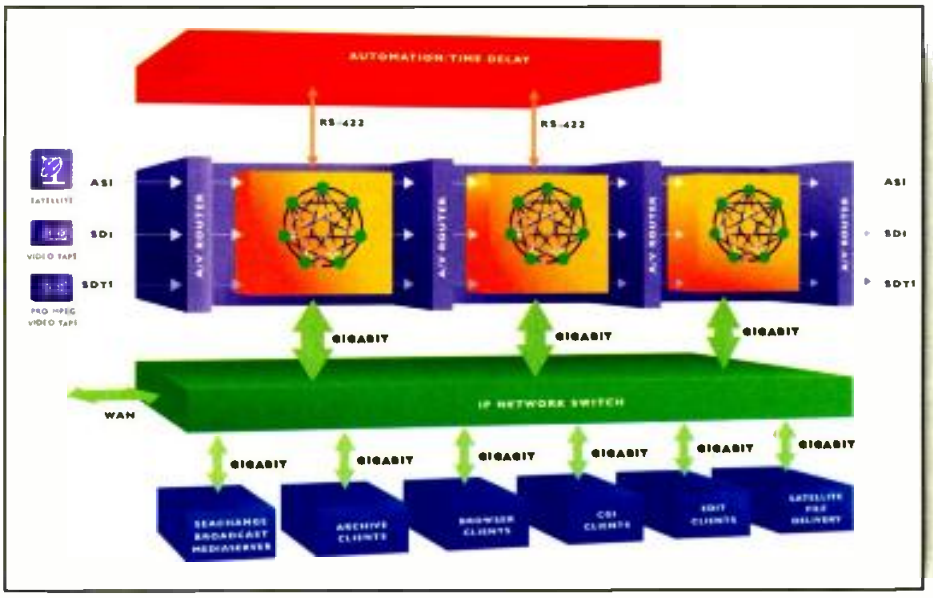
SeaChange's MediaCluster architecture provides access to videos as data objects in the same way a file server provides files to network clients. Because MediaCluster members manage their own file systems and export access only to the data objects, each MediaCluster member can read, write and delete files from its local RAID-5-based file system without disrupting other servers in the cluster. Furthermore, data objects are fragmented and written to all members of the cluster using well known RAID-5 striping and parity techniques. This ability to perform 2D RAID-5 striping, first across the disks within each server and second across the servers within the cluster is referred to as RAID². A number of beneficial properties result from the MediaCluster architecture, principally load-balancing, single-file copy, linear scaling of both storage capacity and I/O bandwidth and fault-resiliency, among many others.

The core feature of the MediaCluster is the unique level of fault resilience. Data is striped across all nodes in the cluster. In addition, the system generates parity blocks. Think of parity blocks as the total sum of all the data in a stripe (normally one rotation around the cluster). If a block of real data is lost, the parity data is used to regenerate the lost data by calculating the partial sum all of the other data and subtracting the partial sum from the total sum (the parity data). An exclusive-or (XOR) function is used for this purpose. This technique is done in real time so that it does not appear that any data (or node or link) was lost.

MediaCluster storage and service bandwidth capacity can be scaled while the system is operational, that is, recording and playing media streams. Storage capacity can be added by adding disks to each node's chassis, adding additional expansion chassis to nodes, or by adding additional nodes to a MediaCluster. Bandwidth can be increased by adding nodes to a MediaCluster. As each new node is added, any media content in the cluster is striped onto the newly added node.

Broadcasting gets networked

For broadcast facilities that have very large storage or I/O channel requirements, one or many Broadcast MediaClusters and other critical broadcast components such as off-line data tape archives, nonlinear editors or Web browsers can be networked together using the high-performance LAN-based Networked Storage Architecture model (shown here). This places the broadcast plant of the future squarely in the realm of a data storage and network facility based on open standards and commodity-based solutions.



SeaChange's Networked Storage Architecture.

The Broadcast MediaCluster, coupled with the Networked Storage Architecture, radically reduces the capital cost for a multichannel video server. The combination is so effective that the channel/expense ratio becomes inverted. That is, instead of many operators required to operate a single channel, a single operator can now originate many channels. ■

John Pittas is vice president of broadcast products for SeaChange International

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SYSTEM DESIGN SHOWCASE

Sveriges Television's networked media servers

By C. Jason Mancebo

When Sweden's Sveriges Television (SVT) launched SVT24, the first 24-hour news service in Sweden, it needed a fast, efficient and cost-effective distribution and contribution system to interconnect its diverse regions throughout the country with its headquarters in Stockholm.

SVT24 is required by its charter to broadcast over half of its news content from outside of Stockholm, from regions as far away as beyond the Arctic Circle. Using its existing microwave links as the primary means of distribution would be cost-prohibitive for a 24-hour service, as SVT24 would be charged for each transmission. Also, there was not enough capacity in the microwave network for the needed 10 feeds at once.

SVT looked for other options and chose the innovative approach of installing 15 SGI Media Server systems for production and broadcast in Stockholm and the remote regions and connecting them over a computer network that comprises local area networks (LANs) linked with an E-3 34Mb/s microwave wide area network (WAN).

This solution, which has resulted savings of both time and money, allows news stories and programs to be transferred as DVCPRO25 .dif data files at 95 percent to 105 percent real time, and offers low-resolution browse streaming and server control.

Browsing clips from across the nation utilizing networked broadcast Media Servers from SGI, SVT producers fulfill their legal mandate of news from outside the greater Stockholm area.

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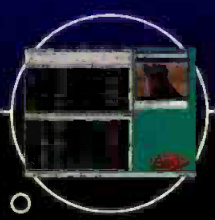

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Sveriges Television's networked media servers

Design goals

The programming on SVT24 consists mainly of rebroadcasts of regional newscasts, a newswheel of news clips and some live inserts. Since speed is important in the news business, SVT required a fast and reliable means of getting news stories from its nine regions and the local Stockholm region to SVT24. The ability to share media files over a standard IP WAN was crucial.

This led to the requirement for the video servers to be open-platform and standards-based and work both as computers connected to a high-speed network transferring DVCPRO25 .dif files and as professional video machines with SDI serial digital video and AES/EBU digital audio inputs and outputs. SVT chose the SGI Media Server for production and broadcast to fit this bill.

In building the all-digital facility, SVT24 also wanted to test new and innovative technologies that could be used for future digital facilities; fashion new professional roles such as media manager, media journalist and on-air producer; and create a new service for the public.

Facility

The facility to house SVT24 and the Stockholm regional digital channel was built from scratch by Sony in an existing office building in Stockholm. This was actually phase one of a greater plan to convert all of SVT's news facilities to digital and to house them under one roof in the year 2001.

The facility includes a studio that also serves as the newsroom, a control room with combined production and master control capabilities, edit suites, a machine equipment room, and a media management room.

> Using its existing microwave links as the primary means of distribution would be cost-prohibitive for a 24-hour service.

The single control room contains two video switchers. A Sony DVS-7250 production switcher with DME7000 and a Sony DMX-B4000 digital audio mixer are used for traditional news productions.

At most other times of the day, a Sony DVS-M1000 master control audio follow video switcher with DME3000 handles production, especially when airing the regional news rebroadcasts or the daytime newswheel.

The studio uses four Sony BVP-550 cameras.

iNEWS (formerly Avstar) journalists' workstations are used for researching and writing news stories, story approvals, and creation of show rundowns.

There is currently one SGI Media Server for production and broadcast in the Stockholm facility to receive .dif media files via the E-3 WAN from the regional facilities and play them to air.

Two channels of this server are used for air product, and one channel is dedicated to the media management room. The media manager can record and play back to the server, controlling it from a standard PC with Media Control Panel software.

Edit suites include seven existing Macintosh OS-based Avid NewsCutter nonlinear editors tied into an Avid Media Server residing on an SGI Origin 2000 server and 16 Beta SP tape-to-tape edit suites.

Three Media Recorder clients and three Airplay clients also use material from the Avid media server. Currently, two of the Airplay channels are used to play edited clips to air. The third Airplay feeds the SGI Media Server (via serial digital video) that is used as the backup play-to-air server. SVT expects to use the SGI server as the main playout server in the future.

The server is also used to transfer .dif files to a robotic data tape archive system — a Tape Storage 3494 using 3590 Model E tape drives and IBM RS/6000 UNIX server with 6000 hours of .dif file storage. Individual clip material from all of the regions plus SVT24 is stored in the archive.

SVT24 currently uses two low-resolution proxy browse systems. One is located in the city of Växjö where a production and broadcast server under special software control checks the other high-resolution servers on the network to see if any new material has been added. If so, it automatically

SVT uses SGI Media Servers like the one shown above to transfer news stories as DVCPRO25 .dif files between their headquarters in Stockholm and regional facilities. The systems are linked with an E-3 34Mb/s microwave WAN.

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transfers those files via the E-3 WAN and then feeds one channel of its SDI digital video and audio outputs to a Minerva VNP MPEG-1 (1.5Mb/s) encoder to create the low-resolution proxy. This, along with metadata, is stored on a server for broadband with Kasenna MediaBase. Any PC or workstation on the local or wide area network can search and retrieve low-resolution clips. The second browse system, an IBM cache disk for a tape library file server located in SVT24, is used only for finished stories on the Avid server.

The network is the key

Making all this connectivity and productivity possible is the network backbone.

To handle the increased traffic from the server systems on its existing microwave WAN, SVT upgraded it from 2Mb/s to a 34Mb/s E-3 TCP/IP Fast Ethernet 100BaseT network provided by Teracom. SVT connects its various LANs to the WAN by Teracom-delivered Cisco routers.

This network is used not only for handling the broadcast and production needs of SVT, but also for its entire enterprise system, including accounting, payroll and e-mail.

format unless it needs to be viewed.

This has many benefits. In SVT24's case, it was able to significantly reduce its contribution costs with the use of the data network. Expensive video/audio microwave and satellite links are now used only occasionally and when necessary (e.g., for a remote guest in a live show). In addition, the quality of the signal is improved because it doesn't need to be decoded and re-encoded and modulated and demodulated.

Hawrys custom automation software serves the regions and SVT24.

The regional servers are configured for two inputs and two outputs with at least two hours of video, with some of the regions upgrading to more. The five local office servers have one input and one output and four hours of storage. In the SVT24 facilities, the server is set for four inputs and four outputs and 24 hours of storage.

SVT also uses a standard Linux ftp server as an Internet gateway for contributions outside of Sweden. This was tested together with other broadcasters such as CNN and TV2 Norway. SVT was then able to share .dif files over the Internet — not in real time but at an acceptable speed.

> The ability to share media files over a standard IP WAN was crucial.

The rest of the district contribution system (DKS), which became operational in the summer of 1999, consists of an SGI server for production and broadcast in SVT24 in Stockholm, each of 10 regions (including the Stockholm region) and five local offices.

The systems used for SVT24 use DVCPRO25 compression and create a .dif file that remains in the data

Automation and control software

SVT developed its own automation software, called Hawrys, which is used in the regions and SVT24. Hawrys reads rundowns, looks for production marks and presents the list to the on-air producer, who uses it to select and play clips from the servers. Hawrys communicates to the servers via open telnet-based multi-unit video control protocol (MCVP).

The on-air producer is one of the new roles created for SVT24 to select clips to be played and operate the video switcher. Editing and scheduling becomes a simple process with Hawrys. The numerous files received for a newscast can be edited or reordered as necessary and broadcast immediately.

Hawrys is also used to start the countdown clock with "final word" prompting, obtain timings from the rundown, activate the subtitling system if needed and send metadata to the tape archive notifying it that a clip has aired. It also controls the Chyron Maxine CG, Inscriber, a Quantel still store, the Avid Airplay and Tektronix 10x1 switchers.

SVT's automation system is as automatic as possible to allow their small staff to work efficiently and to manage operating expenses. To that end, Hawrys automatically archives a clip after it has been played out and controls the creation of the browse copies.

SVT uses other self-developed software to create HTML Web pages that allow access to the low-resolution server. The moment an edited piece from a region is stored on its local server, a browse copy is made, allowing viewers in other regions or in Stockholm to view it. This allows the journalists and producers to concentrate on the content and not worry about how they will get the video feeds.

Users can utilize the Web pages to search for clips using key words, retrieve low-resolution clips streamed from the browse server, and select and transfer desired high-resolution clips from any server or tape archive on the network. The software also allows the

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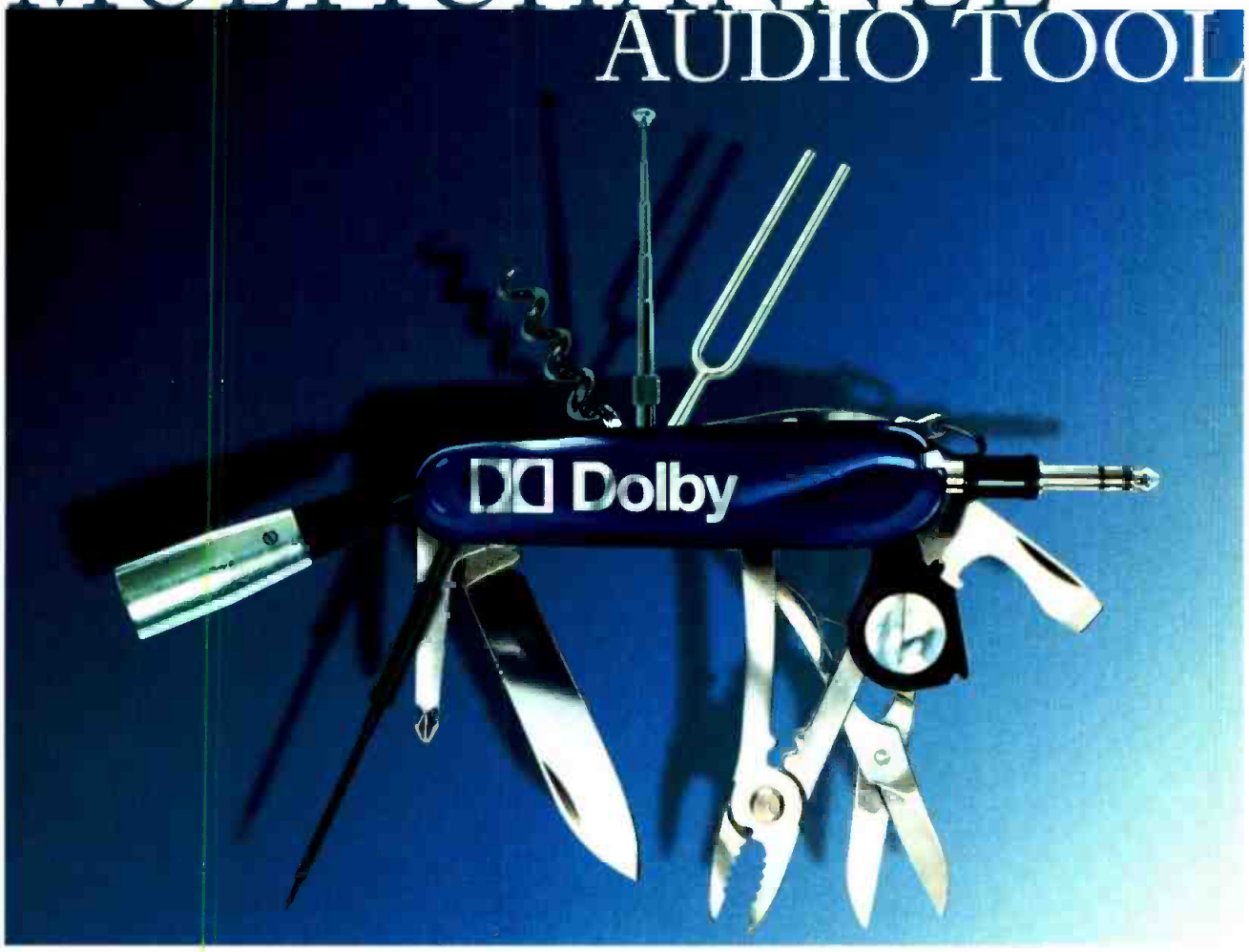

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user to view rundowns from other regions. All of this is made possible by SVT's network architecture.

Phase two plans

SVT plans on expanding its server system next year when it moves all of its news, sports and current events programming units into a new all-digital facility in a different building in Stockholm.

The system installation will be handled by Sony and will be built in stages to keep all the services on the air during the transition. The new facility will have new studios and four control rooms, two with totally new equipment and two with existing equipment relocated from SVT24 and elsewhere.

The new system will also employ two ingest servers with a total of 12 video/audio-pair I/Os for real-time video from linear tape editing suites and news services such as Reuters and AP. The ingest servers will feed real-time video and audio to MPEG-1 encoders for the low-resolution browse server, which will be relocated from Växjö to Stockholm.

Each control room will have a pair of mirrored media server systems assigned to it for playout to air. The Hawrys software will be updated to include mirroring functions, not only between servers in a single control room but for servers in all the control rooms. Servers in every control room will have clips for all the programs loaded in to allow the production crew can quickly move to another if a control room fails in the middle of a program.

SVT's Hawry's automation software, shown above, provides for selection and playback of clips, starts the countdown clock and controls CG, switching and still store equipment.

Anticipating greater use of the IBM tape library, SVT plans on changing the type of tape used so that the total archive storage time will be doubled to 12,000 hours. A new and extensive media management system will be used for content cataloging, metadata creation, and browse search and retrieval.

New edit rooms will be outfitted with Avid PC-based DV NewsCutter Effects with new software to allow exporting of .dif files via the network into an SGI Origin 3400 content store server.

This file server, having only network connections, will act as the hub to all the other servers on the network. With the Gigabit Ethernet backbone in the new building, there will be more than enough bandwidth to handle a large number of simultaneous transfers. This will be especially important just before the start of a newscast, when all the NewsCutters are expected to transfer their just-in-time edited pieces to the media server.

SVT has been able to do more than it ever thought possible with SGI Media Servers. In just a short time, many of the regions have expanded the use of their local servers above and beyond their original function of automatically recording and transferring daily news programs. SVT believes that all broadcast facilities will be migrating to the type of network and server architecture employed at SVT24, not only for the advantages of flexibility, efficiency and quality, but to handle the possible melding of TV and the Internet into a whole new entity.

One of the purposes of SVT24 was to find a way to move forward with the new digital production technology for news. The strong combination of SGI Media Servers, Avid News Cutters and Sony's control rooms made it possible for SVT24 to enter into the IT way of news production and leave the video way. It's as big a technology leap as leaving the film way of news production 20 years ago. ■

C. Jason Mancebo is manager of Applied Engineering, Technical Marketing, DTV and Professional Media Technologies for the Telecommunications & Media Group at SGI.

Design team

Niklas Krantz, Tomas Rapp, Henrik Andersson, John Glimberg, Ulf Helge, Magnus Åkerlund, Per Einarsson, Marie Valund and Olle Soprani.

SVT24 key equipment:

Studio:
4 Sony BVP-550 cameras

Production control room:
Sony DVS-M1000 master control switcher with DME3000
Sony DVS-7250 production switcher with DME7000
Sony DMX-B4000 digital audio mixer
Chyron Maxine 601 CG
Quantel Picture Frame still store
Screen subtitling system
3 Avid Airplays connected tc an Avid Media Server
1 SGI Media Server
2 Hawrys control stations

Routing switchers:
Sony DVS-V6464B, 64x64 with embedded audio
Sony DVS-V6464B, 64x32 with embedded audio

Archive:
Tape Storage 3494 using 3590 Model E tape drives and an IBM RS/6000 UNIX server

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Transmission & Distribution

Antennas revisited

BY DON MARKLEY

Now that more antennas have been delivered as part of the DTV build-out, it would seem timely to look at the trends that seem to be developing.

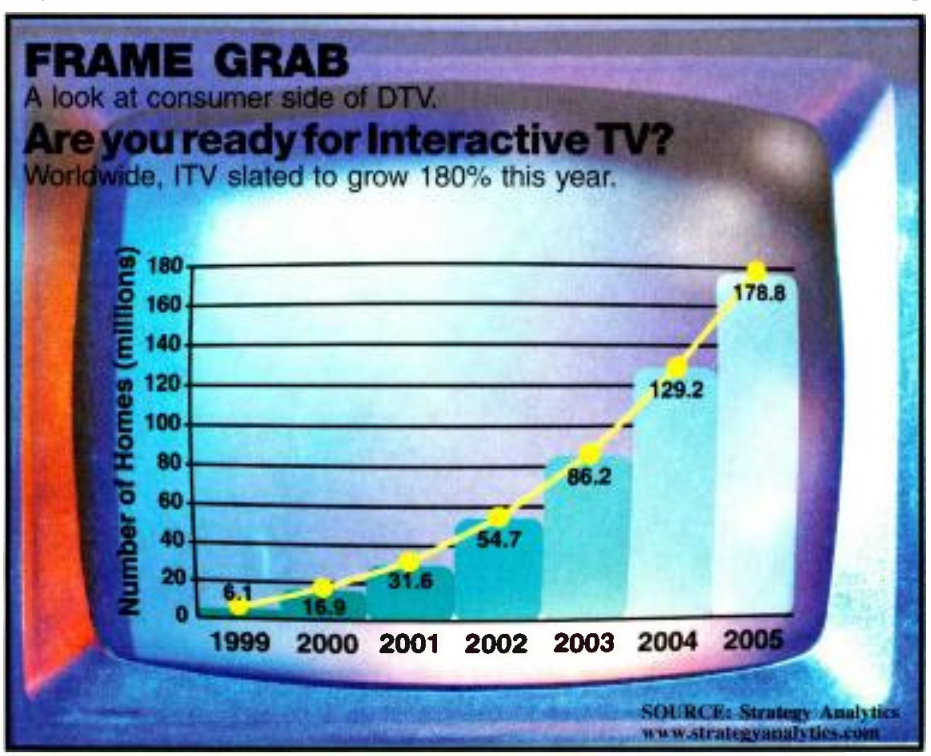
The use of panel antennas is more widespread than in past years. The traditional television antenna in this country has been a single channel, top-mounted radiator. For UHF, slot antennas have predominated while the bat-wing has been used for the majority of VHF stations. The need for more antenna space has driven many stations to leave the traditional approach and join into broadband antenna systems with other broadcasters. The panel meets all the requirements for such use. Panels have been installed with up to 150kW average power rating that can accommodate both NTSC and DTV stations. The VSWR on those antennas can be adjusted to below 1.1:1 over all of the channels in use. Panels can also be easily directionalized, although the final pattern will vary somewhat for the different channels in use. Finally, vertical plane patterns are relatively easy to control but will again vary somewhat with channel.

Panels in multistation applications

The problem with a multiple user panel antenna is that it requires a compromise between the users. Normally, the antenna isn't optimized for one given station, unless that station is paying for the system. Rather, it is designed to meet everyone's needs as well as possible. While this may seem to be a problem at first, it is amazing to find out just how little difference a dB here or there will make in the actual service from an antenna on a tall tower. Another problem with panel antennas is that they are somewhat larger than slot radiators with a resulting increase in windload and weight.

The panel antenna has also found use in multiple station standby systems. For example, two panel antennas have been installed on the Sears Building in Chicago for standby use by multiple stations, including both NTSC and DTV facilities. Those antennas are located on the less desirable areas of the building where their patterns are affected by the existence of the main towers. Current plans are for one antenna to be shared by a total of seven stations and the other to be used by five stations. The antennas have been heavily used during the installation of new main DTV antennas. The service from those antennas has been found to be quite good, even though nulls exist in some directions due to the main towers. The biggest problem hasn't been in the performance of the antennas but in adjusting the transmission lines from the combiners to the antennas for a flat response over the entire UHF band.

Measure first — not after you have turned expensive components into carbon lumps.



Use of panel antennas for standby applications brings up a good point. Standby antennas can be located in less desirable locations, freeing up the more desirable spots for main antennas. No station would consider the standby antenna locations of the Sears Building for a main antenna due to the unwanted pattern nulls. However, it should be remembered that a standby antenna is intended for use only when the main antenna must be shut down. That is usually only during periods of maintenance on the tower or, in rare occasions, when the main antenna fails. The

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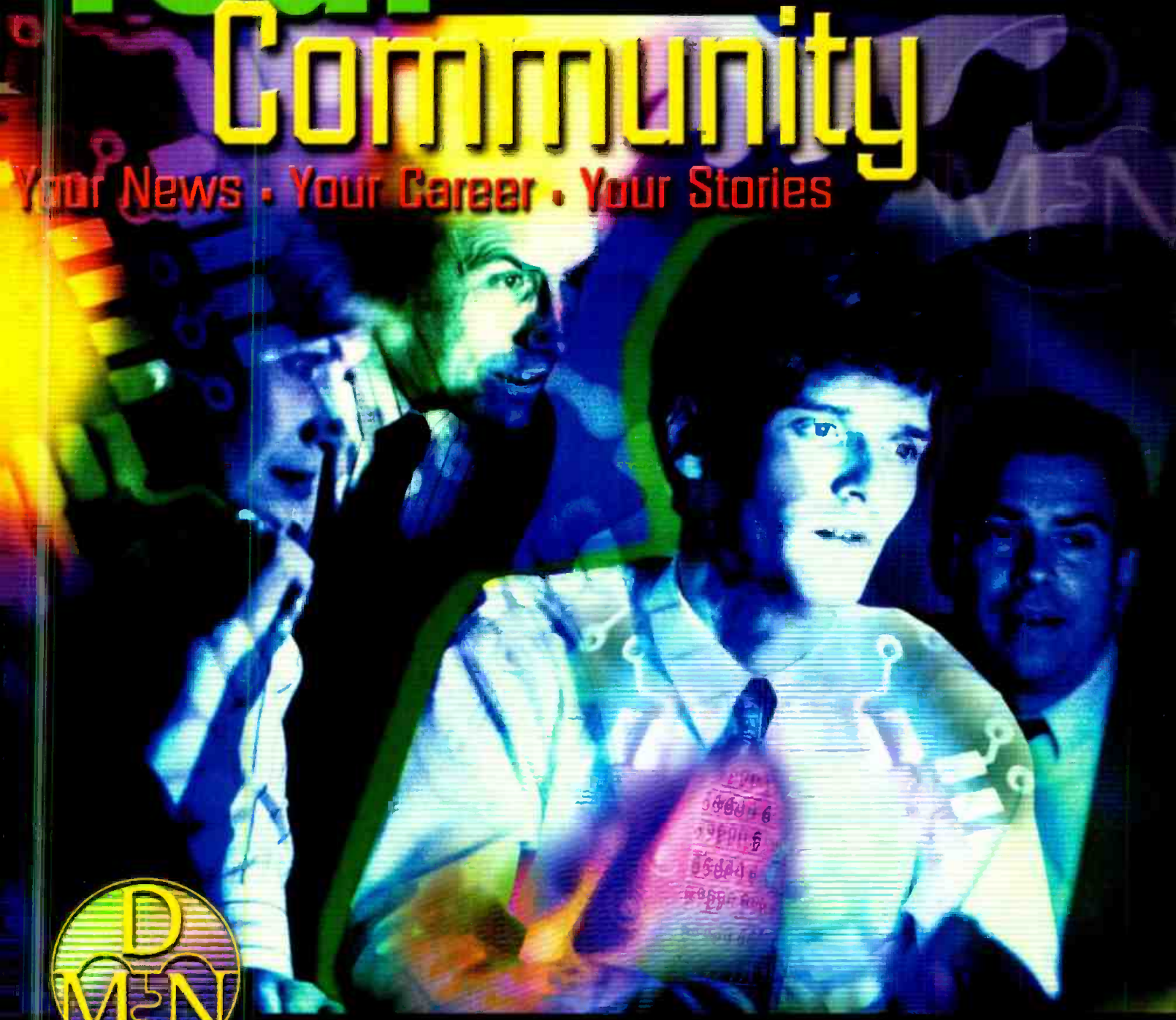

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total failure of a main antenna doesn't happen often, but the need for workers to be in the vicinity of that antenna occurs regularly. It would be nice if the standby antenna could be so located as to provide the same service area as the main antenna, but that usually isn't realistic. It is more reasonable to consider the auxiliary antenna as being better than being off the air while maintenance is performed. Other than during periods of construction, stations will normally use the standby less than one percent of the time.

Alternatives

With the onset of DTV, the most desirable tower top location often isn't available without a lot of work. Some stations have removed their existing top-mounted antenna and replaced it with stacked antennas for NTSC and DTV use. However, a greater number of stations have added a side-mounted antenna for DTV. While it is then necessary to accept the distortion in the pattern caused by the tower structure, a new family of antennas becomes available for use. First, side mounting an antenna requires much less in the way of structural strength than for a top mount. Obviously, that is because it is possible to brace the antenna to the tower, as needed, along its length. Rather than using a steel pylon as the basis for the antenna, an aluminum pipe can be used with a great reduction in weight and cost. While those antennas usually don't show up in the catalogs, all of the major manufacturers have them available. The performance is the same as for the steel-masted antennas.

While no one usually wants to make an issue of it, the fact is that the antenna pattern submitted to the Commission is usually for the antenna alone. There will be an impact on the antenna pattern caused by the tower. Regardless of just how the antenna is presented to the FCC, a complete pattern analysis should be performed by the manufacturer to determine exactly what the overall performance will be, including the tower and everything on the tower in the aperture of the antenna. Just as has been done for years for FM antennas, the effects of the pattern distortion can often be minimized by the manner in which the antenna is mounted or oriented on the tower. It is even possible to use the pattern distortion to the station's advantage by placing the lobes over the more desirable parts of the market.

Finally, don't even think about hanging a new antenna and line and then firing up the transmitter without first having the system swept and, preferably, tuned. If everything turns out to be all right, you will at least have documented proof of the original values of VSWR across the band and of the performance of the transmission line system. If everything is not initially correct, the tuning can be performed and the problems corrected before you have to explain to the management just why the new antenna system has a very noticeable ghost in the picture. That would be the good part. The bad part would be dancing IOT's as the system tried to feed a split bullet. Measure first — not after you have turned expensive components into carbon lumps. ■

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

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Metadata

BRAD GILMER

Metadata is simply information about something else. In the rich media environment, metadata is usually information about essence. Essence is broadly defined as that thing we work so hard to get on the air: a television program, a commercial or a movie. Essence is usually contained on physical media: videotape, audio tape, hard disk or film. Metadata is usually contained on physical media, typically a 3.5" floppy, a hard disk, DVD or some other computer-oriented storage medium. Increasingly, essence and metadata are transported via a network rather than using physical media.

Here is an example of how essence and metadata are generated. An editor edits an incoming feed of news conference into a one-minute piece while a writer produces a script to go with the edited video and audio. At the end of the process, the producer receives the completed script from the writer, and the edited video and audio from the editor. The producer inserts the package into the news rundown; and at the appropriate point in the evening newscast, the news anchor introduces the story according to the script and the technical director plays the tape. The story is closed captioned in real time as it plays to air.

What is the role of metadata in this workflow? As the news conference is being recorded, time-of-day timecode provides information about when events on tape occurred. The Edit Decision List (EDL) from the edit session describes how the story was composed and lists other material that may have been used to create the story. The rundown contains the script and voiceover cues. Closed captioning provides a text record. All of this metadata is associated with the video and audio essence that make up the news story.

Limits on space for metadata

Videotape has always allowed us to convey a limited amount of metadata along with the essence. Timecode and closed captioning can be embedded in videotape. However, when it comes to carrying title information, scripts or formats, this information almost always rides either on a label stuck to the tape or box, or on a piece of paper stuck inside the box. This has worked in the past, but frankly it has been a bit awkward and forces operators to re-key data as the content moves from one place to another. The situation is somewhat better with digital VTRs, but there are still limitations on the amount of metadata that can be put on the tape. Unfortunately, metadata is almost unlimited. How can we put an almost unlimited amount of metadata into a limited space?

Determining the appropriate essential metadata repetition rate is a key part of the overall system design.

One solution is to split metadata. Essential metadata can be sent with the essence. Non-essential metadata can be sent via a separate data path. For example, timecode and MPEG coding parameters embedded in the essence datastream while scripts are sent separately. Once the metadata is separated from the content, how can it be reliably put back together? The Society of Motion Picture and Television Engineers (SMPTE) has standardized the Unique Material Identifier (UMID). The UMID provides a reliable way to uniquely identify essence and content. Once the essence and metadata are uniquely identified, it is easy to put them back together again.

As we move from the analog to the digital world, we must deal with some fundamental differences between analog and digital essence transfer. Two characteristics of analog transfers are that a receiver may join a stream even though playback at the source began earlier and a monitor can display the output of a router within a fraction of a second of the time the router is switched to a particular source. What about the case where the essence is compressed digitally? These two simple functions may not be available unless essential essence is repeated. Why? Let's look at an example.

Let's assume that a signal consisting of one video and two audio channels is compressed using MPEG. A decoder may not be able to decode original pictures and sound without key information about how the signals were compressed. If this essential metadata is sent only once at the beginning of transmission, receivers will not be able to join the transmission once it has started. If essential metadata is repeated throughout a program, the problem described above is solved. Finding the correct rate for the repetition of metadata is critical. If the repetition rate is too low, a decoder will have to wait a long time to receive and decode essential metadata. This interferes with channel surfing. If the repetition rate is very high, the decoder can join a program much more quickly, but bandwidth for the program is reduced. Determining the appropriate essential metadata repetition rate is a key part of the overall system design.

It might be assumed that all essence and metadata should be preserved as far as possible throughout the broadcast chain. However, some metadata types may intentionally be destroyed after they have served their useful purpose.

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Examples of transient metadata (with "short" permanence) include rights information, machine control and encoder control. However, some permanent metadata would be expected to remain with the content, including such things as UMIDs and program titles.

To finish our discussion of metadata types, there is the concept of static metadata and variant metadata. Static metadata is metadata that remains the same throughout the duration of a piece of essence. A movie title is an example of static metadata. Variant metadata is metadata that changes during playback of the content. Timecode is the most obvious example of variant metadata.

Moving metadata

The two most common ways of moving metadata in a facility today are the piece of paper in the tape case and a 3 1/2" diskette. Neither of these methods works very well in a networked facility. Newsrooms, graphics facilities and large playout facilities often employ high-speed networks to move content within and between facilities. Several groups are working to create standardized ways to exchange metadata among systems in networked facilities. The European Broadcast Union (EBU) has a number of ongoing projects focusing on the user requirements for metadata in various applications including archiving, air playback and authoring. The Pro-MPEG Forum and the Advanced Authoring Format Association have been working jointly on developing a metadata exchange format that would allow for the exchange of metadata in networked environments between various manufacturers. The AAF Association is also working on developing specifications and a software SDK that will provide a solution for the exchange of metadata in the rich media authoring environment.

The concept of a standardized file interchange format is simple. Essence and metadata are put together in a wrapper. The content is then transferred between systems over an interconnect, such as SDTI. In a computer environment, the transfer could happen across conventional IP computer networks. This is a powerful concept. Imagine being able to transfer a post-production project, movie or commercial using whatever infrastructure is appropriate — a conventional broadcast digital router, a computer network, streaming tape or removable hard disk. Furthermore, imagine being able to transfer not just the essence but the metadata as well, in a standardized way from one vendor's equipment to another. This is the thrust of the current collaborative effort between the AAF Association, the Pro-MPEG Forum and the EBU.

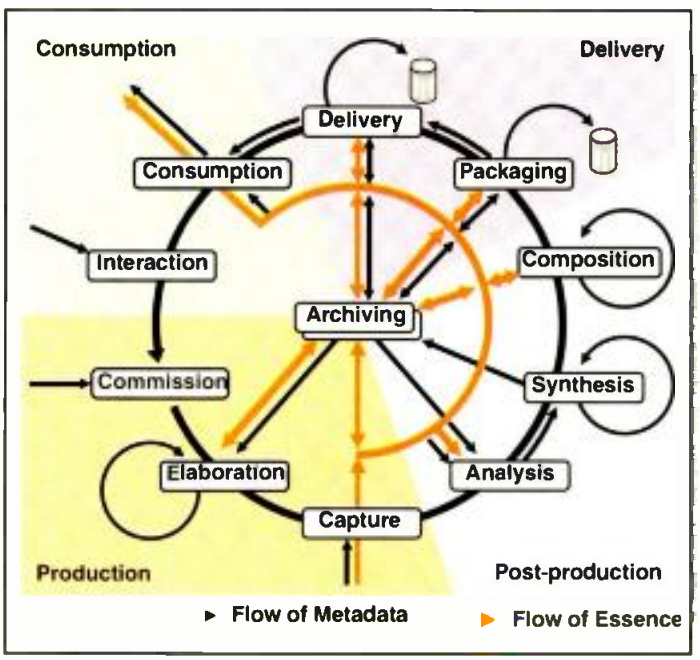


Figure 1. The flow of essence and metadata through a facility from commissioning to consumption. The different-colored backgrounds show areas where user requirements differ and where it would be appropriate to use different operational patterns.

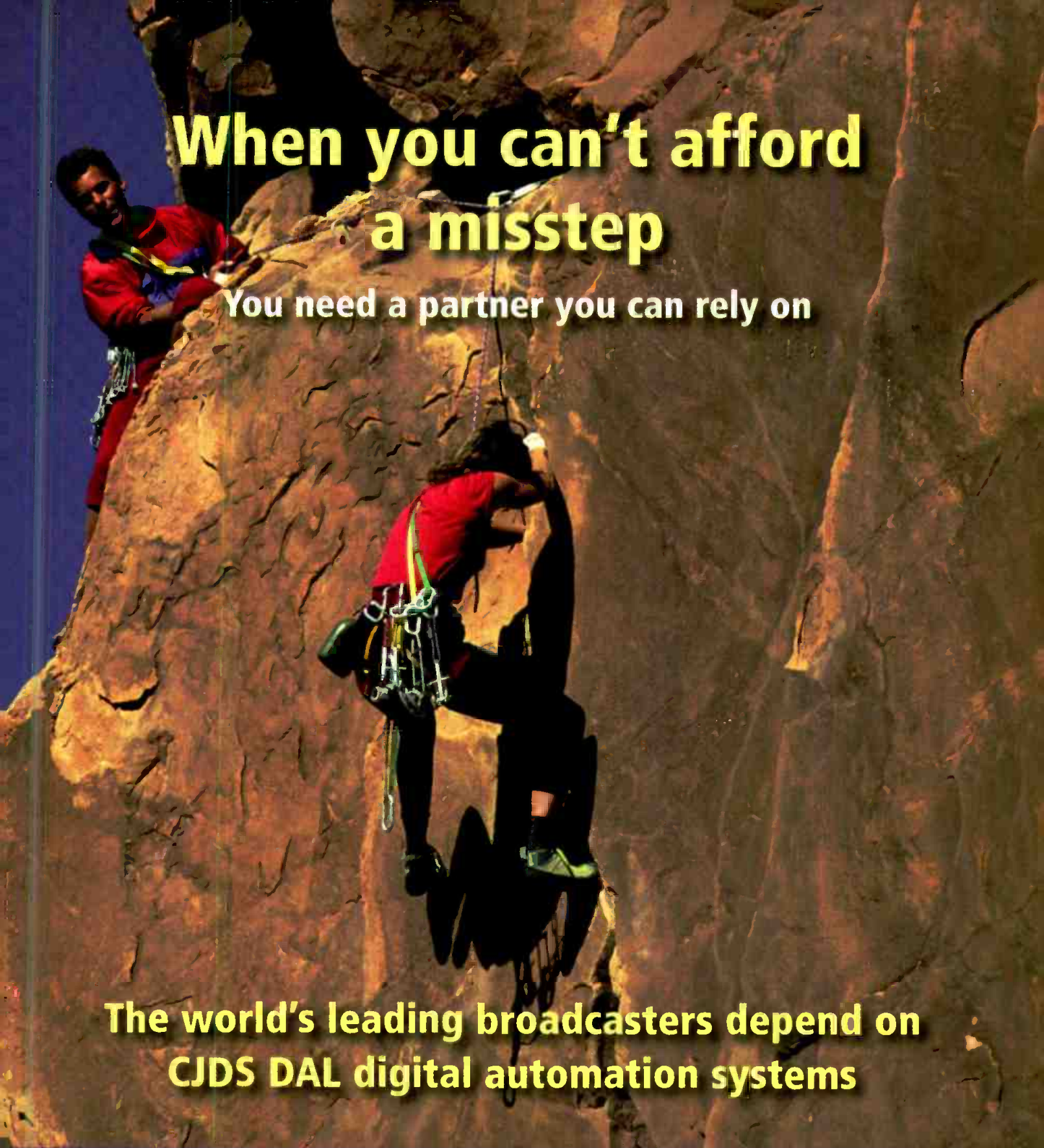
User requirements

File transfer can be divided into the following categories. *Authoring interchange* is the interchange of content within the authoring environment. An authoring environment might include video and audio editing tools, graphics rendering workstations and font creation tools. *Finished interchange* is the interchange of content within the air playback environment (sometimes called the production environment in Europe). *Content repository interchange* is the interchange of content between other areas of a television facility and an archive. *Publication interchange* moves content through the emission chain. Metadata user requirements are different in each of these areas. For example, it may be appropriate in an authoring interchange format to exchange a metadata file that has references in it to a reel of tape on a shelf somewhere. It is the general view that such an "external reference" would not be appropriate in the Finished Interchange environment. A file transfer format in the Finished Interchange environment should guarantee that both the metadata and the essence are received at the other end. A file that says, "go find the essence on the shelf over there" is not good enough for the air playback environment.

Another key concept in the exchange of content is that of *operational patterns*. Operational patterns determine how complex the metadata and essence are allowed to be in a given file interchange. For example, an operational pattern for finished interchange (used in the air playback environment) should not allow a user to send a bunch of separate clips that need to be edited together before they are ready for air. Why? Because programs in the air playback environment should be ready to go. They should not require additional editing, effects or other operations. However, in the authoring interchange, it is totally appropriate to send a number of different pieces of content along with metadata instructions for how these pieces are to be assembled into a finished product.

Figure 1 shows the flow of essence and metadata through a facility from commissioning through consumption. The different colored backgrounds show areas where user requirements differ and where it would be appropriate to use different operational patterns. The EBU has been working to compile a list of user requirements for the different operational areas reflected in the chart. A number of groups have also been working to define the characteristics of the operational patterns required to meet the user requirements in these areas. ■

Brad Gilmer is president of Gilmer & Associates Inc., and the executive director of the AAF Association.



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The Master

a blueprint of the future

By Daniel Taylor

Most television stations in the United States were constructed between the 1940s and 1960s. Over the years, these stations have undergone many structural and equipment modifications, often within the confines of the existing building. The result is all too familiar to the owner, general manager and staff: an overcrowded facility with overtaxed and inefficient mechanical and electrical systems, a warren of old wiring beneath the floors and a poor functional layout.

This situation is especially unworkable today, as news branding is becoming crucial to revenue and digital is replacing analog broadcast equipment. The need is clear: a broadcast television station must have more space, properly configured and operationally effective, with the flexibility to accommodate new and emerging technology.

Plan:

Developing a master plan ensures new or renovated facilities meet current and future demands. A satellite feedroom is shown here. Photos by Aker/Zvonkovic Photography, Houston.

But there are many questions: Do we expand and upgrade the existing facility or build a new one from the ground up? How much time and money will each option cost? How do we get there from here? The master planning process provides the answers.

What is master planning?

Master planning, when undertaken before design of a renovation or new facility, allows owners to make solid business decisions about their broadcast facilities and equipment. It is an information-gathering process in which a team comprised of a project director, architect, mechanical and electrical engineer and systems integrator conduct interviews and a building walk-through with a station owner, general manager and other personnel who are part of the station's facility planning project team.

The project design team interviews station executives to learn general requirements including cost and timing, as well as their perspectives about other issues, including station image, corporate culture, growth, change and design. The project design team combines this information with statistical data to develop the size and adjacency requirements for space and infrastructure.

While the final design may take many forms, the master planning process addresses the common goals of broadcast facilities:

- promote communication within the organization;
- enhance adjacencies and production workflow;
- provide flexibility necessary to adapt the workplace to future staffing and technical requirements;
- provide for the desired image of a quality, professional organization;
- provide the necessary tools and amenities to accommodate functional requirements; and
- reduce costs and increase production reliability.

Programming: The first step

The first step in the process of developing a master plan is programming — asking the station to define who it is and what it does. The project design team will do a building walk-through and interview members of the owner's project team to identify the overall project requirements: staffing, technical, electrical/mechanical, and site requirements; the owner's overall vision for the project; arrangement of and among departments; and cost and timing issues.

Both general and technical questions will be asked, such as: What is your mission, your culture? How long can you afford to be off the air in case of a power interruption? How many newscasts do you do? How many control rooms do you need? Do you do post-production? Where do you see your station in five to 10 years? If the owner has a preference or a need to remain in the existing facility, the project design team also will survey existing conditions.

From this the team will develop a preliminary program, which will have the following elements:

- Overall production workflow analysis;
- Program matrix listing, which includes department/functional areas, overall square footage, number of personnel, UPS, generator requirements, and the estimate of BTU and wattage requirements per square foot;
- Architectural space program, which includes the rooms/area/technical space, sizes of rooms, furniture requirements and equipment requirements;
- Preliminary design and construction schedule; and
- Mission statement defining overall project goals and vision.

Development of the preliminary program requires about three weeks to complete, on average. The results provide a rough guide to the size of the facility, as well as mechanical/electrical system requirements — no small item

The current demands of replacing analog equipment and news branding require broadcasters to re-evaluate their facility needs. A news control room is shown here.

The development of a master plan also requires facilities to determine how they will accommodate new technology, including 5.1 audio. An audio control room is shown here.

given that the mechanical system alone may comprise as much as 30 percent of the total space of a broadcast facility. The preliminary design and construction schedules are conceptual. There are no drawings at this point, and the schedule is outlined in broad terms.

Renovate or move?

A big issue during this stage is the question of whether to renovate the existing facility, buy and renovate a larger existing facility, or build new on a bare piece of property. If the entire station is in need of renovation, it is generally less expensive and faster to build a new building than to attempt renovating an existing building. This is true whether the existing building is your current station or an empty existing building available in the open real estate market. This is especially true if the existing building is a non-broadcast facility, for reasons related to architecture, technology/flexibility, core and shell, mechanical and electrical systems, fire protection, construction process, and insurance costs.

Architecture: Unless the facility was built as a television station, very few existing buildings fulfill the unique functional requirements and volumes of today's broadcast facilities. Often, costly structural retrofits are required to meet the space requirements. Existing non-broadcasting structures rarely have adequate ceiling height, especially for sound stages. The functional integrity of the technical plant and other broadcast functions may be sacrificed; for example, a technical plant may end up requiring long cumbersome cable runs and broadcast functions that should be adjacent to one another but are not.

Technology/flexibility: One of the most important advantages of new construction over retrofit of existing buildings is the flexibility that can be designed into new facilities. Existing buildings were not designed to handle the intense requirements of broadcast technology. The requirements for mechanical systems, electrical systems, broadcast cable, grounding, UPS and acoustics can overwhelm an existing building. In contrast, a new building can be designed for flexibility and growth in such a manner to allow for minimal disruption when it occurs. Digital broadcast is a changing industry, which demands flexible facilities.

Core and shell building: In existing buildings, whether a current TV station or a non-broadcast structure, base building components may require expensive retrofits. For example, stairwells and rest rooms must be upgraded to meet ADA requirements. Roof membranes and elevator machinery often have reached the end of their life cycles and must be replaced. The exterior façade is deteriorating and must be repainted or replaced. Low ceiling heights cause serious problems in access floor areas, limiting space for cabling, ramps, set lighting and the mechanical system.

Mechanical systems: The mechanical systems in most existing buildings are nearing the end of their effective life cycles. Additionally, existing non-broadcast structures generally do not meet the needs of broadcast facilities, and these buildings often do not have

> A broadcast television station must have the flexibility to accommodate new and emerging technology.

enough space to accommodate the appropriate new systems. The heat loads generated by broadcast equipment and stage lighting require, at a minimum, additional cooling tonnage. Typically, the replacement of all ducts (except in office areas) and the mechanical plant is also necessary. Redundant cooling is required in case a chiller goes down or is turned off for routine maintenance.

Many successful renovations of existing broadcast facilities have been completed.

Electrical systems: Broadcast facilities also have unique electrical needs: large amounts of kilowatts, a reliable transformer or two, a large UPS system, larger than average generators and fuel tanks, reliable switchgear designed without a single point of failure, lightning protection, and a new grounding system. Most existing non-broadcast structures were not designed to meet these types of critical reliability needs, and if they are present they are often nearing the end of the effective use and must be replaced.

Fire protection: Most existing buildings have wet pipe fire protection systems, which must be retrofitted with a dry pipe system or chemical systems to protect digital equipment.

Construction process: Because in complete renovations every hard system (mechanical, electrical and plumbing) and, potentially the structural system, must be modified or replaced, the building is virtually stripped in large areas to its core and shell. In existing broadcast facilities this type of renovation must be carried out in several phases, adding additional time and cost to the project. It also produces strain on the staff and interferes with the production process. This, in turn, affects the bottom line. In existing non-broadcast structures, often all you gain is a minimal core and shell that is not ideally suited for broadcast. In either case, at best, the process is not fun.

Furthermore, all existing structures run the danger of encountering unforeseen construction costs, and usually do. Bids from contractors are often higher in existing structures because of unforeseen conditions and "out of sequence" construction patterns. In new construction, unforeseen conditions are almost non-existent and construction sequencing is in a logical linear pattern.

Insurance costs: An underwriter often will give a more favorable insurance rate on a new building that clearly meets its requirements than an existing building that just comes close.

However...

Many successful renovations of existing broadcast facilities have been completed. Often, the owner must remain in existing facilities for one reason or another, and it is the architect's job to make it work. The master planning process helps make this possible. In the best situations, the owner has adequate land to build a sizable addition for technical production functions — the newsroom and central broadcast plant — leaving the original space to be renovated for "soft" functions like conference rooms, lunchrooms and administrative offices.

After the project design team and owner meet to review the preliminary program, adjustments and modifications have been made, and unresolved issues have been further defined, the

The master planning process involves determining mechanical and electrical demands for a new or renovated facility. This step requires careful thought because mechanical systems can consume up to 30 percent of a station's space. A master control roomis shown here.

project design team will complete the preliminary program.

The completed program will continually develop and be modified by unforeseen changes and new information. The documents that will be modified most often will be the architectural space program and BTU/electrical matrix.

Site due diligence

As part of the master planning process, the A/E team will perform a site due diligence study on the existing site or provide a "Site Requirements" statement for use by a real estate acquisition team. A caution about real estate brokers: All too often, a broadcast television owner will contract with a broker to find a suitable piece of property for a new broadcast facility — sometimes even completing a purchase — before even consulting with a qualified A/E firm to perform site due diligence. This can be a disaster. The following items must be addressed in the site due diligence process:

- Traffic study;
- Utility locations and quality;
- Available power (redundant grids);
- Zoning analysis;
- Environmental study (Phase 1);
- Special restrictions;
- List of site assets;
- Aesthetic potential of site;
- Satellite uplook;
- Microwave path;
- News platform views;
- Heliport restrictions;
- Security problems;
- Deed restrictions (from owner);
- Employee amenities;
- Construction cost issues;
- Soils report;
- List of potential problems and possible remedies; and
- Complete building code analysis.

Schematic design

At this point, the A/E will produce site test plans and schematic floor plans for each of the desired schemes. Alternatives to these schemes also will be produced. Each scheme should reflect the A/E's keen eye on the issue of production and workflow. The pros and cons of each scheme from a design, construction, technical and production flow point of view will be addressed.

Modifications and additional test plans will be developed as required by the owner's review. A final report will be produced with a complete due diligence report for each scheme, and a final design scheme recommendation will be made. A cost-benefit analysis for each scheme will also be part of this phase. A preliminary construction schedule will also be developed.

Final presentation report

Finally, the A/E will produce a final executive presentation report customized to the needs of the client. It will reflect the prime scheme, or a comparison of schemes, as required. The report will include, but is not limited to:

- Image statement describing aesthetic design goals;
- Statement of overall project goals;
- Flexibility statement describing proposed needs for flexibility and future expansion;
- Space standards;
- Department summary;
- Architectural space program;
- Digital renderings of proposed building;
- Schematic site plan;
- Schematic floor plan;
- Building design concepts;
- Planning concepts;
- Site review statement;
- Preliminary zoning and code analyses;
- Description of structural specifications;
- Description of mechanical/electrical specifications;
- Schedule;
- Cost estimate; and
- Cost analysis.

A blueprint

The result of the master planning process is a document that summarizes the findings and, after review and revision by the owner's team, establishes the proper direction for design of a facility. Whether it is a renovation, expansion or new facility, the master planning process ensures that the facility will be designed to serve the broadcast television station well into the future. The master plan is a working plan that remains a resource for all those involved in the further development of the project, in essence, a blueprint of the future. ■

Daniel Taylor is vice president of broadcast for Carlson, Chicago.

Keys to a successful project

1. Understand your company goals, both short term and long term.
2. Develop a project program and master plan suitable to your business culture.
3. Investigate all options early in the project (attach price and time to options).
4. Utilize a core project team early (architect, MEP, systems integration and pricing capabilities); i.e. don't pick a site without thorough due diligence with qualified professionals.
5. Develop systems to acquire basic facts without getting lost in minutia:
   - establish gross heat and electric loads;
   - establish redundancy requirements using business sense; and,
   - establish rack counts on air day and in future .
6. Establish a schedule that makes business sense and will work in the real world.
7. Attach a price and time to all options.
8. Simplify and reduce costs.
9. Don't disregard image — you're in the image business.

No one automation system is right for all broadcast facilities. Broadcasters should determine their needs and find a system that is efficient and fault resistant. Ackerley Group's KCBA in Salinas, CA, uses Sundance Digital FastBreak automation system as part of its Digital CentralCasting program.

SIZING automation TO FIT

BY JIM BOSTON

In this day of widespread computer networking, most of us know about the OSI software stack. This allows an application, for example an Internet browser, to not have to be concerned with how to communicate over a given network. The operating system the application is riding on top of knows how to use each particular communications scheme that might be required. All the application needs to be able to do is to call on the services of software layers below it. The services required for reliable communications over an intranet or Internet have undergone stratification. The most common way to ensure dependable communications between two computers is via TCP/IP. The application requiring the communications calls on the services of the TCP layer, which provides notification that the sent data has successfully arrived at the desired location. It does this by wrapping chunks (packets) of your applications data with information to enable successful recovery at the receive end and rules for feedback to the sender if something has gone awry. The TCP layer hands your wrapped data to the IP layer. The IP layer adds another layer of wrapping; this time the address of the destination is added. These two layers are referred to as the Transport and Network layers respectively. The IP layer hands this doubly wrapped data off to the Datalink layer below it. This layer knows how to negotiate the physical network that your computer is connected to — the most common LAN in use being the Ethernet. Below the Network layer is the Physical layer. This is the coax, or twisted pair, hubs, AUI boxes, etc. that comprise the local LAN. An application running on one

SIZING automation TO FIT

PC requiring communication with another application on another PC would call on the services of the layers below it. The application, which resides in a layer known as the "application" layer would call upon the layer below it, which calls on the layer below it, etc. The layer below the application layer is the Presentation layer. This layer invokes other applications needed to present data to the user. Such as video/audio players, and browsers if the data being received requires these services. The next layer down is the Session layer. This is the layer that sets up a communication layer between applications residing on separate PCs. This layer tears down the session when it is complete. This layer can conduct multiple sessions at once, assigning each one a virtual port number. Some applications like FTP, and Web browsers use assigned port numbers, whereas other port numbers are dynamically assigned as needed. Next is the Transport layer. This layer makes sure that data sent from one application to another arrives in tact. This layer is where the TCP part of TCP/IP resides. The next layer down is the Network layer. It adds the addressing necessary to get the data to its intended destination. This layer houses the IP portion of TCP/IP. The next layer is the Data-Link layer. This layer is specific to the local network connection that the PC has. This layer knows the protocol required to communication on the LAN the PC is connected to: such as Ethernet, Token Ring, FDDI, ISDN, Frame Relay, etc. The bottom layer is the Physical Layer. This consists of the electrical drivers and receivers connected to the actual port on the back of your PC. The cabling, hubs, and other physical items that comprise your local network are all considered part of the physical layer.

This layering approach to dividing up the chores used in software is used in the average television station also. The major tasks that must be carried out in a commercial television station include selling the commercial time, making sure that the clients' spots are successfully scheduled to run and running the correct spot at the right time. Finally, there must be the necessary hardware to air the commercials and some programming as well. We have names for these tasks: Sales, Traffic, Operations, Engineering. Of course, there are other departments, but these four make up the direct conduit from sales to cash flow. We can conceptualize these entities as a stack of layers. At the top would be sales. Sales activity is funneled into traffic. As most of us know, traffic takes sales orders and contracts along with the shows the station airs and determines when every item is played. The output of the traffic department is a program log. Traffic departments are faced with filling every second of commercial inventory while getting the most money to be had for that particular commercial slot. This means that sponsors and their accompanying media (the spot) are often in a game of musical chairs right up to the day of air, and often up to the hour of air.

The program log, also known as an event list, is handed off to operations. Until recently, operations had to manually locate the programming and commercial spots and load them into the appropriate playback device. If the spot or program was not in house, it had to be bicycled in, recorded off satellite or obtained by some other terrestrial means. Someone also had to manually start the playback device and switch to the desired source. There have been control systems above master control switchers for quite some time that would automate the playback and switching operations. But today, most new installations are adding a much broader control layer over the equipment or physical layer. This layer is generally called automation, and in some installations it nearly covers the entire physical layer below it. A final component in the sales-to-payday path is reconciliation. Once a client's spot has been successfully played, the information must be sent back to traffic, which lets accounts receivable know that there is money to be collected. If all has gone well operations completes the cycle by sending an "as-run" list back up to the business layer.

The name of the game is to minimize the number of discrepancies. The whole cycle just mentioned must function together to accomplish that. One of the traffic vendors' biggest arguments for using their particular system is how low their particular discrep rates are. As you would expect, each claims to have the lowest percentage. At the operations level you need the automation system to perpetuate a low discrep rate. Of all the systems you might invest in for your facility, automation is the farthest from being a cookie cutter product. A good automation vendor will spend a lot of time trying to understand your operations and expectations.

Building blocks

Automation consists of a number of basic and required components. Additional capability and quantity of devices controlled (how wide the automation layer will be over the physical layer) is available *a la carte*. The basic building blocks consist of Media Management, Event Control and Device Control.

Media management software controls ingest and preparation of material. What this means for most facilities is that it controls the ingest of material into a server and maintains the database that organizes the media for the human operator and the rest of the automation system. Some vendors split this function up into separate applications – one for ingest and preparation, and another for management of the material on the server(s) or tape playback system. As you probably already know, the Event Manager needs to communicate with the traffic layer above it. But the Media Manager must also exchange data with traffic. Either traffic or automation, and often both,

The name of the game is to minimize the number of discrepancies.

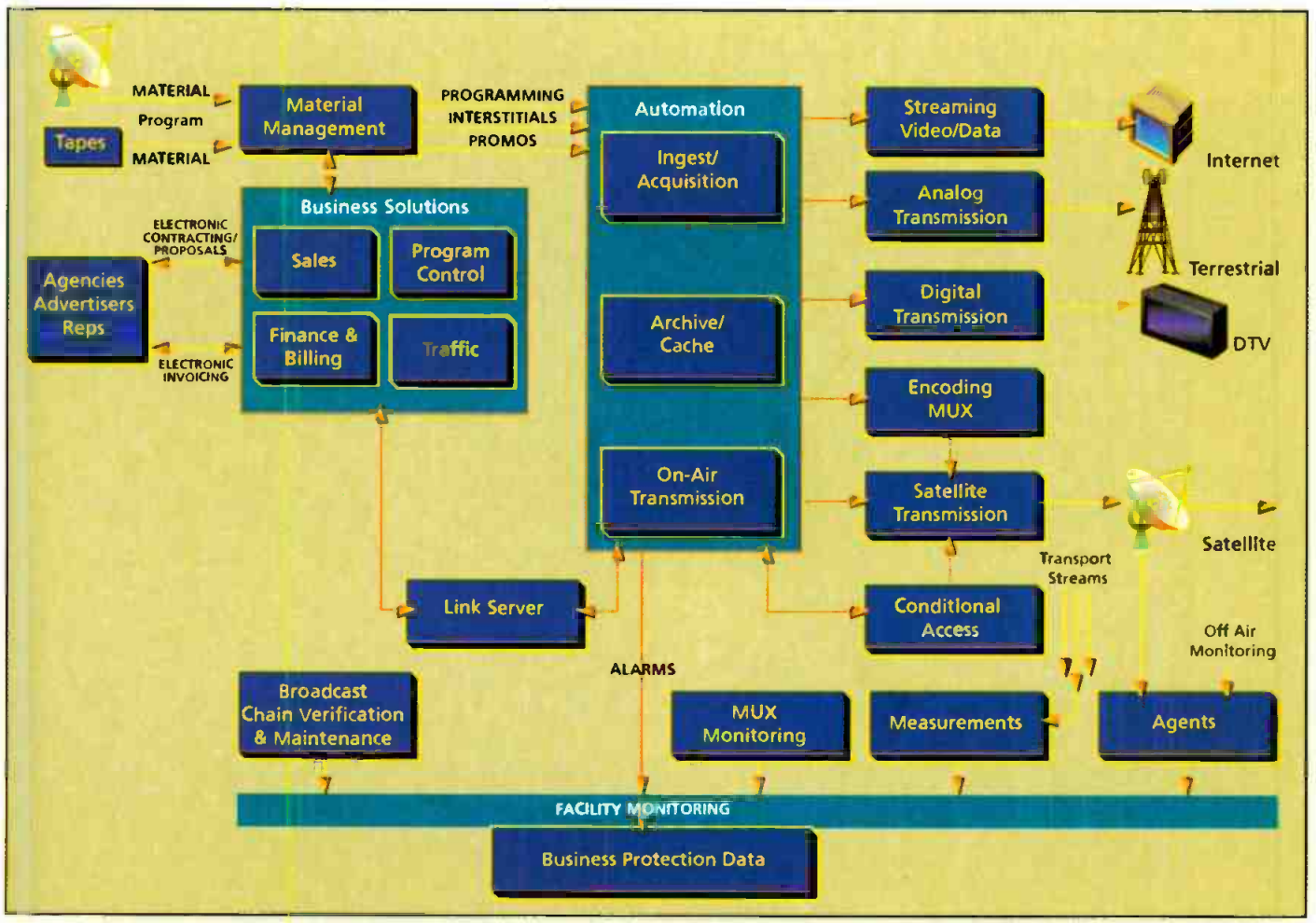
needs to know what media is missing in the playback systems. This is one reason that most systems have a computer known as a server. It is used in some systems to sort data traffic between the traffic and automation layers to either the Media Manager or the Event Manager. You might wonder how the traffic system and the automation talk. The traffic vendors publish Automation Interface Protocols that the automation systems speak. Early protocols were batchlike in nature. They sent information to the automation or received feedback from the automation layer only when instructed to do so. Newer protocols have continual dialogs between the two layers as needed.

The next component is the Event Manager. This software receives the playlist from traffic. The playlist can come straight from traffic in some systems, or can be sent first to the systems server and stored as a database that can be accessed by the Event Manager. Some systems have the playlist and Master Control operators GUI on the same PC. Other systems separate the two. The playlist is sent to a PC called a machine or device server. This is the third basic automation component. Once the playlist is in the device server, the rest of the system could be taken offline and the list could simply run on its own as long as the event list didn't need editing and the required devices were connected to that device server. Some device servers can control as many as 64 devices, mainly via RS-422. Most local television stations don't require half that many controlled devices. If more controlled devices are required, then additional device servers can be added. Some systems don't send the event commands to the device server until shortly before the event happens. Although most installations require only a single device server, vendors allow for two device servers to run in parallel, one acting as a backup. A single device server is a single point of failure that will have immediate impact on your operation.

At least one vendor requires your software to be modified and re-compiled if devices are added.

Additional playlists and the number of controlled devices are purchased as needed. The basic system usually comes with at least the on-air playlist, but often you must purchase the capability of using more than one playlist at once. Additional playlists are needed for multichannel operations. Other uses would be for automated satellite operations. Some device controllers can run multiple playlists at once. Some vendors allow devices on one

Continued on page 118



Key to the effective implementation of any automation system is first carefully defining the tasks to be accomplished. Shown here are the typical chores that must be completed from selling time, generating PSIP data through reconciling the as-run logs for both analog and digital channels. The complex, but manageable, process requires close communication with your automation vendor. Graphic courtesy Columbine-Jefferson-DAL Systems

Timing in hybrid facilities

By Mike Betts

The Weather Channel, Inc., based in Atlanta, is seen in more than 75.2 million homes nationwide, and is the world's only 24-hour international weather network. Shown above is a routing/DA room for master and studio control at the facility's Atlanta installation. Photo courtesy of MCSi.

Timing requirements within broadcast facilities have changed from the days when analog NTSC was the only game in town. Now digital and analog reside side by side, and if you're lucky enough to have a completely digital facility, timing problems are a thing of the past ... or are they?

Analog timing review

In most broadcast and production facilities, video timing of the various video sources is required so that switching between video signals does not cause a disturbance to any receiving equipment,

monitors, VTRs or at the transmitter. It also maintains the NTSC signal as a valid RS170C waveform.

Analog NTSC facilities typically have a master sync pulse generator (SPG) to provide the main reference for every piece of equipment that needs to be synchronized. This reference is usually an NTSC "color black" signal. Most equipment, such as cameras, VTRs and graphics systems, can "gen-lock" to this signal and provide the engineer with timing adjustments to allow the output waveform to be correctly timed to the timing reference. The timing reference location is usually at the input to a routing switcher or production switcher, as this is both an easy place to select and measure many signals and the place where the signals need to be in time. The typical delays incurred within an analog facility are fairly short and are in the order of a microsecond for a production switcher down to a few tens of nanoseconds for a distribution amplifier. Signals passing through different paths encounter varying delays which are compensated for either by adjusting the cable length if possible when the delays are short or using adjustable delay amplifiers when more delay is needed.

The process becomes more complicated in larger facilities when a source, such as a camera, has to be timed to many locations at the same time. Some sophisticated systems have been employed to automatically re-time a source as the final destination changes and the source's timing has to change to keep it in time. It is more usual to add delays in the various paths to provide the correct timing requirements simultaneously at the various locations.

Timing simply means synchronizing the three basic parameters of the signal to match a reference. First is vertical sync or field timing, second is horizontal sync or line timing and the third is color sync or subcarrier timing. In addition to these parameters the correct subcarrier-to-horizontal relationship should also be maintained, especially if any editing is required. Timing is most often measured by externally referencing a waveform monitor to the house reference and adjusting the waveform monitor/vectorscope to display the appropriate parameter to be measured using the timing reference (usually color black). The source to be timed is then selected and adjustments made to make the new waveform match the reference. Care needs to be taken when making adjustments to allow for amplitude, width and shape differences between analog waveforms, plus make sure these parameters themselves are within specifications.

Timing Simply Means Synchronizing The Three Basic Parameters Of The Signal To Match A Reference.

NTSC signals include the basic parameters to easily measure or compare two video signals. The first of these parameters is the vertical sync sequence, which includes the pre- and post-equalizers and the serrated vertical pulse itself, plus the remaining lines in the vertical blanking period. The next parameter is the horizontal blanking period that includes the horizontal sync pulse, the front and back porch, and the color burst. The last parameter to check is the color subcarrier. The subcarrier burst phase is viewed in the vector display mode, along with the decoded video information plotted as R-Y against B-Y. The burst phase is adjusted to be coincident with the reference axis (-B-Y). The phase of the color burst to video color information is also a critical measurement to prevent color errors at the decoder. The position of video within the line and field is also important but does not itself disqualify the signal as valid (unless the video encroaches into the vertical or horizontal blanking periods) and would only produce a positional offset at the display device. However, positional offsets are very important if there is a need to switch between two versions of the same source, such as a direct source against the same source through a DVE device in a production switcher. Special equipment is also available to measure a source's SC/H phase relationship either via a numeric readout or an indicator dot on a vector display.

There are many other parameters that can and should be checked when comparing two video signals, but it's the timing parameters that are of importance here. Three other areas, though, require a mention: frame synchronizers, audio timing and component analog

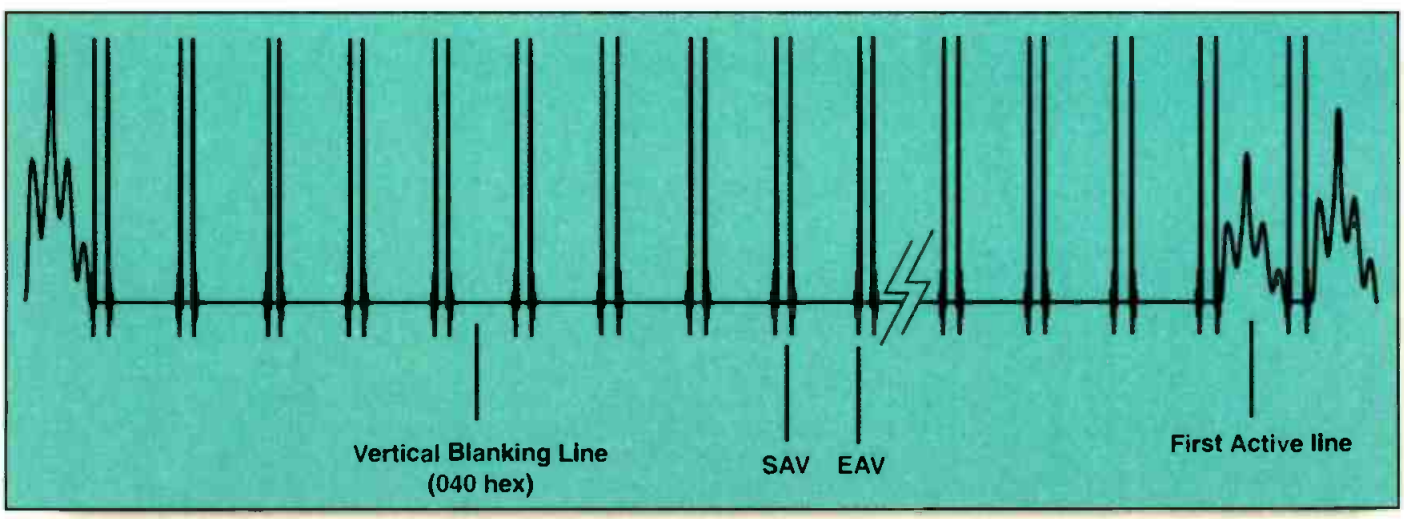


Figure 1. Serial digital video vertical blanking waveform with SAV/EAV enabled.

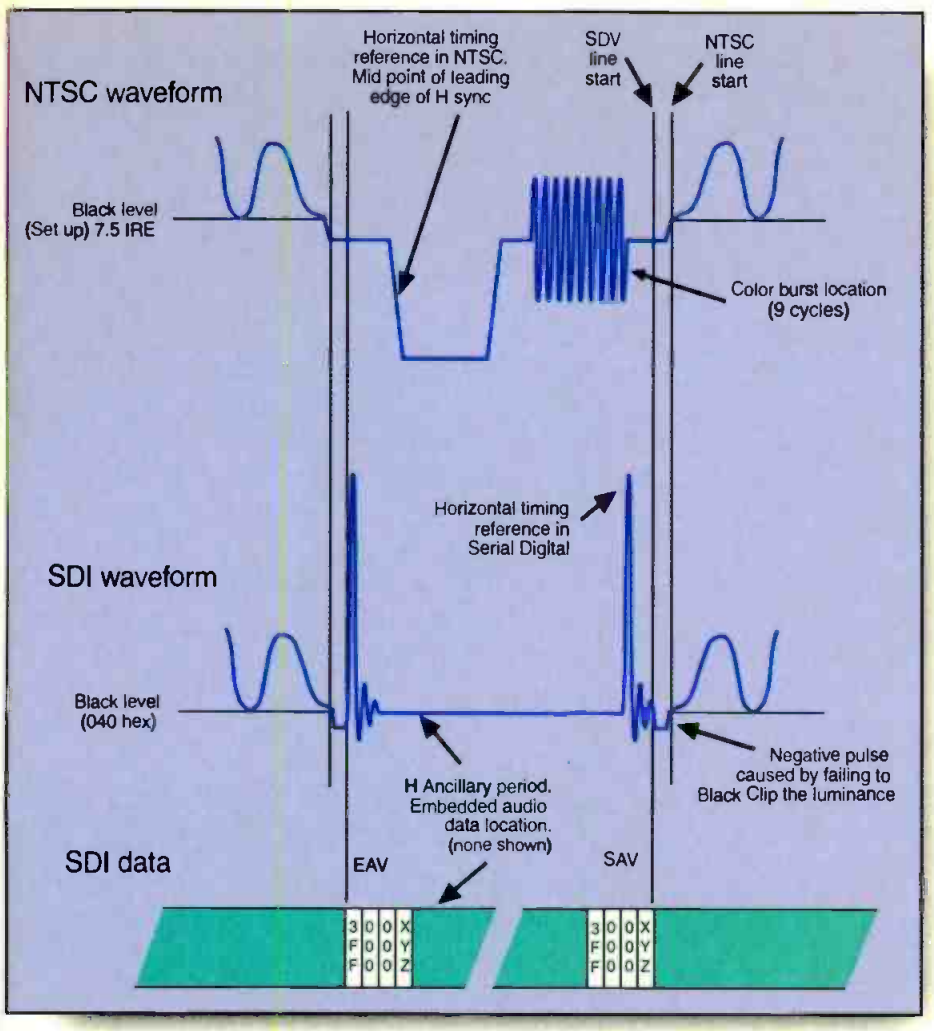


Figure 2. A comparison of horizontal blanking information for NTSC and SDI waveforms and SDI data.

video (CAV). Frame synchronizers are sometimes used to re-time video within a facility, especially when a production switcher output is needed to feed back its output as a source into a routing switcher or into a master control location. This is normally acceptable unless many frame-delayed paths are used when lip sync between video and audio becomes a problem. (Normally one or two frames of video to audio delay are not noticeable, but a delay of three or more frames is noticeable to the average viewer.) New frame synchronizers can include an identical delay in a companion audio channel to help reduce the lip sync problem, but this may require additional audio routing to use it.

Analog audio timing on its own is not a problem as delays are short. In fact, it is difficult to measure the timing delays as there is no absolute reference in an analog signal to provide a means of measuring the delay. As the audio delays are short compared with the frequencies involved, path delays are not usually critical when compared to the related video signal. Stereo channels necessitate monitoring of audio phase between the two channels, but comparing timing between two individual signals is typically not needed.

CAV facilities also deserve a mention as they have the same vertical and horizontal requirements of NTSC facilities but trade off the need to time three video paths (R, G and B or Y, R-Y and B-Y) against the need to perform subcarrier timing. The tradeoff is usually worth it because component processing preserves the color bandwidth and removes the losses incurred during NTSC encoding and decoding. Component analog equipment such as routers, production switchers, DAs and cabling, though, does cost more to purchase and install.

Digital timing requirements

Frame synchronizers and DVE equipment started the digital video revolution and provided features not otherwise available with analog equipment. Early equipment was analog both in and out and sometimes composite digital within. This equipment was treated in the same way as analog equipment as far as timing was concerned.

The early adoption of digital composite as a video format initially made some economic sense. However, this was soon overtaken by the cost reduction of LSI circuits that could just as easily process component digital as composite digital. As component digital offers higher bandwidth component signals and incurs none of the losses introduced by NTSC encoding and decoding, it has become the *de facto* standard for most production and television broadcast facilities around the world. Referred to by the standards of CCIR 601 or SMPTE 125M, it is also sometimes referred to as 4:2:2 or incorrectly as D1 (D1 is a tape format).

In order to discuss the requirements of digital timing, a quick review of the component digital signals is in order. The luminance and band limited chrominance components are sampled at 13.5MHz at 10-bit resolution. The 720 luminance (Y) samples and the 720 co-sited color difference chrominance samples of B-Y (Cb) and R-Y (Cr) are time multiplexed into a parallel stream at 27MHz. The output then becomes a serial stream at 270Mb/s with the sequence of Cb, Y, Cr, Y, Cb, Y, Cr ... (These parameters are the same for both 525 and 625 systems.) This sequence is repeated for all active lines in the picture. The sampling sequence is also maintained through the horizontal and vertical blanking intervals so as to maintain compatibility with the timing of analog signals.

To synchronize the video sample streams of each line, a sequence of four synchronizing bytes is added to define the start and end of the video line. This sequence is referred to as SAV and EAV (start of active video and end of active video) and each four-byte group consists of the hexadecimal sequence 3FF, 000, 000, XYZ. The XYZ byte provides additional data bits to define the start or end of line, Field 1 or Field 2, and the start of an active or vertical blanking line. This is all the synchronizing data that is sent or needed.

Checking digital video timing

Let's look at what this means for digital timing measurements. First, a digital video waveform monitor often offers the option of suppressing or

displaying the SAV/EAV bytes. When displayed this sequence appears as large positive pulses on either side of the horizontal blanking period and gives a visual reference for H timing. (See Figure 1.) The pulses appear with some associated ringing due to the single byte of 3FF producing an illegal rise-time signal in the analog domain (74ns) which causes the analog reconstruction filters in the waveform monitor to ring. Digital H timing can be performed in the same way as analog H timing by using the SAV pulse as the point of reference.

Other than the visual SAV/EAV reference pulses during vertical blanking, no apparent information is provided on vertical timing. If we examine the vertical blanking period, all that is visible is the series of SAV and EAV pulses of the H blanking periods and a DC level corresponding to reference black (040 Hex) (See Figure 2). There are no vertical reference pulses. The initial thought might be to look at the first line of video as the timing reference, but this can cause measurement errors if the video information itself has been delayed by a line and is not in the correct vertical location within the digital stream. In addition, the digital signal does not provide any visual clue as to which field interval that you are looking at. (The digital standard does not include half lines, so if you see video with a half line it usually means that the signal was converted from analog.)

Luckily there is a solution to this dilemma. Most waveform monitors include readout of the field and line that is selected (in-line select mode). The waveform monitor obtains this information from the SAV and EAV data by decoding the 'Field' and 'Active' bits within the XYZ byte of SAV. The extracted information is then used by the waveform monitor to determine which line and field to indicate in the display.

How then do you compare the vertical timing of two signals? First, adjust the signal for the first line of video on a signal, say Field 1, Line 20 (or a vertical interval line if VITS or other data is present) and note the location on the display using external reference. Then switch to internal reference and determine if the display changed. If it did not, then the signals are in vertical time. This method does not work with a black signal unless there is some VITS present, as all of the lines will look the same. Some waveform monitors (such as the Tektronix WFM 601 M) provide another way to look at the SAV/EAV information directly as data. (See Figure 3.) In this mode the data bytes are displayed as binary, decimal or hexadecimal values with the field, line and sample number indicated. The active and blanking lines are also indicated allowing the top line of any picture (even color black) to be determined. Examining this data compared with external sync does allow the vertical timing to be checked, but does not provide an easier method of finding the vertical relationship between two signals.

Digital equipment offers both pluses and minuses when it comes to timing a facility. The plus with digital is that most production switchers have automatic timing circuits that will keep signals timed to the switcher's reference as long as it arrives at the input within the capture window. This window can be from a few microseconds to a full line. The minus with digital is the need for vertical timing due to the delays encountered with digital processing. It is also possible that vertical timing errors are completely ignored by some equipment and that video is passed through and synchronized horizontally with new sync (SAV/EAV) added from the switcher's external reference. If the information coming into a switcher is one line off vertically going into a switcher, it will be one line off coming out. In addition to this, the video at the output of the production switcher itself is also delayed by about one line from the reference because of the processing delays and auto-timing circuits used within the production equipment. This can produce signals that are both one line late in time and have the video position off by a line as well. Careful consideration of the delays involved and keeping both vertical timing and video placement correct will allow a facility to produce video without information shifts when switching between sources.

	Sample	Cb	Y	Cr	Y'
F 1	1709		200		
L 20	1710			200	
	1711				200
	1712	3FF			
	1713		000		
	1714			000	
	1715				200
	0	200			
	1		040		
	2			200	
	3				040
	4	200			
	5		040		
	6			200	
	7				040

Figure 3. Data display showing the start of active video on line 20 of field 1.

Hybrid complications

The problem of vertical delays becomes even more of a concern in a hybrid facility. When converting analog NTSC to digital component video, the main concern is the decoding delay. A notch filter decoder adds little delay and can usually be accommodated by the auto-timing circuits of digital production switchers. To provide better NTSC decoding, a comb filter is usually chosen. Depending on the type of comb filter employed, either one or two lines of delay can be introduced to the digital output relative to the input. This poses a significant problem if the analog source must also be timed into analog equipment at the same time as it is available for digital equipment.

Figure 4 shows a facility with a camera source being used by an analog system and a digital switcher simultaneously. The delays encountered can quickly add up. In this example, two lines are incurred in the NTSC decoder plus one more line through the production switcher. In this case there is a solution to the dilemma. Replace the

NTSC-to-component serial digital converter with an RGB-to-component serial digital converter. This has short delays when compared to the NTSC decoder and uses the full bandwidth of the RGB signals to produce the serial digital video without incurring NTSC losses. As a rule always use the component analog outputs (when available) of a device for conversion to digital for the best results and fewer timing problems.

A blanking test signal that produces a half amplitude pulse on the first and last vertical lines in the picture and two parallel lines on both the left- and right-hand edges of the picture helps with timing checks and video placement problems. (See Figure 5.) The outside lines define the exact edge of the digital signal and should not be lost when passing the signal through a digital video channel. The inner lines on the left- and right-hand sides are the edges of the NTSC analog picture. Digital pictures are wider than analog pictures by a few samples on each side (six samples in 525/60 systems). This difference in active line width causes black edges on analog-originated pictures. A problem related to these black edges on a digital picture is that they should be black and not "lower than black." When an NTSC signal is converted to digital a black clip should be employed to remove the blanking level step from the converted luminance signal. (SeeFigure 1.) As there is no setup in digital, the setup step on the edges of the analog signal becomes a negative pulse if not clipped when the conversion to digital is made. Another solution would be to reduce the horizontal blanking width of the source to remove the black edges from the original signal prior to conversion to digital. This could be achieved with existing source material by a small amount of picture expansion through a DVE device to fill in the black edges.

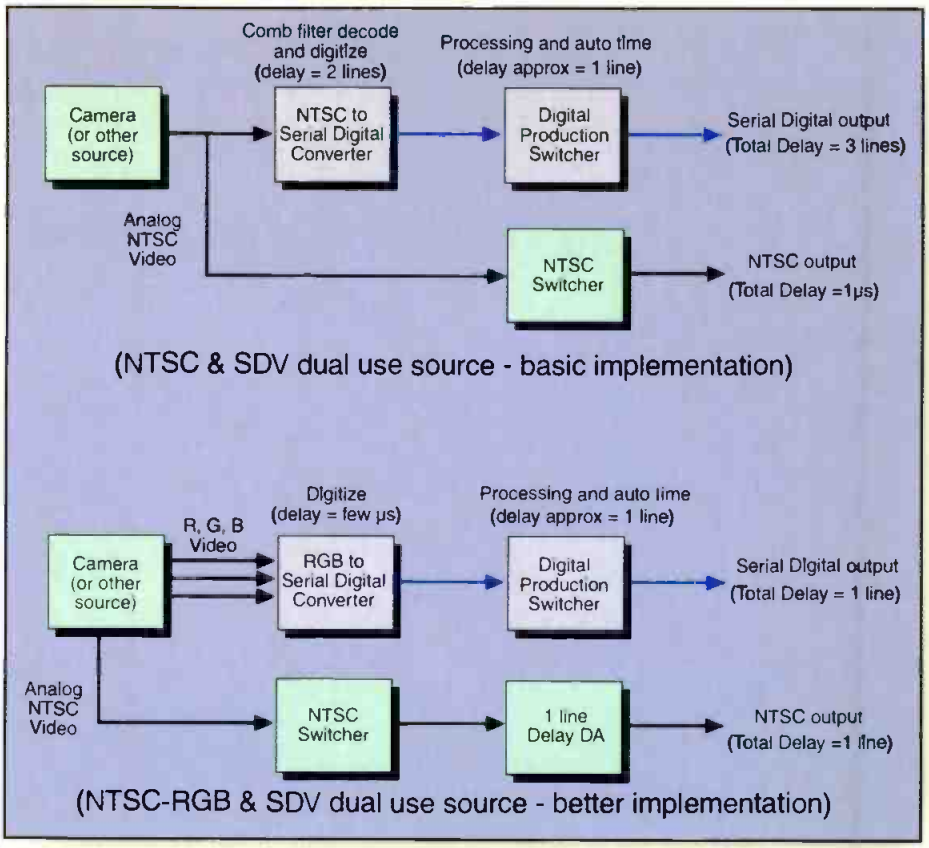


Figure 4. NTSC vs. component implementation where a camera source is simultaneously used by an analog system and a digital switcher.

A hybrid facility can consist of many different paths, and these should be timed to match the longest path. This is typically the "NTSC-to-digital" path. The example in Figure 5 is one example to illustrate the problems involved.

Video networked timing requirements

The advent of video networking does offer solutions to audio and video timing problems. Video and audio information stored in file servers has corresponding tags to indicate the correct video-to-audio relationship of the files to each other. As video file servers do not store sync information, the video file server simply has to play out the audio and video correctly synchronized to each other when needed with the correct sync inserted. Any processing required is performed either directly on the data or by playing out the video and audio to a production suite for combining and processing then re-recording. All equipment used should maintain the correct relationship between signals during the play and record processes so timing problems should be few. The timing problem with file servers is normally more one of file transfer bandwidth than of individual signal timing.

Timing an entire facility as it changes from analog to digital and then to a networked facility can be overcome, provided all of the problems are understood from the outset. ■

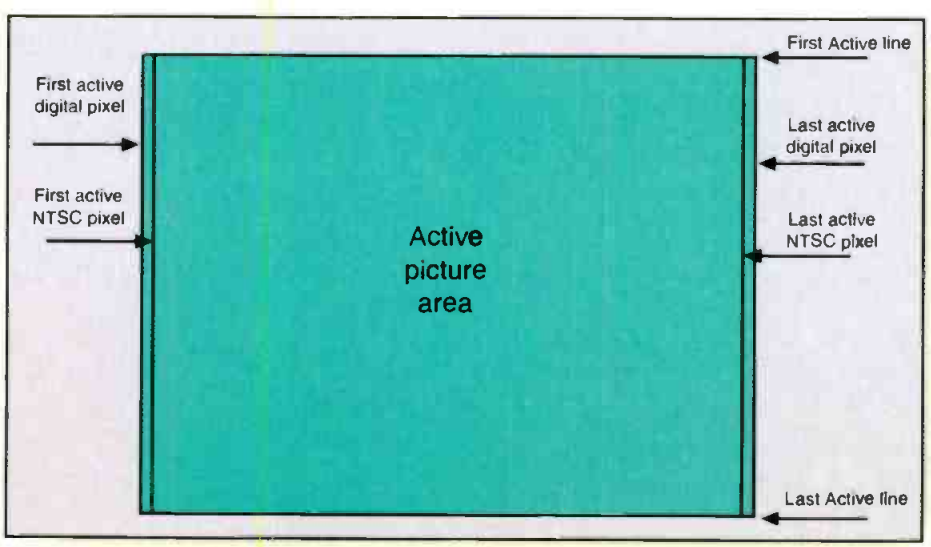


Figure 5. Serial digital video picture timing signal.

Mike Betts is senior partner of Broadcast Training Partners in Nevada City, CA.

BY JIM SALADIN, SENIOR ASSOCIATE EDITOR

BROADCAST ENGINEERING SALARY SURVEY 2000

Broadcast television's transition to digital has translated to many things for engineers – a steep learning curve, long hours, new equipment and new ways of doing old jobs. But with a great deal of the responsibility for that transition placed squarely upon their shoulders, have industry professionals seen monetary gains in balance with their increased workloads?

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That's the question *Broadcast Engineering* set out to answer in its 2000 Salary Survey. 2750 surveys were mailed out to randomly selected readers spread across three different segments of the television industry (broadcast, cable and production) and four different job titles (VP/DOE, chief engineer, staff engineer and operations management). To further stratify the results, they were divided by market rank, either Top 50 or Below Top 50, and presented in context with earlier surveys from 1997 and 1998. In addition to querying our readers about salary status, we also asked some interesting questions about implementation budgets, the replies to which yielded some insight to the industry's support of the digital transition.

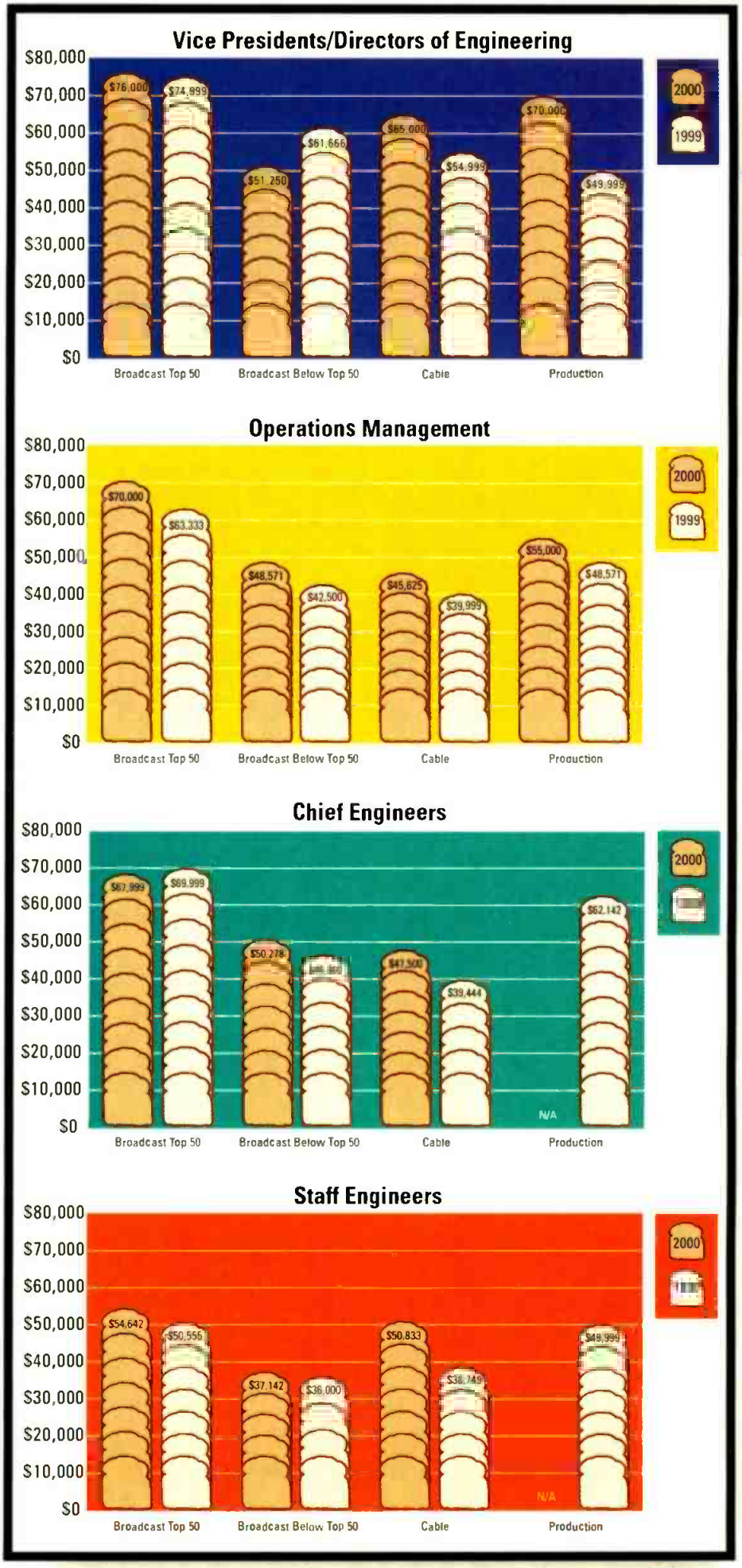
The salary results

Vice presidents and directors of engineering are, logically, the most likely to see wage increases in the first waves of the transition to digital. They are the individuals largely responsible for fashioning a station's plan of attack and for implementing staff structures to smooth what is inevitably a bumpy ride.

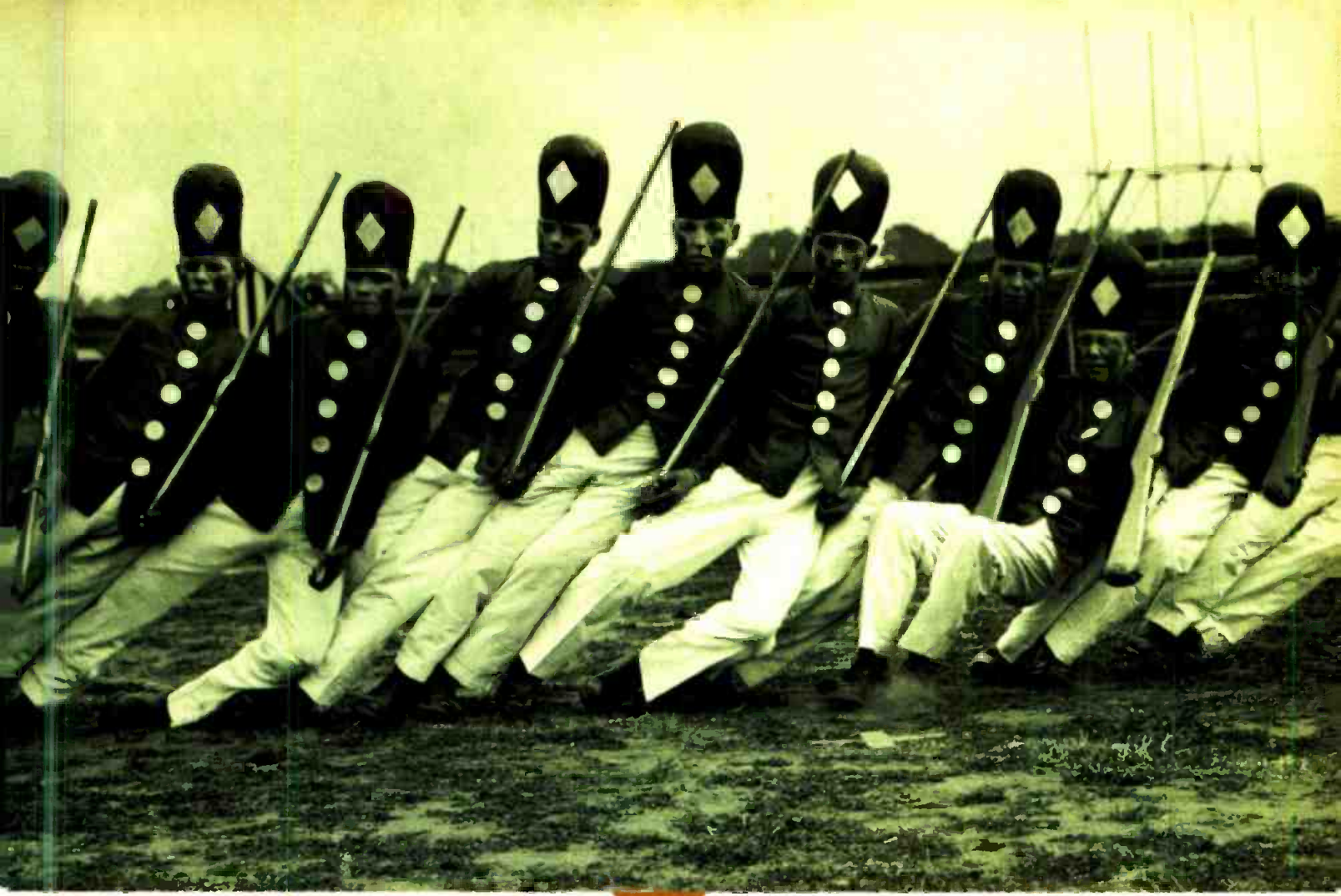
That logic is not borne out by the results of the survey. Respondents in the Broadcast Top 50 saw only minimal gains since 1998, moving to $76,000 from $75,000, while Below Top 50 saw a marked downturn, to only about $51,250 from a high of $61,666. Both cable and production segments saw healthy gains over the last two years, with the average Cable VP/DOE increasing to $65,000 from just under $55,000 and production executives making an even more substantial gain — to $70,000 from $50,000.

The numbers for chief engineers provided a little better news for small market stations, with Below Top 50 increasing about 10 percent to $50,278. However, Top 50 took another hit, decreasing from a high of $70,000 to just under $68,000. Salaries for cable CEs made a healthy move to $47,500 from $39,444.

Results for staff engineers were mixed as well. The cable segment showed another strong rise, to $50,800 from



A dramatic upward salary trend has not materialized for most of the broadcast industry. Most segments have seen little increase, while others, like small market VPs/DOEs, have seen marked declines.



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$38,750, and Top 50 saw a solid 8 percent increase to $54,642 from $50,555. A relatively flat 3 percent increase was reported in the Below Top 50 segment.

Contrary to returns from the three other job title categories, operations management saw strong increases in all categories. Median salaries in broadcast increased 11 percent in larger markets to $70,000 and 14 percent in smaller markets to $48,571. Cable and production segments saw similar gains, to $45,625 and $55,000 respectively.

The question of certification

Is it worth the effort to gain SBE certification? The answer to that question depends largely upon where you currently reside in the engineering hierarchy.

Overall, the percentage of engineers holding SBE certification has moderately increased since the 1998 survey, to 28 percent from 23 percent, with the most significant change occurring among chief engineers (to 36 percent from 26 percent). If you are a VP/DOE, SBE certification is something you should look into. Those holding some level of certification reported a 19 percent higher salary, $73,571 vs. $61,666. However, salaries for chief engineers and staff engineers held consistent regardless of SBE certification status. So from a salary standpoint, SBE certification does not necessarily translate into a salary advantage.

Other indications

A great deal of information not specifically related to the salary numbers above was collected, and it presents a more fully realized picture of the status of the broadcast industry and those who work in it. For example, an overwhelming majority of broadcast and non-broadcast professionals received salary increases over the last 12 months. In broadcast, the percentage seeing increases remained consistently above 80 percent regardless of job classification. The numbers for non-broadcast were not quite as high, though still firmly in the majority – between 72 percent and 85 percent. Regardless of job title or industry segment, professionals received, on average, a 4 percent increase. Staff engineers in broadcast facilities received slightly lower salary increase (3 percent), while non-broadcast VPs/DOEs received 5 percent increases.

Age also plays a part in the wages of industry professionals. Average salaries can be expected to continually rise until the 50 to 59 age range, where they level off. Salaries for those 60 and older can be expected to drop marginally but remain in the mid- to upper $50,000s.

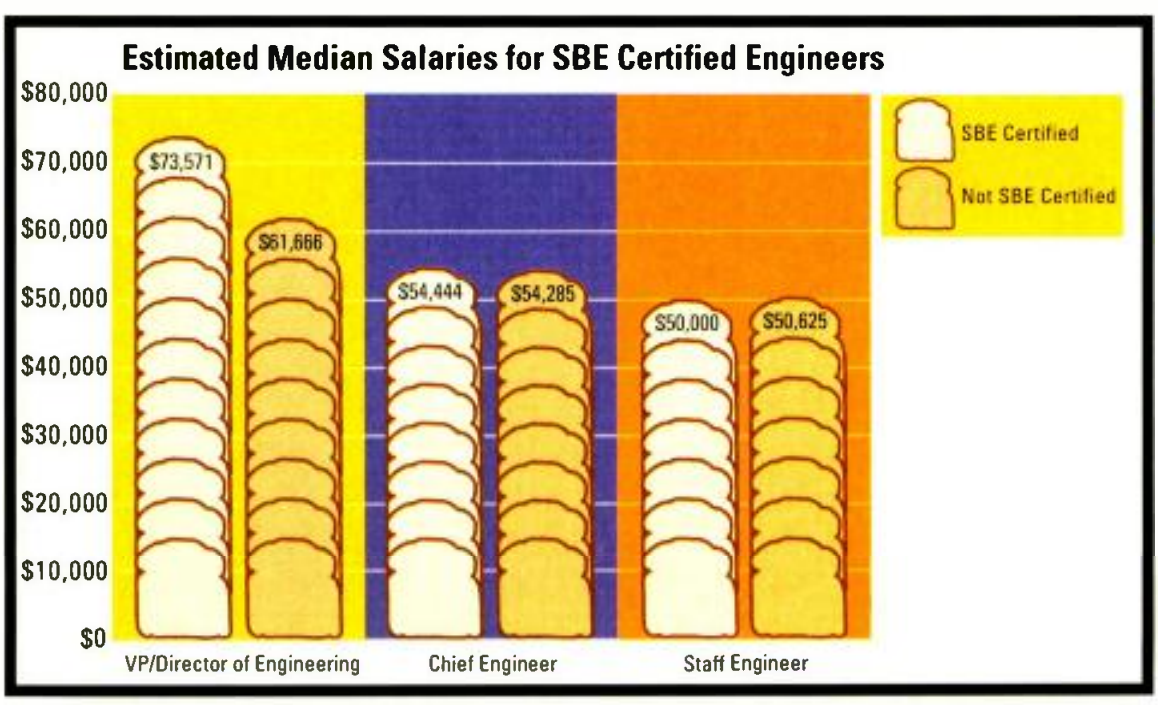
A surprising number of respondents also participate in part-time or freelance work within the industry. Operations managers in cable or production facilities are the most likely to be involved in additional part-time or freelance work, with nearly half (47 percent). Non-broadcast chief engineers are the least likely to take on additional work, with only about 26 percent supplementing their incomes.

Salaries for chief engineers and staff engineers held consistent regardless of SBE certification status.

Industry investment

Perhaps the most telling results contained in this survey are in answer to the question "What is your station's year 2000 budget specifically for the implementation of DTV?" The results speak volumes about the commitment of large market and small market stations. It was expected going in that large market stations would be investing more in the transition for two reasons – they're affected by an earlier DTV deadline and, being larger markets, they have more money to spend. However, what was not expected was the relatively small amount of funding the majority of stations are aiming toward their impending conversion to digital operations.

For 2000, only 12 percent of small market stations had dedicated $1 million or more to the transition and



While SBE certification proves to be a boon to executive level positions, its influence is negligible for the other job segments, with certified and non-certified salary levels registering as virtually equal.

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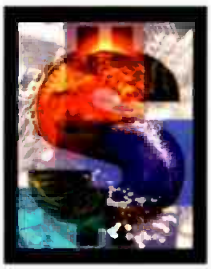


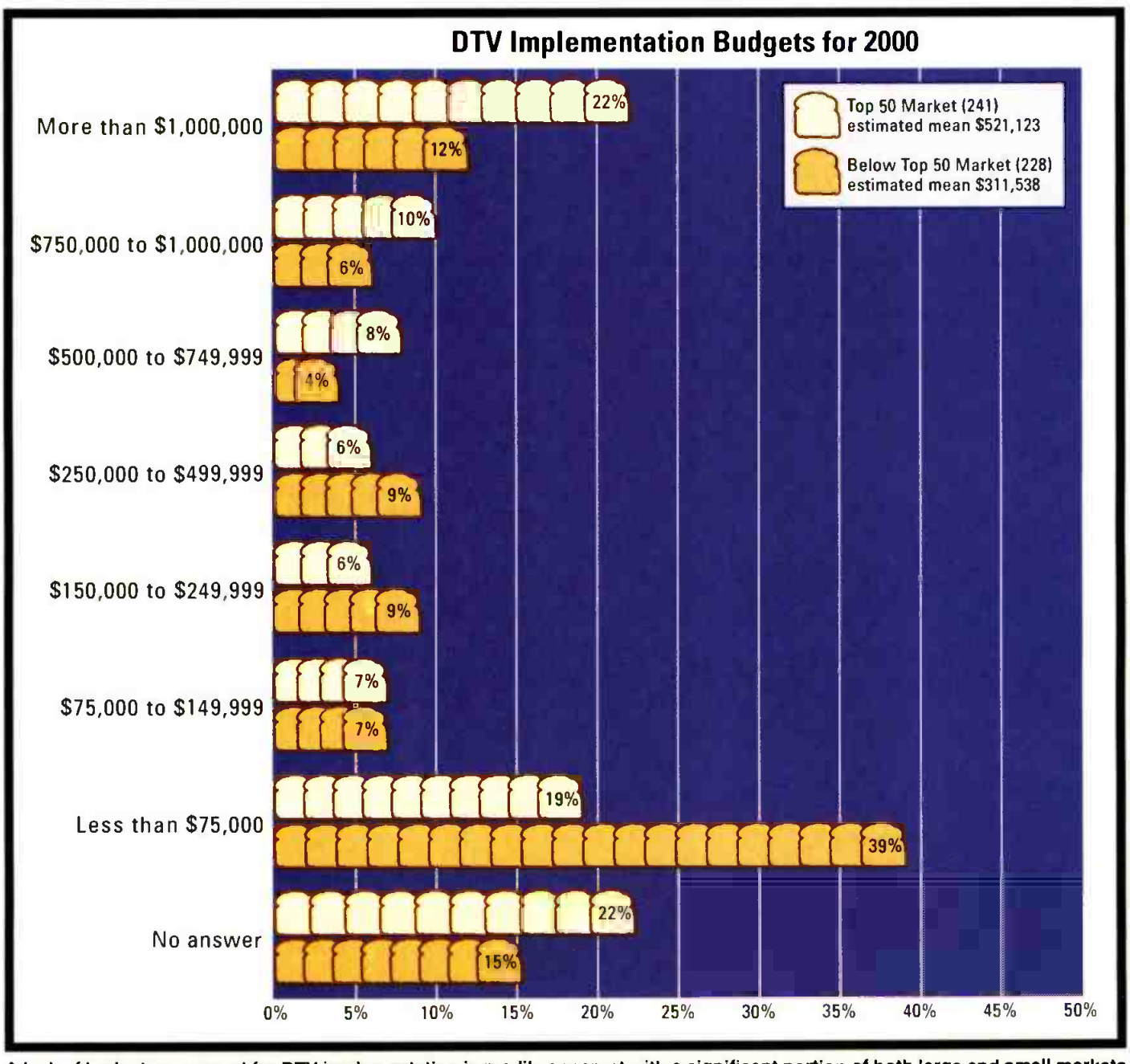
only another 10 percent clocked in between $1 million and $500,000. Of large market stations, only 22 percent were planning to spend at least $1 million for digital implementation. Another 18 percent came in between $1 million and $500,000. Given the obvious expenses related to going digital, it is hard to imagine that even those spending up to $1 million are giving serious consideration to an immediate, meaningful digital signal.

On the flip side of those numbers, 19 percent of large markets and nearly 40 percent of small markets had budgeted less than $75,000 toward the digital conversion – hardly enough to buy a digital VTR. With a May 1, 2002, deadline looming, that $75,000 hardly translates to a real commitment. The lack of investment by large markets is less shocking when you consider that a number of them have already made the digital conversion and are budgeting less for equipment. However, the question of small markets, those stations that should be in the full swing of digital production, the results for broadcast, whether in small or large markets, are mixed. Though this survey provides an accurate snapshot of the broadcast industry in 2000, the picture of where we'll stand remains out of focus. ■

transition, remains open.

What that transition to digital means to the bottom lines of broadcast professionals also remains an open question. While the changes in our industry are largely benefiting those in cable and

19 percent of large markets and nearly 40 percent of small markets had budgeted less than $75,000 toward the digital conversion.



A lack of budgetary support for DTV implementation is readily apparent with a significant portion of both large and small markets planning less than $75,000 for their digital transitions.

It would take a lengthy scientific explanation to describe how "Pipeline" affects time. So let's stick to a subject we all understand: Money.

Sure. We could trot out our technical types to clue you in on the aspects of quantum physics and relativity theory that allow "Pipeline" to do its thing. (Which is delay both audio and video–together or separately, in the same or different amounts, for anywhere from one to ten seconds, in any worldwide standard, without data compression.) But that would soon become tedious.

However, when we say that it does so for a fraction of the cost of any device with comparable capabilities, your interest (and your ears) will perk right up. The Pipeline is currently being used to correct today's overprocessing problem of audio/video delay offset; multi-path transmission audio/video delay offset; censorship; and large screen sports and entertainment lip sync.

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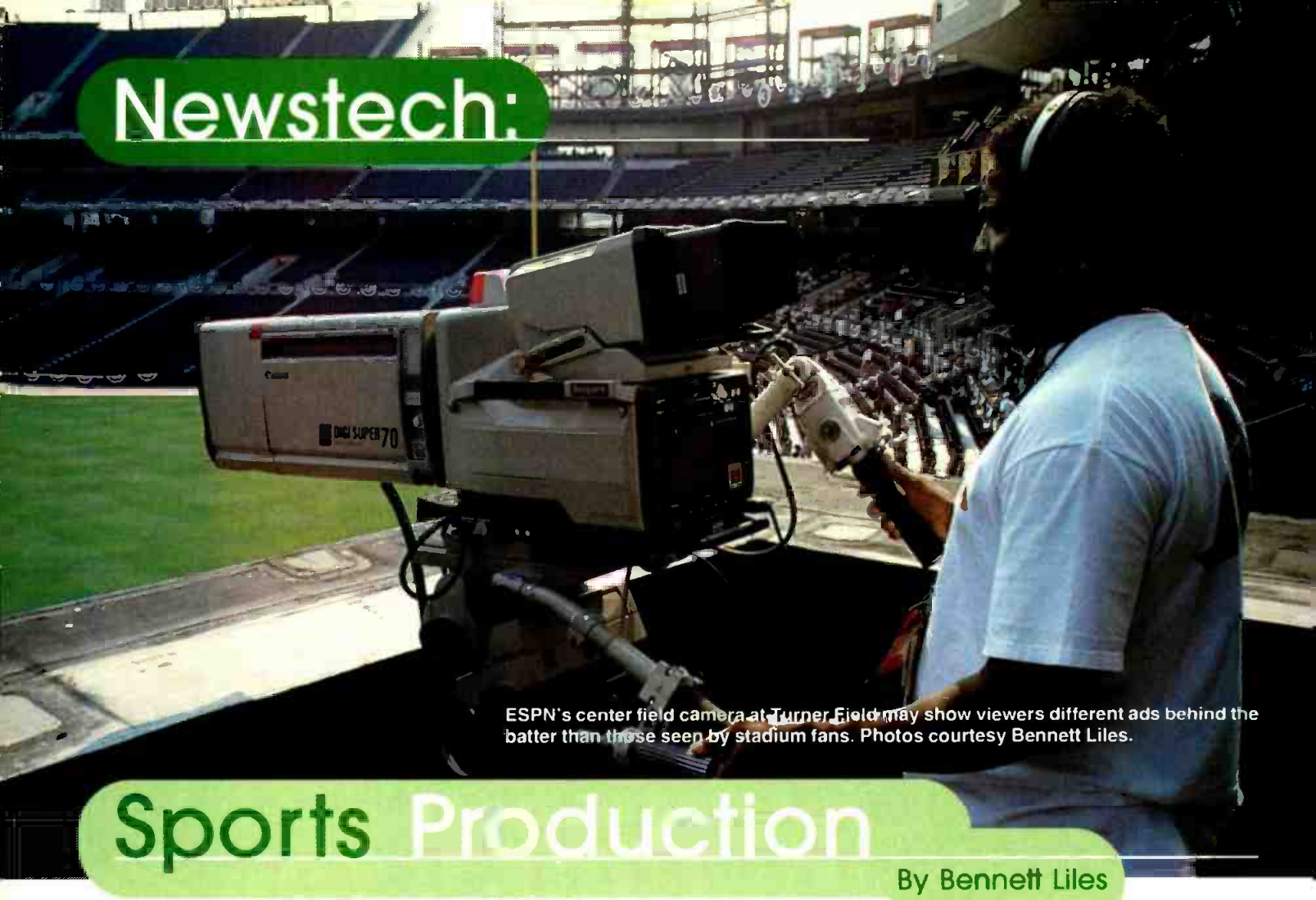

ESPN's center field camera at Turner Field may show viewers different ads behind the batter than those seen by stadium fans. Photos courtesy Bennett Liles.

Newstech: Sports Production

By Bennett Liles

Of all the formats of television production, sports coverage is unique both in the types of personnel required and the equipment and configuration of the production truck involved. The only script is the game schedule and rulebook. The outcome is rarely predictable and the crew has to be ready for anything.

Primarily, sports coverage is a numbers game. There are scores, player numbers and statistics to be organized and presented in a dynamic view on demand. Multichannel character generators and fast operators are a must. Success here often depends on careful pre-game or pre-game-date assembly and storage of names and player stats. CG and tape are the most heavily involved elements during the pre-game production where ten-things-at-once displays are made to happen with the push of a button during the game. A recent addition to the already heavy graphics load in sports has been the introduction of real-time relay and display. In football, this would include hang time of a kickoff presented as a running stopwatch. In baseball, the speed of a pitch and the speed of the batted ball can be shown as a dynamic cell in a corner bug where the ball/strike count and base runner graphic is often included. At Turner Field in Atlanta, this information comes from six laser guns mounted at strategic points. The speed data is sent to the truck, into the CG and through the video switcher. Instantly, viewers know how much wear and tear the game is putting on Greg Maddux's arm, in one mile-per-hour increments. The stadium also has a robotics op position from which a battery of robotic roof cams and announcer cams are run. These individual video lines are also fed to the truck via the stadium breakout panel. This is a massive eight-foot wall of audio, video and camera connectors bringing signals to the truck area from all points in and around the stadium.

Also busy on pre-game vignettes are the tape operators. While some trucks have the replay ops in the production room with the director, the more typical plan is for all these people to be seated in a row in the tape room. Each has a slo-mo controller with speed lever and a video switcher to select input sources independently. Usually, each replay op is assigned one or two cameras to capture and play back. A fairly recent addition to the tape room

> The speed of a pitch and the speed of the batted ball can be shown as a dynamic cell in a corner bug.

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Newstech: Sports Production

is the EVS or "Elvis" as it has come to be known by its operators. This is a digital hard drive video controller for storage and playback, and it can handle multichannel play and record operations simultaneously—a valuable feature during pre-game production. The operator sits in front of a quad split monitor that shows the two inputs at the top and the two outputs at the bottom. While a field interview is being recorded with manager Bobby Cox on one channel, video replays of game moments to which he is referring can be searched on the other channel and tagged with labels like "Chipper Jones big hit 1" or "A-Jones game save catch." The simultaneous building and recording can be done by a single operator.

Many systems are now equipped with the "ad cam." In baseball coverage, this graphic tool puts an ad banner behind the batter as seen from any chosen camera. This is often the outfield camera that shoots over the pitcher's shoulder as the pitch is thrown. The ad, only seen by television viewers, can be changed at any time and shown for the entire game or just for certain innings as previously arranged between the sales department and clients.

The main production benefits of digital trucks are delivered to viewers in the trucks' audio and video switching capability. Video switchers for sports production are heavy on effects banks and "e-mems" in which various dynamic and repeated effects are stored for instant recall. The graphics-heavy nature of sports production puts a heavy load on the video switcher. Good organization plus the routing versatility of

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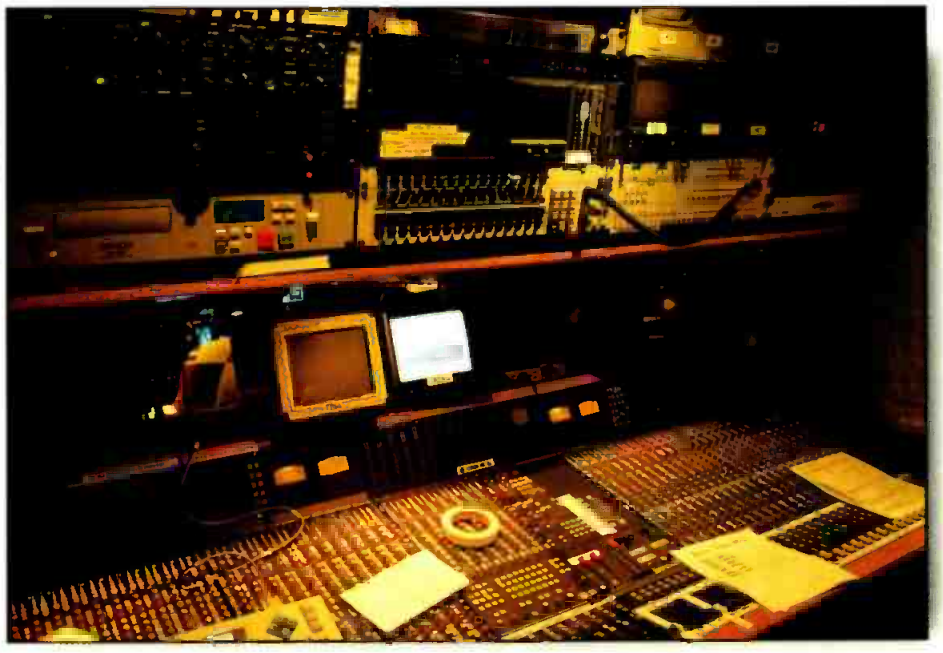

The audio section needs a large, fast mixer with conventional knobs and faders.

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this tool makes the most notable difference between a super show and a host of viewers reaching for the remote.

At the camera end of the cables, there are features that make life much easier for directors and camera ops alike. Instant replay is king in sports production, and while the replay operators are individually switching various cameras into their replay machines, the camera people can know instantly if they are serving on a replay camera through the use of "iso tallies." These small green lights are located on the back of each camera, next to the red line tallies. The camera op can instantly know not only if the camera is on the line live, but also if their camera is being isolated for instant replay without requiring extra chatter on the intercom. As soon as a replay operator selects a camera for input to a replay machine, the green iso tally informs the camera operator. For arena sports like football and baseball, 1:70 lenses get in close at great distances, but lesser zoom ranges may be used for tennis and other more close-in events. Experienced operators are needed with these focal lengths as the action is fast while the depth of focus is razor thin.

A handy routing feature, regardless of the game, is talent-to-director talkback.

Even though effects returns are now standard equipment, sometimes this is a feature that is left inactive or uninstalled. For sports, the effects returns (hopefully two) must be in good working order. The graphic-heavy nature of this format means that names and stats will frequently be keyed over cameras. When renting a truck for sports, it is vital to make sure that the effects returns are installed, configured and actually work when the truck rolls in.

Listening in

One less obvious but very effective area where sports production has dramatically improved is in the realm of sound. Where once a single crowd mic hung over the announce booth railing was standard, now we must have the crack of the bat, the growl of the umpire and the smack of the shoulder pads. For effects, shotgun mics have been augmented with parabs. This is an area in which TV sound learned from radio. For sports of almost any type, these two mic types should be in abundance on any production truck and they should be capable of both RF and cable linking to the mixer. Frequency agile RF mics are basic due to the fluid and often uncontrolled situation with RF coordination. For the sound people, an RF spectrum analyzer can spot RF coordination trouble sprouting like grass on its display.

Particularly in auto racing, RF management is serious business because the competitors themselves rely on it so heavily.

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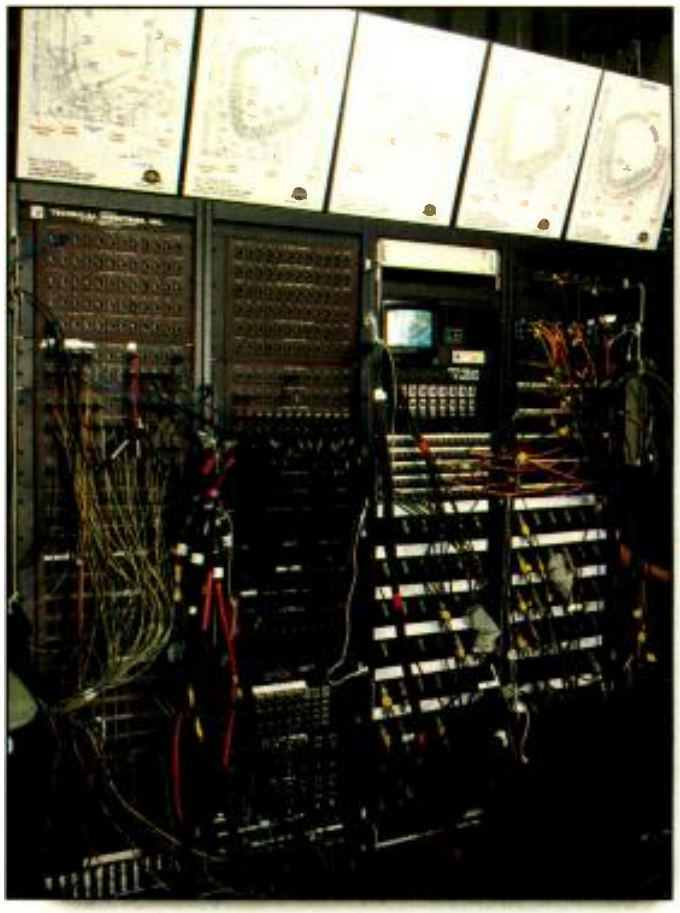
can be saved and control of routing and input channel EQ is virtually infinite. Some trucks have gone a little too far with this, installing sound boards with an array of starship-like touch screens that must be navigated for every adjustment. This works in the recording studio, but on sports production the audio board must be fast. For most adjustments made during production, conventional knobs and faders still work best in the trenches for sports sound. Good compressors are an essential element usually found lacking at the game's first big play when the announcers begin shouting. These should also be isolated on the announcers' mics to avoid having the crowd sound "pumping" up and down with the commentary. For the sound op, a variety of different sizes and types of monitor speakers are needed, including a strong cue speaker that can be operated at a fairly high volume level. A handy routing feature, regardless of the game, is talent-to-director talkback. That is, a way for the booth announcers to talk at will to the director even when their mics are not on the program line. Discussions need to occur during commercial breaks and other tape segments. This pre-fade announcer mic signal can be brought to a separate speaker at the director position or fed into his or her intercom station through auxiliary program input. It is also great for the sound and tape ops to have this feature. This enables a tape operator to work privately with announcers beforehand in producing pre- and post-game segments. Up in the booth, heavy-duty sound isolating headsets with windscreened boom mics are standard issue for talent who generally operate in a high ambient noise environment. Dynamic headset mics prove to be the most rugged yet full-ranged type for the close-mic shouting of play-by-play talent. Most announcer units come as a small box with a cough switch and headphone volume control. Many sports announcers prefer to have an uninterrupted line feed in one side and the IFB interrupt on the other. The same sound sources usually apply to the camera positions. The line feed on one side and intercom on the other will allow camera people what they need to follow the action.



Turner Field breakout panel. Signals from all over the stadium feed through here and then on to the broadcast trucks.

The real challenge in designing, building or contracting for sports production is in balancing versatility with simplicity and reliability. This often involves equipment that is complex to set up but simple to operate. ■

Bennett Liles is an engineer with Georgia Public Broadcasting.

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Fiber for sports

BY MARY ADCOX AND JAMIE SILVA

Virtually every major city in theU.S. is outfitting its sports stadiums with hybrid broadcast camera cables that take advantage of fiber optic technology. With the advent of HDTV and other high-speed digital audio/video transmissions, the amount of data being routed to the broadcast truck is continuously increasing (multiple gigabits per second).

Fiber optic cable must be considered in order to properly "future proof" the infrastructure. Multimode fiber is best suited for applications in which links have many connectors that run less than two kilometers. However, the bandwidth of the fiber is limited due to modal dispersion. Conversely, single-mode fiber is best suited for longer distance applications (greater than one to two kilometers) and high data rate applications. Because the fiber is single-moded, modal dispersion is not a limiting factor and much higher data rates can be achieved.

Single-mode fiber is the fiber of choice to enable high data rate transmission, such as the non-compressed 1.5Gb/s HDTV signals.

Optical fiber must be utilized in order to transmit a fully uncompressed 1.5Gb/s SMPTE 292M HDTV signal for distances greater than 100M. For distances less than 100M, enhanced triax and coax cable can be used to transmit the serial digital datastreams. However, care must be taken when installing these types of cables to avoid degradation of the signal.

Because optical fiber is immune to both grounding problems and crosstalk from other cables and does not radiate energy, planning a new facility is less complex. With fiber optic cable, distance or placement no longer limits cable runs from the camera-to-camera control unit (CCU). Unlike enhanced triax and coax cable, the fiber cable can be run next to transformers, high intensity light sources, motors and other sources of "noise" without fear of signal interruption. Fiber cable can be run along rafters, up the side of the stadium, and/or through control rooms, without fear of damage or signal loss.

Powering the camera with the CCU at lengths greater than 1500M has been demonstrated in trials with major camera manufacturers. SMPTE standard 311M, "Hybrid Electrical and Fiber-Optic Camera Cable" gives minimum performance requirements for the cable: two copper conductors for power, two control conductors and two fiber optic strands for video and audio transmission. The copper power components allow the HDTV fiber-based camera systems to operate like the older triax systems, where the cable actually provides power to the camera. This is a big advantage when no local power sources are available for the camera.

Due to the distances and data rates required to broadcast sporting events in HDTV format, fiber is an essential element of the system. The standard fiber optic interface enables efficient and flexible datacasting, resulting in a higher quality image that can be stored digitally and recalled instantly with exacting detail time after time. ■

Mary Adcox is a sales engineer for Corning Inc. Jamie Silva, RCDD, is a cable design engineering manager for Mohawk/CDT.

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ESPN unveils new studio

BY LARRY DORMAN

ESPN's newest star debuted on Aug. 13 and has quickly established the kind of hip, formidable presence associated with the sports cable network's best-known names. A stylish yet completely functional place that Chris Berman, Dan Patrick and other ESPN anchors and analysts can call home.

"It was time for a change," said Kevin Stolworthy, vice president of studio production and technical operations. "The idea was to get our different shows working off each other to create the sense of a single environment — what we call 'seamless' programming. The goal was to achieve one feel, but with unique and distinctive elements."

ESPN's studio overhaul — its first since 1994 — was more than a year in the making, from its conception last summer through the recently completed construction phase. The impetus for change was quite simple, according to the people who were intimately involved in the project: make some changes or risk appearing stagnant.

"In television, sets and set design are very cyclical," said Rick Paiva, senior coordinating director at ESPN. "The time had come for us to take a fresh look at our set design and catch up technically and electronically with what's going on in the industry."

The results of a rigorous self-examination can be seen in a fully revamped studio that features a new set for *SportsCenter*, as well as in the new homes for programs such as *Sunday NFL Countdown*, *NFL PrimeTime*, *College GameDay* and *Baseball Tonight*.

ESPN hired Production Design Group. Ltd. (PDG) — the company

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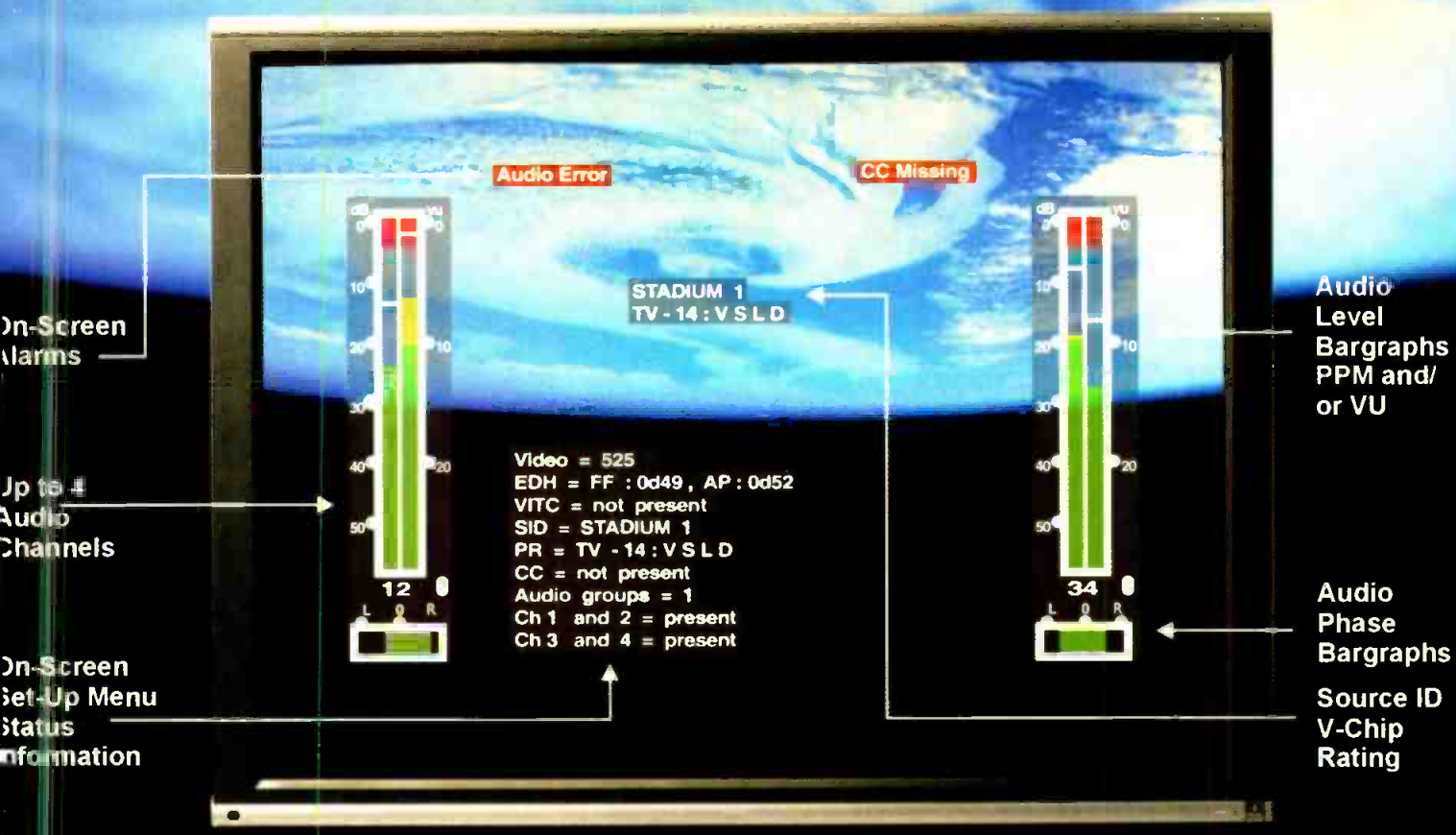

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ESPN unveils new studio

that created sets for *Good Morning America*, *Dateline NBC*, *Meet the Press* and *48 Hours* to create the new studio.

The design components include three specific show areas with desks seating from two to four anchors; an interview area with set anchor desk that also serves as a demonstration area for expert analysts; and a single anchor stand-up/interview area. These sets allow for more movement and diminish the sense of an overcrowded sports desk by comfortably allowing for more reporters and analysts to stretch out, walk around and use a telestrator if needed.

The new studio environment also embraces the latest technological innovation, particularly with the use of plasma and LED screens for *SportsCenter* and the NFL set. The 16:9 plasma screen is a thin display monitor that provides vertical graphic support alongside the anchor, instead of traditional over-the-shoulder graphics. The LED screens are used as background accompaniment allowing scoring and other statistical information to be displayed while sports anchors report the news.

The result of the collaboration between ESPN and PDG are impressive thus far. What was once a more stolid and functional set has been reinvented as a more action-oriented and information-driven arena teeming with the latest in sports news and analysis.

"We have loyal viewers. What we want them to take away [from the new studio] is a sense of ESPN as the center of their sports universe," Paiva observed. "We want them to subconsciously ask themselves, 'Why would I go anywhere else for sports information?'"

At the same time, ESPN is not trying to subvert the sports television medium by placing function (studio design and technological applications) over form (sports news and analysis). "Design for design's sake is useless," Noubar Stone, ESPN's creative director, pointed out. "We haven't reached our objectives if viewers only talked about the new set. We want people to appreciate the scenery and graphics as part of a more pleasurable way to see the whole news and information package that we present."

Said Stolworthy, "People watch us foremost for information. We don't want something that's gaudy or distracts for our viewers. We want people to feel the changes we've made, but ultimately it's all about the latest sports news and highlights."

ESPN also realizes that a fresh studio environment will not by itself increase viewership, ratings and revenues. However, an updated studio environment that further stimulates the information delivery process can only help to reaffirm ESPN's place in the ever-crowded mind of the 21st-century sports fan. ■

Larry Dorman is a sports and media writer based in Farmington, CT

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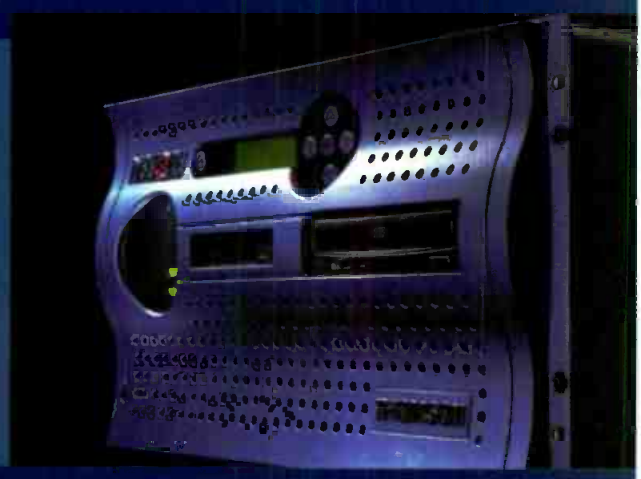

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Applied Technology

Studer's D950S with VSP: How to surround

BY STEFAN LEDERGERBER

Surround sound vastly increases the spectrum of creative mix-down options. The extra channels can be put to different uses, some of which highlight limitations of the mixing technology that severely hinder efforts to create a high-quality listening experience. This article will demonstrate a promising creative approach by examining the physical prerequisites and providing examples of practical surround mix-downs.

Surround today

There are two approaches to using the additional surround channels:

- Sound source imaging to the rear and sides. This may be considered an effect to be creatively deployed by the recording engineer.
- Creation of the impression of a genuine acoustic event, with so-called "envelopment" to give the listener a heightened sense of involvement.

A realistic-sounding envelopment is achieved by feeding the surround loudspeakers with signals corresponding to what would be heard from a given direction, including crucial side reflections generated within the perceived space. The most natural way to create an envelopment is to use an array of five microphones positioned similarly to the five loudspeakers and route their playback signals directly to the corresponding speaker channels. In most cases, though, the recording engineer has to create an artificial mix incorporating sonic corrections.

In order of arrival, the sounds reaching the human ear may be classified as direct sound, early reflections and late reflections (reverberation). Generating all three components as faithfully as possible for each of the loudspeakers requires knowledge of the sound source position for direct sound and early reflections. Realistically integrating a monophonic sound source (e.g. a single spot microphone or one track of a multitrack recording) in a surround image with envelopment requires generating these dependent on the panner position. The simplest place to achieve this is in the panner itself.

Surround sound vastly increases the spectrum of creative mix-down options.

Surround mixing techniques

Surround mixes may be roughly classified as follows:

- The surround channels are used simply as effects. Although arbitrary and flexible, this technique is unlikely to deliver long-term listening satisfaction.
- Impressive surround effects may be generated using a battery of delay lines, reverbs and other effects units with output routed to the various playback channels. Mixing is time-consuming.
- Surround music mixes can be made, preferably made from material that already contains dedicated surround signals such as ambience microphones positioned close to the live audience. Once a rough mix is established, the problem is surround fall-off as more monophonic signals are added, caused by a lack of envelopment matching these signals. The fewer mono signals a surround mix contains, the better the surround image. This means compromising between acoustic balance and the overall surround impression.

Virtual Surround Panning (VSP) technology in the D950S can be used to solve this problem. In conjunction with reverb, it is a complete room simulation and parameterized audio positioning tool that allows mono sources to be realistically imaged. One advantage over conventional panners is the ability to generate early reflections within a simulated acoustic space from the correct direction and at the correct time depending on the pan position. It also offers better directional imaging (left-right panning) by adding phase and frequency spectrum information to the customary amplitude difference between left and right loudspeakers. The newest version also provides for late reflections (reverb).

The technology was utilized in the November 1999 mixes of live recordings of the Proms using a D827 DASH Multitrack and D950S digital console.

The sound engineers began by establishing an enveloping surround image derived from the main and ambience microphones. Surround was perfect, but the balance and tone of individual instruments was unsatisfactory. Spot microphones were then added to the mix. Balance and tone were now right, but the good initial surround was swamped by the two-channel mix between the front loudspeakers. The logical corrective step was to increase the level of the surround channels and add a touch of ambience from the side between the front and rear channels. The surround loudspeakers were audible again, but in place of seamless surround were two separate sound images emanating from the front and rear speakers. Even with additional reverb treatment, the new surround image was significantly inferior to the original.

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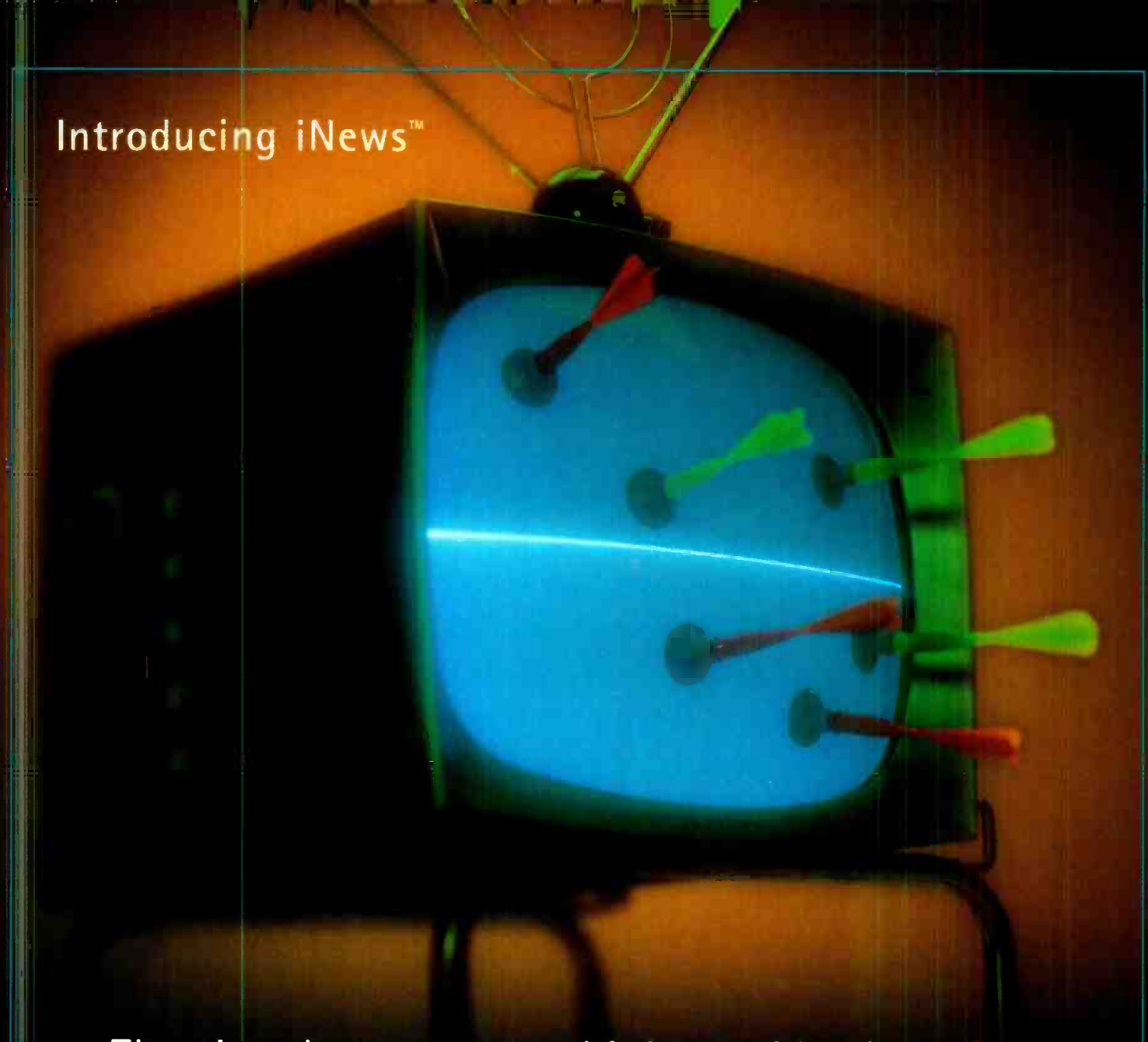
Virtual Surround Panning (VSP) technology in Studer's D950S, shown above, is utilized in mix-downs to create a realistic-sounding envelopment by integrating monophonic sources.

was activated in the spot microphone channels. First, the simulated room model was tuned to match the Royal Albert Hall as closely as possible. Then these reflections were subtly added to the respective pre-panned microphones. Despite the spot mics, the surround effect and envelopment returned. It was no longer necessary to compromise between the front soundstage and the surround effect. Subtle early reflections brought another bonus: The spot microphones could be inserted at the correct distance-impression in the sound image. It also eliminated the need to use a few external effects units, making the mix even clearer and more transparent.

Spatial perception hinges on positional reflections. Using surround to create a better image of the acoustic space clearly means paying more attention to these reflections. For the mixing desk panner to function as an effective positioning tool, it must also take into account position-dependent reflections. VSP in the D950S does precisely this and addresses many of the recent problems associated with surround mixing. Recording engineers can begin assembling a mix using a conventional stereo approach and experiment from there. VSP offers new creative freedom. ■

For more information on Studer's D950S with VSP, circle (450) on Free Info Card.

Stefan Ledergerber, el. Ing. ETH, is project manager and hardware engineer at Studer Professional Audio AG in Switzerland.



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SIZING automation TO FIT

Continued from page 85

device to be controlled by playlists on other device servers. Some also let the same device be shared by multiple playlists. Some systems have elaborate software that will automatically search the system for media not already loaded which is needed by a playback device, and will then copy the required material when found. The philosophy in selling device control is different among the various vendors. Some simply sell port capability, while others charge per device controlled. Plus, at least one vendor requires your software to be modified and re-compiled if devices are added. While on the subject of additional costs and fees, most vendors charge a yearly software and support fee. Plus, automation systems require a substantial amount of installation and training time at your facility. You get to pay for that also. Also, there are other costs associated with implementing automation. If you have a media management database for your commercial server already, can that database be converted for use by the automation database or must the inventory be reloaded back onto the server to create a new database? Although different databases will use the same server file format, you might have to reload media just to create an external database useable by the new media manager.

It is not unusual for even a small automation system to be comprised of four or five PCs. As mentioned already, many systems require not only a server PC, but also PCs supporting media management, on-air (controlling the air playlist), and one or more device servers. For the sake of operating efficiency and human ergonomics, additional PCs will often be required for various options, such as an installation running various event or playlists. The required PCs usually are connected via an Ethernet. This local LAN usually sits off by itself away from the

Automating an analog vs. a digital station

RICHARD TYRRELL-EAD

Digital television transmission produces new management challenges for stations. Multicasting, datacasting, electronic program guides (EPGs), and selectable subtitles and language audio tracks are only a few of the options digital transmission affords station operators. Yet, how does automation manage this transition from analog to digital and enable a station to optimize its resources?

Equipment

The difference between analog and digital automation starts with the equipment used for information management and transmission. While analog automation can work with tape and tape machines and requires no transmission information, digital automation stores material in video servers and can require CD/digital tape players along with control information for encoders/decoders. For transmission, analog requires no forward control of the transmitter, while digital transmission can require extensive control and information for the encoding and transmission process. Digital transmission can be transmitted terrestrially via ATSC signal, or can take advantage of Fibre Channel/ATM, WAN, LAN, and satellite allowing for centralization and reuse of material.

Asset Management

An analog automation system works with a database - tracking where a program or commercial resides (e.g. tape 1, 2 or 3). Digital automation requires a much larger, more complex database that coordinates encoding and transmission information for the program/commercial's metadata (e.g. multilingual names, descriptions, synopses, credits, V-chip information, CA and categorizations) between the business side (traffic and program control) and material management. Digital video servers provide for a second copy of the metadata to be stored with the clips and programs.

A database that centralizes transmission information is essential for digital transmission. Transmission information that resides in a common database synchronizes all of the transmission equipment with the information required for every piece of material transmitted. By centralizing these instructions (playlists) changes can be made once and all transmission components will follow.

Bandwidth

Analog allows broadcasters to deliver one channel per transmitted signal (pipe) to viewers. Digital compression allows a station to make choices. A broadcaster can choose to have one high-definition channel or choose to segment spectrum in a multicast environment (implement multiple channels). To keep overhead from going up, the station's automation system must provide the capacity for one operator to run these multiple schedules.

The Next Step

While you're counting the benefits of digital automation - improved productivity from integrating databases; simplifying a more complex operation than analog; providing a system that allows last-minute changes, reduces errors, and improves monitoring — look ahead to the next step in the progression of automation. As the availability of more customer-specific content increases, automation systems will provide broadcasters with more opportunity to re-purpose material into different pipelines of distribution including digital transmission, Internet, intranet and beyond. ■

Richard Tyrrell-Ead is director of operations and engineering for Columbine JDS DAL.

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LAN for the rest of the facilities. The gateway between the two is usually via the automation systems server. Some systems use high level communications schemes such as TCP/IP, but others use lower level schemes such as NetBEUI (NetBIOS Extended User Interface). NetBIOS is a simple protocol that allows quick messaging between PCs. It provides session communications over a LAN without a lot of overhead. NetBIOS resides on the Session and Transport Layers. NETBEUI provided a standard frame format for packets. Philosophies differ as to which communications schemes make sense when trying to control real-time events. Some get around any real-time delay problems by storing the event or playlist in the device server. That way the device server doesn't need real-time triggers from another PC via LAN. Others use lower level communications protocols that don't have the overhead that higher level protocols have. A drawback to the low-level approach is that you can't build an automation system over a WAN. If the automation network requires routers or switches, some low level communications schemes won't be able to negotiate those items.

Vendors also differ on operating systems used. While most use Windows of some flavor (often NT) on some computers, most do not for PCs acting as servers. Some feel that Windows has too much overhead for a real-time environment. These vendors argue that variants of Unix such as QNX or even O/S2, which allows loading only modules of the operating system required, are better choices. They further argue that real-time machine control needs a leaner OS geared towards real-time events. Most agree though that "business" type apps, which comprise a major portion of automation system software, do make sense running on Windows. That said, there is at least one automation vendor that has been successful building systems that ran totally on DOS, and now on Windows. The mix of OS can affect how a system handles real-time commands such as starting events or commercial breaks, on the fly. Some handle these situations better than others.

So besides a bunch of server-and-client-type PCs, plus a chunk of LAN, automation systems are a collection of software applications often running on a couple of different operating systems. This software is often centered around one or more databases, and a messaging system to let the applications distributed on various PCs stay in sync. The user applications manipulate the database(s), and the database are used to create activity (event) lists that end up in device server PCs that drive RS-422 (or GPI) ports that command the physical layer to do the bidding of the operation and business layers above. Automation needs to act as a component, albeit a large one, that is part of the larger station system. Automation systems promise two things: efficiency and fewer mistakes in your operation. ■

Jim Boston is an engineer with The Evers Group, San Jose, CA.

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Video servers: Serving from a daunting menu

BY JOHN LUFF

Since the invention of the hard disk there have been predictions that linear media, including video tape, will eventually disappear. Not even a decade ago, Tektronix heralded the arrival of what we now call video servers with a demonstration of the Profile. The Profile was a platform that Tektronix intended others to use for their own software and hardware, with the device acting as the video recorder in a variety of uses.

Initially, the video server market was severely constrained by limited capacity and the high bit rates necessary to produce quality reproduction of video. As a result, the applications that were the first targets were quite limited as well. In an interesting twist of technical progress, the first video server applications were often as cache recorders on the outputs of large robotic linear tape libraries. Until disks attained high capacity and became cheap, it would be a narrowly applied technology. Early servers could only store a couple of hours of quality video, about the same as videotape.

Soon 4GB drives arrived, followed quickly by 9GB drives, 18GB drives and larger. Today, servers are delivered with at least 50GB drives in arrays that can quickly reach terabyte sizes. Within the next year, drive sizes will exceed 100GB in commercial use.

Clearly, servers have penetrated areas that few would have thought of 10 years ago. Professional video servers play music videos in clubs, and they are used in homes to timeshift programming under the control of sophisticated automation systems. The last 18 months have seen the introduction of the PVR (personal video recorder), a consumer video server with embedded applications that allow timeshift recording of hours of media MPEG encoded and stored on a hard disk in what can best be described as an appliance.

A review of the technology quickly shows that servers are simply computers with:

- relatively conventional operating systems (NT, Unix, VXWorks and Mac);
- relatively conventional hard drives from a range of manufacturers;
- disk I/O controllers for RAID and non-RAID arrays (or single drives); and
- I/O cards supporting analog and digital interfaces.

There was a sentiment openly touted by more traditional server manufacturers that the computing industry did not support the unique requirements of real-time, isochronous delivery of video that broadcasters need. In truth, it may well have been true to a degree at one time. Now a number of familiar names in the computing industry are supplying hardware with superior networking capabilities and the deterministic delivery that replicates the performance of a VTR or a more traditional video server. It remains to be seen how fast these computer industry companies will learn how to market to the video industry, but their scale will enable them to be formidable competitors.

At one time there was a distinct division between video servers and editing systems. Now, as the market has begun to recognize that the need to store final product on videotape is less important for some applications, the lines between the two principal market segments that use digital video on disk have begun to blur. Server manufacturers have begun to supply editing applications for news. With cross-platform compatibility between the compression used in editing systems and that used in video servers, it is entirely practical to look at the interconnected web of servers and edit stations as a seamless whole. Unfortunately, there are still barriers to implementing such cross-application systems without significant expertise and likely a healthy dose of assistance from the manufacturers involved or specialists in integration.

As part of an editing environment, video servers can offer some features that simple editing systems cannot easily replicate. Servers are optimized for recording and playback of high-quality pictures. But if two copies are recorded, one at high bandwidth and one at low bandwidth, it is easy to see how both full-quality playback and low-quality browsing can be done on one integrated database of video clips. If the server ingests remote feeds, for instance, producers can view those assets immediately from network-attached workstations. Decisions about cutting a news story can be passed on as an e-mail or cut list to an editor who can assemble the cut story in a nonlinear playlist without destruction of the original media. It is likely the media does not need to be copied but rather played from the original clips in fragmented nonlinear media. Perhaps a cut copy will be made, and a low-resolution proxy copy, so that the large quantity of ingested but redundant material does not need to be kept for archive purposes. Just as the outtakes from a motion picture may well be 12 to 20 times the final cut of the movie, broadcast news creates a similar shooting ratio. In broadcast sports production, it is common to make a "melt" reel with the few minutes of truly important archive material copied off to a source tape for future use. In the same manner, the archive in the tapeless facility may only contain a few minutes of useful material, and delete the hours of video shot on the courthouse steps without any useful action happening.

Servers consume storage space voraciously. There are a number of methods of attaching storage to the I/O engines. One could build a disk array that is separate from the operating system's storage and let a special purpose controller have exclusive access to the media disks. Or, as is sometimes the case with DV I/O cards, the media

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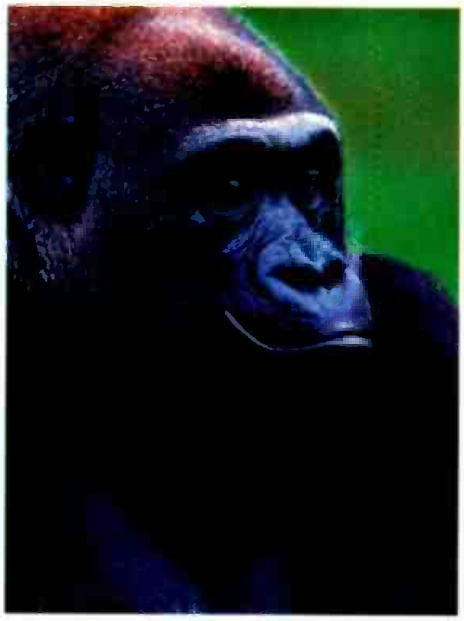

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may well be part of the space the operating system directly controls. Giving the operating system access may increase the range of capabilities for archive and networking of stored media.

Many manufacturers have created shared storage concepts where the media is placed in a pool of network-attached storage. The media drives might be on the same network as other network resources and workstations or on a separate and distinct media-only network where only appliances that need to access the media files directly are resident. Making the media available to a broad range of applications and hardware enables play-to-air and editing stations to share the resources in a peer-to-peer configuration. Management of the media may well become complex in such an environment.

When the media is no longer needed in the near-line and online operations, it can be pushed to an archive device under control of software that keeps track of the location of the assets and facilitates calls to the media library. Often called *asset management*, this process is one of the least understood of the pieces of the growing universe of server and media management devices. In an interesting twist of fate, the cheapest storage for the data that represents the media is again a linear tape-based media, but not one designed for linear playback. They are cousins of linear videotape but distinct in that they offer none of the stunt modes, editing features, control panels or monitor outputs of more conventional digital video recorders. Rather, these computer "back-up tapes" are intended for random access of file-based media. Indeed it is a useless device unless under the control of software needed to load and access files.

Another topology for server storage is termed by one manufacturer as clustering. In this approach, media and I/O are distributed in a homogenous network that allows a server network to extend into the wide area network (WAN). Control of the network of clusters can allow local automation of an I/O and network manipulation of the location and use of the media at the same time. The output in one city could, over the WAN, well be playing media located in another city.

With the ability to build huge and inexpensive arrays of disks with protection from the failure of a single drive, we now see server implementations with hundreds of hours of high-bandwidth video online. Archives have dropped in cost and are rising in storage density as well, with tens of terabytes quite normal in small archives (a terabyte of disk space would be just twenty 50GB disk drives, costing perhaps $25,000). Petabytes are commercially available (a petabyte is a thousand terabytes, or a million gigabytes). At 8Mb/s, a terabyte could represent over 200 hours of content, and a petabyte of video would play for 22 years. It is not difficult to see how this impacts the decision to build facilities with huge online libraries. It is also not hard to see how this moves video into the province of the computer manufacturers, who have vast experience in controlling these complex arrays of devices, which provide access to data online. ■

John Luff is president of Synergistic Technologies in Canonsburg, PA.

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GRAPHICS GENERATOR

Pixel Power Clarity SD: CG, still store and paint system for standard definition; developed to provide broadcasters with a flexible upgrade path to HD; offers the full feature set of Clarity HD, along with support for dual-channel SD, dual-channel SD and single-channel HD, quad channel SD, or dual-channel HD; +44 1223 721 000; fax: +44 1223 721 111; www.pixelpower.com.

Circle (365) on Free Info Card

AUTOMATION SYSTEMS

Utah Scientific Max-MC: master control automation system allows a station to create a master schedule for facility hardware via a network; compatible with most master control systems and designed to retain the advantages of each individual system; features include playlist generation, server controller and custom traffic interfacing; also provides editing tools for entering and changing schedules; 801-524-9999; fax: 801-524-0555; www.utahscientific.com.

Circle (366) on Free Info Card

TRANSCODER

Extron YCS transcoder: encodes and decodes between composite video and S-video, simplifying NTSC and PAL video integration; can convert NTSC 3.58 or PAL video; buffered loop-through on inputs; utilizes three-line adaptive comb filter for crisp, stable output with a minimum of video artifacts and almost no chroma noise; 800-633-9876; 714-491-1500; fax: 714-491-1517; www.extron.com.

Circle (367) on Free Info Card

NEW SOFTWARE FOR DTV SERVER

Accom Abekas 6000 MultiFlex 2.0: provides new features including VITC save and playback for storing vertical interval timecode with each recorded clip, and support of 72GB media drives to increase storage capacity for a single server by 65 hours to 192 hours; also allows up to four tracks of audio embedded into the SDI video input to be recorded onto the Abekas 6000; users may define segments of existing clips to be moved or copied into a new clip ID; 650-328-3818; fax: 650-327-2511; www.accom.com.

Circle (368) on Free Info Card

MPEG TRANSPORT STREAM SOLUTION

Grass Valley Group Flexistream: transfers compressed video for improved video quality at lower bandwidth; maintains editing flexibility and reduces the number of encoding and decoding steps by reconfiguring video inventory in the MTS domain directly on the server; allows the insertion of data into video streams; stores MPEG data as separate audio, video and data tracks to allow individual editing and customization of content; 800-998-3588; 800-547-8949; fax: 503-627-7275; www.grassvalleygroup.com.

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Where the Router Meets the Road

Our Designs are Customer Driven

Why do leading mobile production companies specify PESA routing switchers? Very simply, we listen to the needs of truck builders so we can handle their tough real-world requirements.

The **Tiger** 144x144 digital/analog router packs maximum switching power in a limited space. The video matrix fits neatly in 12RU, while a two channel audio switcher requires only 8RU! Talk about compact!

The **3500Plus** is a powerful yet easy-to-use Windows™ based controller that installs inside the router frame. You can restore multiple setups from disk and tweak configurations on-line. And you've got to see the selection of programmable panels.

Our **Truck Link** interface combines two separate routers into one powerful matrix. This allows you to keep two profit centers rolling and still handle the biggest high-profile assignments. Now that's a competitive edge.

Make sure your truck is powered by PESA Switching Systems.

Test drive one today

PESA Switching Systems, Inc.
35 Pinelawn Road, Suite 99E
Melville, NY 11747
Tel: 631-845-5020
800-328-1008
Fax: 631-845-5023
www.pesa.com
salesinfo@pesa.com

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PESA Switching Systems

SCRAMBLING TECHNOLOGY FOR POWERVU PLUS

Scientific-Atlanta BISS: latest version of the PowerVu Plus now features BISS scrambling technology, which provides a secure method of transmitting satellite signals from one vendor's equipment to another's; standardized solution uses a fixed "session key" for each transmission session; BISS can be utilized especially well in digital Satellite News Gathering; the PowerVu Plus also delivers superior video quality, along with support for 4:2:2 and 4:2:0 profiles; other features include digital and analog outputs and DVB-ASI transport output; 770-903-5000; fax: 770-903-4617; www.sciatl.com.

Circle (358) on Free Info Card

ASSET MANAGEMENT SYSTEM

Keops Broadcast MediaWorks 1.2: application integrating asset management, low-resolution frame-accurate browsing and marking for generating cut-only EDLs; offers new ingest features such as indexing on timecode discontinuities; other new features include 3x faster rewind and fast forward, three new recording modes, source control for VTR devices and support for Grass Valley Group's PDR video servers; 514-876-2855; fax: 514-876-3664; www.keopsbroadcast.com.

Circle (374) on Free Info Card

IMPAIRMENT AND PERFORMANCE MONITOR

Pixelmetrix DV Station: modular multi-layer system simultaneously monitors up to 21 ports and multiple layers of the video transmission chain; allows tracing and pinpointing of RF, protocol, multiplexing and content errors propagating through the network; incorporates a Linux-based presentation engine and integrated LCD touch panel; 877-717-4935; +65 5474935; fax: +65 5474945; www.pixelmetrix.com.

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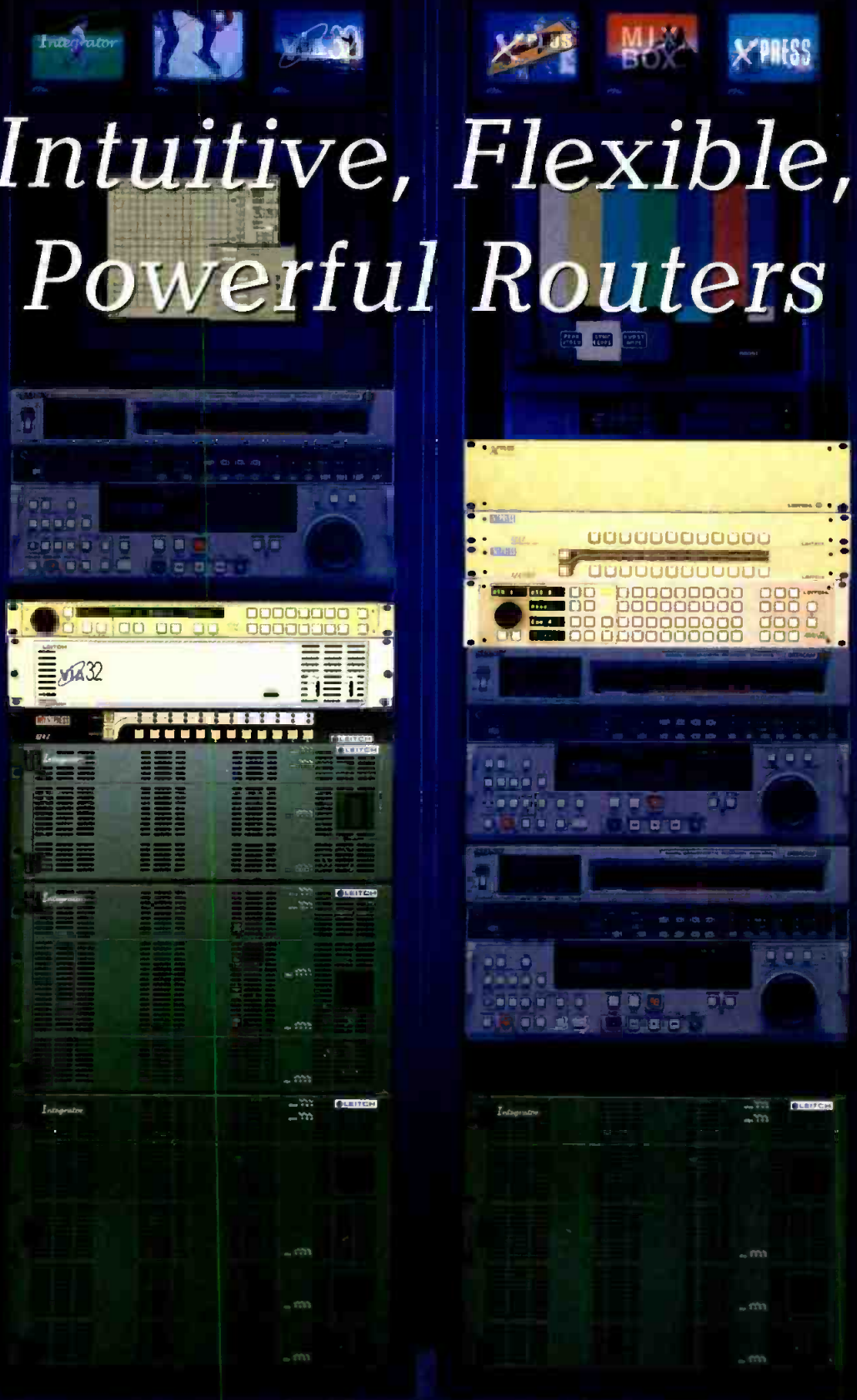
Leitch Knows What You Want...



Intuitive, Flexible, Powerful Routers

ROUTING SWITCHERS

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CONTROL SOFTWARE

The effectiveness of your router system is determined by the power and flexibility of your control software. Leitch routing software is the key to our distinction, providing the flexibility you need to change router and control configurations and the power you demand in a routing system.

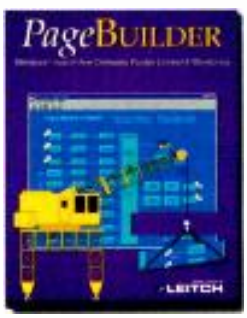
*Router*MAPPER™

Leitch's *Router*Mapper™ software provides a graphical configuration utility for configuring your routing system. It's easy to use drag-and-drop interface allows you to partition your matrices, configure tie-lines between multiple routers or assign specific functionality to buttons on your control panels. Configuring any component in your system only requires a download to that device (which can be done without affecting the operation of the rest of the system), so you never have to take your system down to reconfigure it.

*Page*BUILDER™

Take a picture, make a graphic, or choose practically any image file. Then, import it into *Page*Builder™ to create hot spots like those on the web. Simply click on these hot spots to perform router panel functions or to open other pages with more hot spots. You can even create machine-control interfacing to VLAN systems.

*Page*Builder lets you build a great status display (tally) because it follows your router status (see sample displays below). Imagine it as a QC panel.



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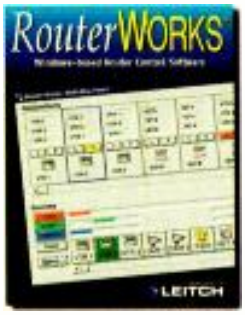
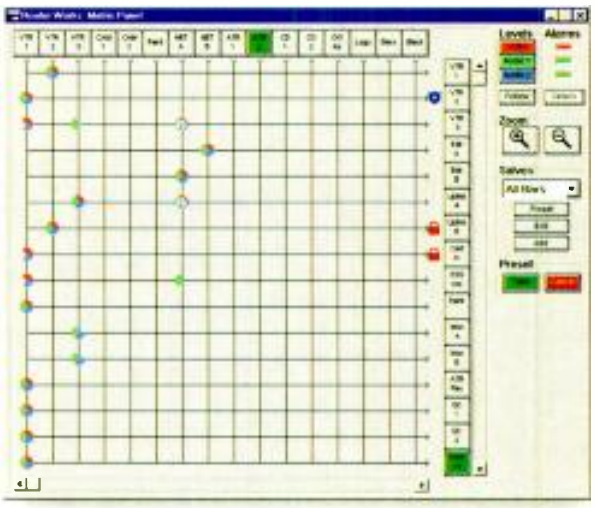
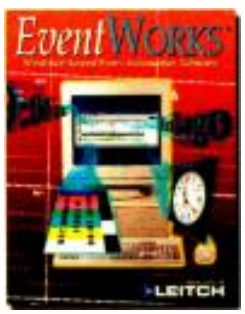
*Router*Works®



Suited to a great variety of PC-based control applications, the Windows®-based *Router*Works® provides simple control and monitoring of any size routing switcher. *Router*Works offers single-bus, multi-bus and matrix views to combine the flexibility of the most powerful hardware control panel with the simplicity of a graphical user interface. Wild database mapping allows you to logically reassign crosspoints, freeing you from the physical restraints of hardware crosspoint matrices and levels.



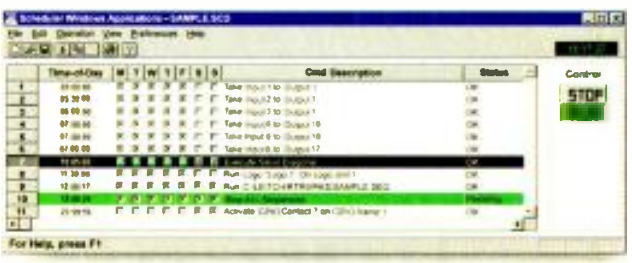
*Event*Works™



*Event*Works™ provides simple automation of routers, VTRs and other broadcast events and includes time of day and sequential execution of events with user-selectable delays and repetition.

Interface

All software applications communicate using standard RS-232 or RS-422 serial ports or TCP/IP over ethernet. For remote applications, TCP/IP can be used over a LAN/WAN or the Internet connection or standard PC modems can be used over dial-up or leased lines. Each software application is available in single, 5, 25 or 100 seat licenses.



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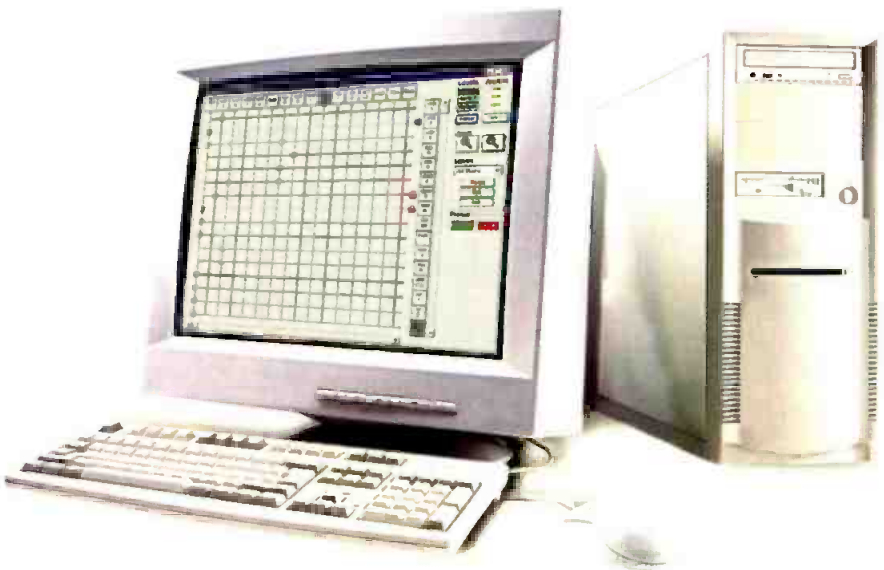
INTEGRATOR SERIES

The Integrator™ provides routing of almost any format—from analog audio and video to high-definition serial digital video. The unique architecture of the Integrator allows multiple signal formats to be integrated into the same frame. Available formats include almost all formats of analog and digital video (compressed and uncompressed), telco formats such as DS-3 and E3, DVB-ASI, AES/EBU audio (balanced and unbalanced), stereo and mono audio, time-code, data, etc...



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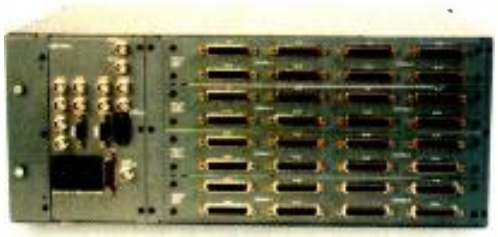

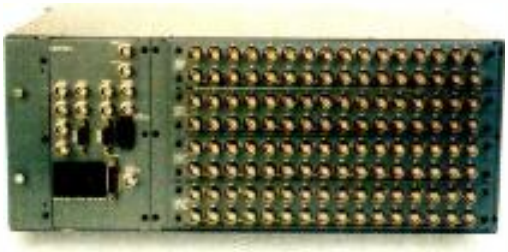

Control Features:

- Soft-matrix partitioning of hardware matrices
- Virtual crosspoint mapping for improved input/output utilization
- Locking and protection
- Crosspoint restrictions
- Left/right audio-channel reversal and mixing
- Up-loadable drivers for diagnostics or integrated control of other vendors' equipment
- Field-accurate, deterministic operation
- Tie-line management for controlling distributed matrices

RouterWorks®, *EventWorks*™ and *PageBuilder*™ software control packages are available to complete the most powerful control system available today.

Architectural Features:

- Field expandable from 32x32 to 512x512
- Frames available in 4, 6, and 8RU
- Redundant hot-swappable power supplies and control logic for reliability
- Front-loading modules with modular rear connectors
- Dual outputs (optional)
- Failure alarms for control, power supplies, and fans
- Dual references (NTSC and PAL or AES references, etc.)
- Dual loop-through X-Y ports
- Dual serial ports individually configurable as RS-232 or RS-422
- Redundant TCP/IP control over LAN/WAN/Intranet/Internet using standard ethernet connections (RJ-45)
- Optional output monitoring
- Flash memory storage of configurations for reliability

Integrator Quick Reference Table

Size	HDTV	SDI/ASI	AES/EBU	Analog Video DS3/E3	Analog Audio	Data
16x16*	✓*	N/A	N/A	N/A	N/A	N/A
32x32	✓*	✓	✓	✓	✓	32 ports
64x32	✓*	✓	✓	✓	✓	
96x32	✓*	✓	✓	✓	✓	
128x32	✓*	✓	✓	✓	✓	
32x64	✓*	✓	✓	✓	✓	
64x64	✓*	✓	✓	✓	✓	64 ports
96x64	✓*	✓	✓	✓	✓	
128x64	✓*	✓	✓	✓	✓	
32x96	✓*	✓	✓	✓	✓	
64x96	✓*	✓	✓	✓	✓	
96x96	✓*	✓	✓	✓	✓	96 ports
128x96	✓*	✓	✓	✓	✓	
32x128	✓*	✓	✓	✓	✓	
64x128	✓*	✓	✓	✓	✓	
96x128	✓*	✓	✓	✓	✓	
128x128	✓*	✓	✓	✓	✓	128 ports
		✓*	✓*	✓*	✓*	
256x256		✓*	✓*	✓*	✓*	
		✓*	✓*	✓*	✓*	
512x512		✓*	✓*	✓*	✓*	

* Call Leitch for availability and help in configuring a system to meet your requirements

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VIA32 SERIES

The Leitch Via32® routing series sets new standards for performance and affordability. These compact, modular routers can be combined to create sophisticated, multi-level routing systems in almost any format (i.e. SDI, ASI, AES, analog video, analog audio, DS-3, E3, etc.).

Compact Modular Design
The Via's compact design easily fits any operation, and its front- and rear-loading modules make it simple to service. All video and audio I/O modules and power supplies plug into the mounting frame, allowing you to easily access any component.

Expandable Configuration
The Via's modular architecture lets you select a router design that supports not only your current demands, but also your upgrade needs. You can expand a serial router from 4x4 to 32x32 and an analog video or audio router from 32x16 to 32x32 in the same mounting frame. Even the control circuitry is designed on a removable module to accommodate design changes.

Redundant Power
To make your Via router even more reliable, add a redundant power supply with a fan assembly. This allows you to replace the power supply and fan without interrupting your operations.

For telecom applications, 48 VDC power supplies are also available.

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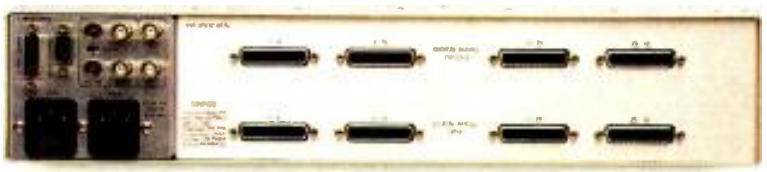
Alarm Capabilities

The Via32 series detects failure in any of the key modules, including the X-Y communications bus, power supply or fan. Every model is equipped with standard LED error and operation indicators to make monitoring effortless. To supplement the LED indicators, an external contact closure is provided, and alarms are repeated in the control system.

Flexible Control System

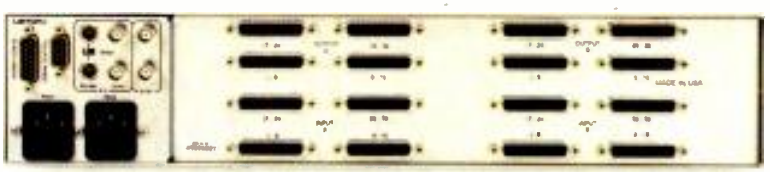
See the control section of this brochure for more information on powerful, flexible control options, including RS-232/RS-422 serial control ports.

VIA-32x32S Serial Video Router



VIA-32x32AES AES/EBU Router (Balanced version)

VIA-32x32AES-C AES/EBU Router (Coax version)



VIA-32x32A2 Analog Stereo Audio Router

VIA-32x32V Analog Video Router

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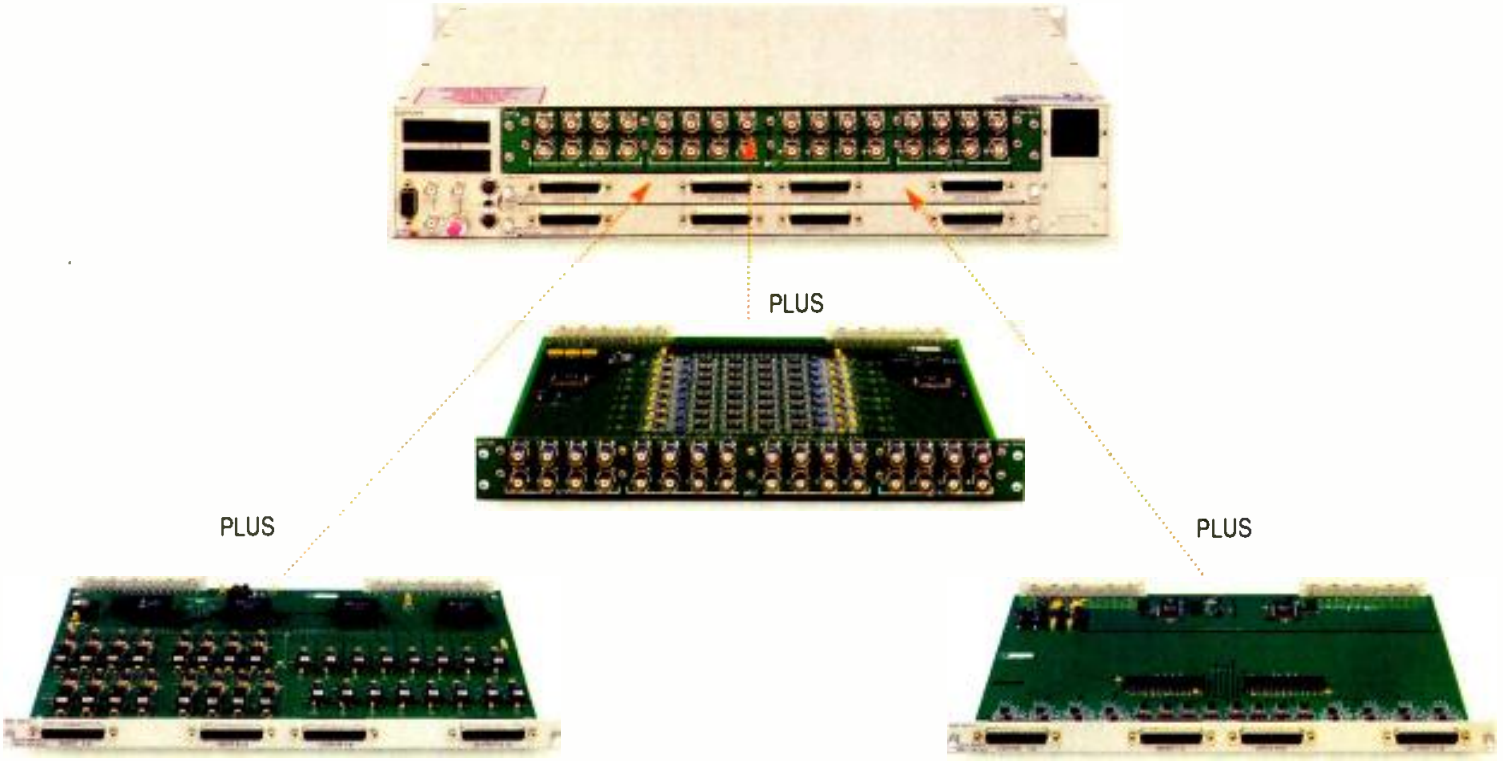
XPLUS SERIES



Xplus™ is a series of modular router matrices, that economically address most small routing requirements. This series features generic 1RU and 2RU mounting frames that accept a wide range of modules. Module sizes include 32x4, 16x16, 16x8, 8x8, 4x4, 16x2, 16x1 and 2x1, with expanded multi-bus configurations up to 64x8 and expanded single-bus configurations up to 256x1.

The Xplus series provides routing switchers for NTSC, PAL and SECAM analog composite; RGB and YUV analog component; SDI digital video; monaural, stereo and multi-channel analog audio; and RF and IF frequency standards. DVB-ASI, DS3 (45Mb/s) and E3 (34 Mb/s) data standards are supported as well.

Flexible Power Supply Configuration
Xplus frames can be configured for AC or DC operation, and the 2RU version can be supplied with redundant power.

Powerful Alarm Capability
An optional local alarm panel indicates power supply voltages and fan failure. To supplement these indicators, the alarm option also provides a set of external contact closures.

Flexible Control
See the control section of this brochure for more information on powerful, flexible control options including RS-232/RS-422 serial control ports and X-Y ports, as well as the ability to attach local control panels.

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Reference Table — *XPLUS* Series Modules

Modules	Description
VSM-32x4	32x4 Analog Video, DS-3 or E3, expandable to 64x4
ASM-32x4	32x4 Analog Audio or Timecode expandable to 128x4
VSR-16x16	16x16 Serial Digital Video (SMPTE 259M) or ASI
ASR-16x16	16x16 AES Audio
VSM-16x16	16x16 Analog Video, DS-3 or E3
PSM-16x16	16x16 Pulse
ASM-16x16A	16x16 Analog Audio or Timecode
VSR-16x8	16x8 Serial Digital Video (SMPTE 259M) or ASI
VSM-16x8	16x8 Analog Video, DS-3 or E3
ASM-16x8A	16x8 Analog Audio or Timecode
VSR-8x8	8x8 Serial Digital Video
ASR-8X8	8x8 AES Audio

Modules	Description
VSM-8x8	8x8 Analog Video
PSM-8x8	8x8 Pulse
ASM-8x8A2	8x8 Dual Channel Analog Audio or Timecode
VSR-16x2	16x2 Serial Digital Video (SMPTE 259M) or ASI, expandable to 64x8
VSR-16x1	16x1 Serial Digital Video (SMPTE 259M) or ASI
VSR-16x1CS	16x1 SDI "Clean Switch" for SMPTE 259M signals, expandable to 32x1
ASR-16x1	16x1 AES Audio
ASR-16x1SQS	16x1 AES Audio with Synchronous Quite Switching
VSM-16x1	16x1 Analog Video, DS-3 or E3, expandable to 256x1
ASM-16x1A2	16x1 Dual Channel Analog Audio or Timecode, expandable to 256x1
AVS-4x4	4x4 Analog Video (DS-3 or E3) and Stereo Audio
AVS-4x1	4x1 Analog Video (DS-3 or E3) and Stereo Audio

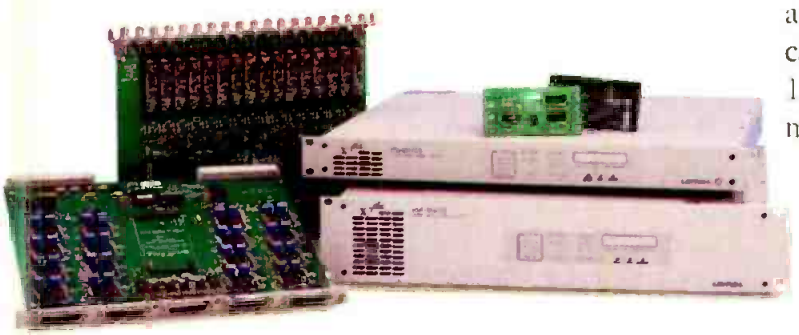
Reference Table — Mounting Frames

Model	Redundant Power Supply	AC/DC Supplies	Max Module Capacity
FR-X+1RU	No	AC	2
FR-X+2RU	Optional	AC	4
FR-X+2RU-2AC	Yes	AC	4
FR-X+2RU-DC	No	DC	4
FR-X+2RU-2DC	Yes	DC	4
FRX-X+2RU-ACDC	Yes	AC+DC	4

Special Application Routing

Serial Digital Clean Switch

The VSR-16x1CS (expandable to 32x1) offers clean, glitch-free switching of SMPTE 259M video signals for digital television master control applications.



AES Quiet Switch

The ASR-16x1SQS offers clean, pop-free switching of AES audio signals using an adjustable cross fade at the switch point while maintaining AES frame during and after the switch. Use in live and post-production applications or in conjunction (same frame) with the VSR-16x1CS module to provide a perfect combination for master control applications.

Hundreds of Router Configuration Options

For ordering convenience, the Xplus routers are generally ordered as complete systems, but they can also be ordered as individual module(s) with frame(s). Some examples of complete systems are as follows:

Examples:

X+256x1S	256x1 Serial Digital Router	X+48x1VA	48x1 Video and Mono Audio
X+64+x1AES	64+x1 AES/EBU Router	X+16x8V3	16x8 RGB (or YUV)
X+32x2V2	32x2 YC (or Video and Key)	X+8x8VA2	8x8 Video and Stereo Audio

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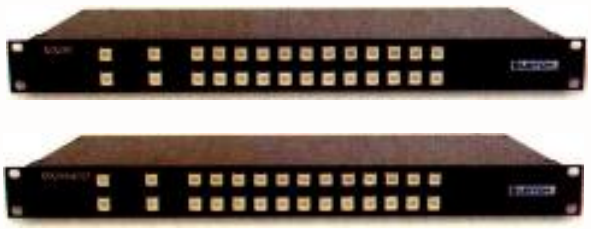
12x2 Wide Bandwidth Series

The 12x2 Wide Bandwidth series of routing switchers provides 12x2 switching of almost all serial digital video formats, from SMPTE 259M (143, 177, 270 and 360 Mb/s) to SMPTE 292M (1.485 Gb/s). Automatic cable equalization is provided for all formats. Re-clocking is automatic on 1.485 Gb/s signals with all other formats passing through without re-clocking. Two separate channels of 12x2 AES (unbalanced/coaxial) are also routed in the same 1RU frame. Two copies of each of the two outputs are provided for the HD/SDI video signals. The compact 1RU design makes it easy to mount and use this switcher in many places, including trucks.

As this product offers two separately controllable outputs, it is ideal for inexpensive master control operations or for back-up to your existing master control. Use one output for the "on-air" signal and the other as a "review" or "quality assurance" output. A local control panel is provided with the unit, and remote control panels are available as an option. The serial control port supports both the standard Leitch ASCII and GVG-TEN-XL protocols. GPI contacts may be added as an external option to allow mechanical contact switching of any one of the sources to either of the two destinations.



Available ordering options include:	
12x2HDAEC2	12x2 high-definition serial digital video and 2 channels of AES coaxial audio
12x2HD	12x2 high-definition serial digital video
12x2AEC2	12x2 routing of 2 channels of AES coaxial audio
RCP-12x2p	Remote control panel tailored for remote control of any of the above routing switchers (NOTE: any Leitch control panel applicable)

Xpress 12x1 Monitoring Routers

The Leitch Xpress™ series is a cost-effective solution for monitoring routing switchers in a 12x1 matrix size. Formats provided are serial digital video, AES/EBU (110Ω and 75Ω) digital audio, and analog video and audio signals. Available in video only, audio only and video with audio packages, the Xpress series accommodates most production, broadcast or telecom monitor-switcher applications.

Comprehensive Control

Control choices include local and remote pushbutton panels, GPI, and optional RS-232/RS-422 serial interface. The local and remote pushbutton control panels can provide AFV or breakaway switching. The GPI port allows contact closure control, as well as joystick override (camera control) for use with or without pushbutton control panels.

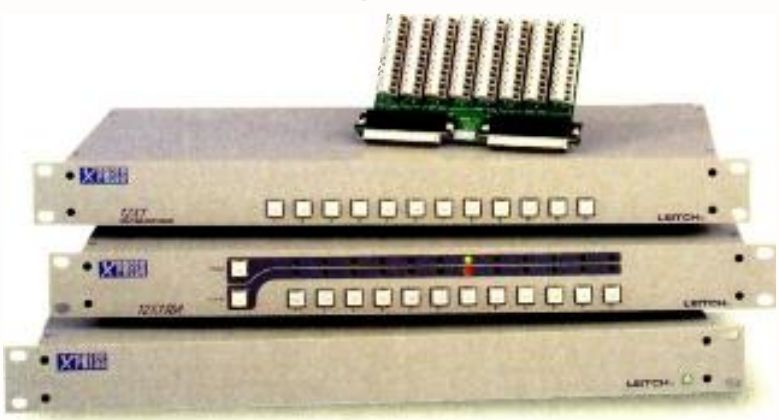
The optional serial port can be factory installed or field retrofitted. This enables computer control using a Leitch-specified protocol. The Xpress routers also emulate the Grass Valley Group® TEN-XL protocol.

Expandable Configuration

Multiple Xpress routers can be linked together for multi-level switching. All Xpress routers provide four outputs, eliminating the need for a downstream distribution amplifier.

Built-In Monitoring

The serial digital video and AES/EBU Xpress routers feature optional analog video and analog audio monitoring outputs. This unique option eliminates the need for external video and audio digital to analog converters in installations where the Xpress is used to feed a monitoring station.



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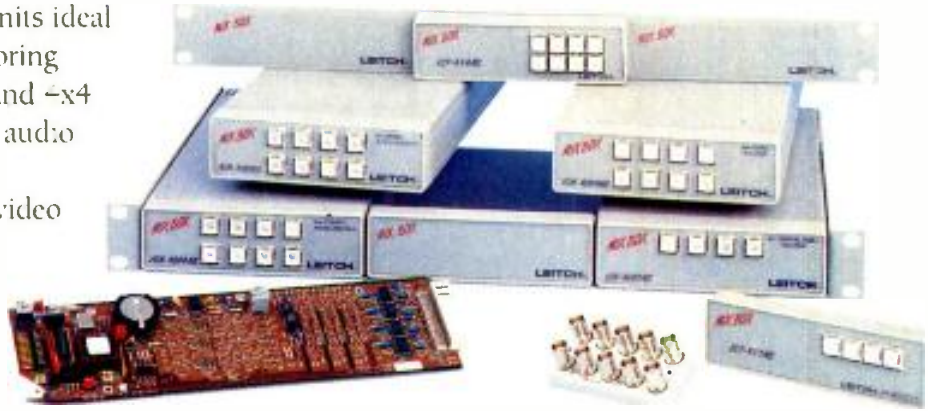
Mix Box and Card Routers

Leitch's Mix Box™ and card routing switchers are small stand-alone units ideal for very small routing and monitoring requirements. Matrix sizes include 4x1 and 4x4 in all versions and 8x1 and quad 2x1 in audio versions only. Signal types that can be switched are serial digital video, analog video and analog audio.



Modules are housed in a stand-alone 1/3-rack-width package and are available with local and/or remote pushbutton-type control panels. Their control signal, which is the same type used for the Integrator™, Via® and Xplus™ series, allows for the various control options explained in the control section.

The card routers plug into frames that have other functions associated with them as well. For instance, a 4x1 serial digital video switcher can be housed with any 6800 or 7000 series digital product. Or you can choose to have an analog video or audio switcher housed with an NTSC sync or test generator in any 1302/2602 series product.

Large Router Systems

Leitch offers routing switchers in any size, from 2x1 to 512x512 or larger. Our unique frame and control system architecture provides many advantages when building larger systems. Our building blocks allow the use of the same hardware (input modules, output modules, crosspoint modules, power supply modules, logic cards) throughout a system, regardless of the size of the system being built. This helps in both the system maintenance and in the stocking of spares. In addition, all modules are front-loading and hot-swappable.

The distributed nature of our control system means there is no "single-point of failure" (i.e. all communications are NOT required to go through a single controller frame). Each frame provides either a single or redundant control logic card and power supply. Communications in a system can be wired as a simple, coaxial loop-through or in a star network with ethernet hubs and/or redundant switches for further redundancy. The configuration of a system is distributed to each device so that if a particular device goes off-line, the rest of the system is still operational. Configuration information can be downloaded to each device or frame without affecting the remainder of the system, thereby resulting in no down-time. Soft matrix partitioning, logic mapping of sources and destinations, automatic path-finding via tie-lines and other control system features provide a wealth of possibilities in meeting your system's requirements.

Leitch's world-wide sales and service presence allows us to offer 24-hour support almost anywhere in the world and on-site help with the commissioning of systems. Please call our trained technical staff for more information or help in defining and configuring a solution to meet your specific requirements.

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Reference Table—Leitch Routers

	HDTV	SDI/ASI	AES/EBU	Analog Video DS3/E3	Analog Audio	Data
Integrator	16x16 to 32x32 32x32 to 128x128	32x32 to 512x512	32x32 to 512x512	32x32 to 512x512	32x32 to 512x512	32 port to 128 port
Via32		4x4 to 32x32	32x16 32x32	32x16 32x32	32x16 32x32	
Xplus		16x1 16x2 to 64x8 8x8 16x8 16x16	16x1 to 256x1 8x8 16x16	2x1 4x1 4x4 8x8 16x1 to 256x1 16x8 16x16 32x4 to 64x4	2x1 4x1 4x4 8x8 16x1 to 256x1 16x8 16x16 32x4 to 64x4	16x16 (separate, unique frame required)
Xpress	12x2	12x1	12x1 12x2	12x1	12x1	
Mix Box & Card Routers		4x1	N/A	4x1 4x4	2x1 4x1 4x4 8x1	

Reference Table—Leitch Control Options

	Integrator	Via32	Xplus	Xpress	Mix Box & Card Routers
Ethernet	Yes (direct to frame)	Optional (requires PC as I/F)	Optional (requires PC as I/F)	Optional (requires PC as I/F)	Optional (requires PC & SPT as I/F)
Serial Control Port	Yes (2)	Yes	Yes	Yes	Optional (using SPT)
Remote Control Panels	Yes	Yes	Yes	Yes	Yes
Local Control Panels	No	No	Yes	Yes	Yes
Application software for Configuration, Control & Monitoring	Yes	Yes	Yes	Yes	Yes
Control from Remote Location	TCP/IP (LAN/WAN/Internet) or Modems for dial-up and leased lines	TCP/IP (requires PC & LAN/WAN/Internet) or Modems for dial-up and leased lines	TCP/IP (requires PC & LAN/WAN/Internet) or Modems for dial-up and leased lines	TCP/IP (requires PC & LAN/WAN/Internet) or Modems for dial-up and leased lines	TCP/IP (requires PC & SPT for & LAN/WAN/Internet) or Modems for dial-up and leased lines (requires SPT)

Canada
Tel: +1 (416) 445-9640
Fax: +1 (416) 445-0595

U.S.A.
Tel: +1 (757) 548-2300
Fax: +1 (757) 548-4088

Europe
Tel: +44 (0) 1483-591000
Fax: +44 (0) 1483-591100

Hong Kong
Tel: +852 2776-0628
Fax: +852 2776-0227

Brazil
Tel: +55 (11) 3151-5093
Fax: +55 (11) 3159-0770

Latin America
Tel: +1 (305) 591-0611
Fax: +1 (305) 591-0613

Japan
Tel: +81 (3) 5423-3631
Fax: +81 (3) 5423-3632

Australia
Tel: +61 (2) 9939-3355
Fax: +61 (2) 9939-3300

www.leitch.com

ZOOM LENS

Angenieux Extreme Tele Zoom: completes the high resolution broadcast ENG family of lenses, offering the largest focal length and a weight of 4- to 5kg; 973-812-3858; fax: 973-812-3858; www.angenieux.com.

Circle (372) on Free Info Card

GRAPHICS SYSTEMS

SGI Onyx 3000 series: line of servers utilizing NUMAflex modular technology and the IRIX 64-bit UNIX operating system for the ability to scale graphics, CPU, storage and I/O components independently; offers users the graphics capability and compute power to visualize large, complex volumetric data with interactivity and realism; features include clip-mapping, volume rendering, multistream HDTV video manipulation and multichannel output; compatible with Onyx2 graphics and the Series 2000 systems; 800-800-7441; 650-960-1980; fax: 650-933-0819; www.sgi.com/go/broadband.

Circle (373) on Free Info Card

HD 720P CAMCORDER

Panasonic AJ-HDC27A: dual frame rate camcorder is based on a newly developed 1 million pixel 2/3-inch IT three-CCD imaging system; offers a sensitivity of F11 at 2000 lux; provides 46 minutes of recording in 720 progressive at either 30fps or 60fps, with two channels of 16-bit/48kHz digital audio; other features include HD-SDI output for full-color live and tape playback, an 8MB multimedia card, and low power consumption; uses standard 2/3-inch bayonet lenses; 800-528-8601; 323-436-3500; fax: 323-436-3660; www.panasonic.com/broadcast.

Circle (375) on Free Info Card

DIGITAL AUDIO ROUTER

ADC Broadcast Envoy 7256: 100Mb/s wideband digital audio and timecode router can handle up to 256 inputs including AES3, Sync AES3 and SMPTE/EBU-format timecode through up to 256 outputs including AES3, Sync AES3, timecode and TDM AES3; provides crosspoint routing of 512x512 mono channels by allowing access to individual AES subframes; 800-366-3891; 952-938-8080; fax: 952-946-3292; www.adc.com/broadcast.

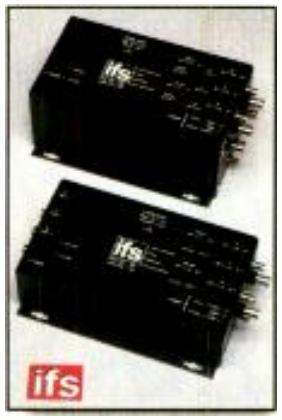
Circle (376) on Free Info Card

RAID STORAGE

Storage Concepts FibreBlock: redundant 240GB device features multistreaming technology in a compact package; system is capable of handling a combined transfer rate of 80- to 85MB/s for multiple datastreams running simultaneously through a single port; features scalability and compatibility with all host bus adapters; 800-525-9217; 949-852-8511; fax: 949-852-8930; www.storageconcepts.com.

Circle (384) on Free Info Card

FIBER OPTIC LINK



International Fiber Systems VT/VR RGB+S 020: transmits high resolution RGB video signals over fiber optic cables, for a bandwidth capability of 600MHz; applications include computer graphic workstations and video projection systems; features a digitally controlled optical Automatic Gain Control and several different signal synchronization options; three video configurations of RGB, RGBS and RGBHV will be available, with planned optional data and two-channel audio capabilities; 203-426-1180; fax: 203-426-3326; www.ifs.com.

Circle (377) on Free Info Card

WIRELESS VHF INTERCOM

Telex Communications Radiocom BTR-300: offers increased frequency band availability; improved front-end filtering increases resistance to interference; up to four base stations and 16 beltpacks can be used simultaneously; compatible with RTS TW, Audiocom, RTS ADAM and Matrix Plus systems; Nickel Metal Hydride batteries and a plug-in charger for longer use are available as options; 800-392-3497; 612-884-4051; fax: 612-884-0043; www.telex.com.

Circle (378) on Free Info Card

COMPACT SPEAKER

Westlake Audio Lc5.75: two-way mini-monitor offers precise imaging and impressive low-frequency response for mobile recording environments, project studio and quality control stations; 6.5-inch-wide, 14-inch-high, 9-inch-deep unit weighs 18 pounds and can be purchased in pairs or individually; employs a 5-inch woofer with a 3/4-inch soft dome tweeter in a single port enclosure and has a frequency response of 60kHz to 18kHz; 805-499-3686; fax: 805-498-2571; www.westlakeaudio.com.

Circle (379) on Free Info Card

WIRELESS MICROPHONE

Azden SGM-2X: shotgun microphone system includes an integrated shock-mount with camera shoe-mount and mic stand-mount and two foam windscreens; comes with two barrels — an omni (8.11 inches long) and an extension barrel that can be added to the omni to make a supercardioid (15.75 inches long); both configurations offer -50dB sensitive low-noise, wide-bandwidth signal and balanced, low-impedance XLR output; 516-328-7500; fax: 516-328-7506; www.azdencorp.com.

Circle (387) on Free Info Card

FIBER OPTIC TALK SETS

GN Nettest OVS-6000: designed for voice communications over a fiber optic cable; full-duplex 6000 series talk sets will replace the existing OVS-5000 series; transmits an analog signal at 1310 nm; available in 30dB or 50dB of dynamic range; features super polish ST, FC or SC connectors; 508-435-3800; fax: +45 72 11 22 10; www.gnnettest.com.

Circle (380) on Free Info Card

DV CAMCORDER

Panasonic AG-DVC200: 1/2-inch 410,000 pixel IT three-CCD DSP camcorder utilizes large DV cassettes; can record 270 minutes; offers an interchangeable bayonet mount lens that allows any 1/2-inch lens to be used; features 800 lines of horizontal resolution, an IEEE 1394 interface, signal-to-noise ratio of 62dB and very low smear; capable of shooting at F11 in lighting as low as .5 lux; also features four-position ND/CC filter, User Scene memory and a six-speed shutter with synchro scan that allows flicker-free shooting of CRT displays; 800-528-8601; 323-436-3500; fax: 323-436-3660; www.panasonic.com/broadcast.

Circle (381) on Free Info Card

TRANSPORT STREAM PLAYER

Wavetek Wandel Goltermann WWG DTS-P: offers layout capability in the lab or in production for set-top box manufacturers and digital TV broadcasters; users can test channel hopping and get multiple sources from a single instrument with the unit's Dual Play option; plays MPEG-2 ATSC/DVB transport streams across a SMPTE-310M, DVB ASI or DVB SPI interface; Continuous Loop Mode replays the output file continuously to provide a constant datastream and permit segment concentration; the unit also resizes 204- and 208-byte Reed Solomon packets in real time and allows users to upload files via Ethernet or CDROM; 800-854-2708; 858-279-2200; fax: 858-627-0146; mpeg.wwgsolutions.com.

Circle (382) on Free Info Card

AUTOMATED FIELD STRENGTH ANALYSIS SYSTEM

Z Technology S5007GPS: utilizes the R-507 Field Strength Meter for accurate high-speed measurement under PC control; provides a comprehensive facility for NIST traceable RF power measurement and documentation of digital or analog signal coverage when used with a calibrated antenna; features the Drive Test Version 2.0 automated measurement program to integrate data collection, dot plotting and swept spectrum analysis applications; operators can switch between applications or use the R-507 in stand-alone mode; 503-614-9800; fax: 503-614-9898; www.ztechnology.com.

Circle (383) on Free Info Card

DIGITAL MONITORING SYSTEM

Magni Systems SDM-560M: multistandard, serial digital monitoring solution offers a new suite of automated measurement screens, in addition to features of the SDM-560 such as the ability to measure and depict signal strength, jitter and EDH status; expands on the AVM-510, providing composite, S-video and SD 601 display outputs for monitoring Serial Digital 601 or Composite analog signals; features on-screen display of picture, waveform, vector, audio and digital readouts; also includes a "bright-up" feature depicting picture areas that exceed gamut limits; 800-237-5964; 503-615-1900; fax: 503-615-1999; www.magnisystems.com.

Circle (385) on Free Info Card

ROBOTIC PAN/TILT CAMERA

ParkerVision Digital CameraMan: digital camera/robotics/lens package available in fixed 4:3 aspect ratio; features three CCDs and 380,000 effective picture elements, horizontal resolution of 850 TV lines, and 65dB signal-to-noise ratio; digital SHOT Director allows the camera to be controlled from as far away as 2500 feet, and a single operator to control as many as 16 Digital CameraMan cameras through an RS-485 networking port; also features controls for linear matrix, white balance and shading compensation, and 125 camera presets to allow automatic pan, tilt, zoom, focus and change of camera settings; 800-532-8034; 904-737-1367; fax: 904-733-3587; www.parkervision.com.

Circle (386) on Free Info Card

SERVERS

Quantel Clipbox Power: provides embedded editing, allowing multiple editors to directly edit all material held within the server simultaneously and without copying; runs non-compressed MPEG or DVCPRO; can support up to six edit seats, two real-time ports, six faster-than-real-time ports and two 50Mb network connections simultaneously; can be controlled by any automation system; features up to 200 hours of storage; 800-218-0051; 203-656-3100; fax: 203-656-3459; www.quantel.com.

Circle (388) on Free Info Card

AES-3 MULTICHANNEL AUDIO INTERFACE

Leitch ACE-1600/ACD-1600: enable encoding and decoding of up to eight audio channels into or from one AES compatible signal in multichannel or 5.1 surround sound broadcasting; used in conjunction, the systems allow a stereo infrastructure to carry multichannel audio; chassis for the systems are 1RU; 800-231-9673; 757-548-2300; fax: 757-548-4088; www.leitch.com.

Circle (389) on Free Info Card

POWER SUPPLY

Lambda Z-up Series: high-power programmable system provides guaranteed accurate voltage and current programming stability between test equipment and the power supply; system is power factor corrected; RS232 or RS485 communication ports allow the power supply to be configured into a programmable power system of up to 31 DC outputs; available in 200W, 400W and 800W; features low ripple and noise, an "up-programming" time of 50mS at 0 to 100 percent load, and over-voltage, over-temperature, over-current and foldback output protection; 631-694-4200; fax: 631-293-0519; www.lambdapower.com.

Circle (390) on Free Info Card

FIBER OPTIC CABLES

Chromatic Technologies Field Deployable Cables: available in single- and double-jacket configurations; abrasion-resistant polyurethane outer jacket is capable of withstanding more than 250 pounds/inch of force; cables include single- and multimode fiber optic constructions and conform to IEEE 802.3Z gigabit Ethernet standard; sizes range from 4.75mm to 7.49mm O.D. for up to 600 pounds pull strength; 888-541-7100; 508-541-7100; fax: 508-528-9950; www.drakausa.com.

Circle (391) on Free Info Card

DIGITAL MEDIA MANAGEMENT

A.N.N Systems Inc StarDRIVE 3.0 Suite: manages and synchronizes low-resolution newsroom computer assets with high-resolution assets in the broadcast domain, from ingest through production to playout; can be integrated with the A.N.N OpenMedia newsroom system and AP's ENPS newsroom system via the MOS2 Protocol to provide complete production capability and digital integration; 818-879-0000; fax: 818-865-1421; www.ann.com.

Circle (392) on Free Info Card

CONTROL PANEL

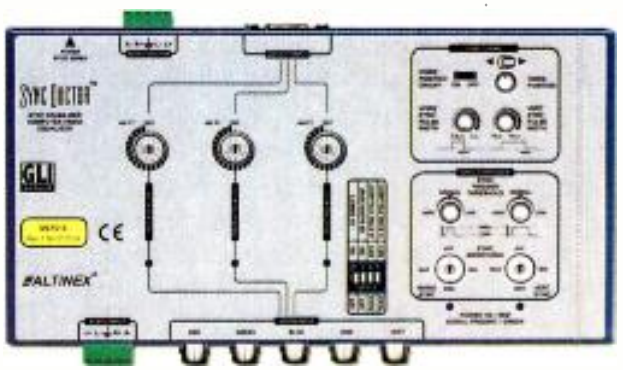
Sierra Video Systems SCP-200: flexible, fully programmable and compatible with the Tahoe, Shasta and Yosemite routers; features programmable control buttons, virtual mapping, single button takes and presets, level breakaway, salvos and macros in addition to standard crosspoint selection; system includes Windows program to adjust these functions to fully customize the panel for a specific facility; 530-478-1000; fax: 530-478-1105; www.sierravideo.com.

Circle (393) on Free Info Card

VIDEO/AUDIO DEMULTIPLEXERS

VideoTele.com M2-VMX/M2-AMX: M2 series now features ProSelect channel customization; service providers can use the added capability to handle a combination of 12 streams from up to three satellite transponders; provides video and audio processing, demultiplexing, and packetizing in a compact, single-vendor chassis; other new features include a graphical user interface for mapping onto the equipment of emission technology vendors, as well as the ability to perform all functions remotely over an Intranet, a Virtual Private Network or over the Internet; 503-594-1400; www.videotele.com.

Circle (394) on Free Info Card



LIP-SYNC CORRECTOR

Altinex Sync Doctor: allows correction of lip-sync error through manipulation of the signal characteristics; designed for installation at the end of a cable run, before the input to a large screen projector or monitor; provides adjustments for pulse, trigger threshold, smoothing, aligning and polarity reversing; also features built-in ground loop isolation; Red, Green and Blue video channels with 16-position equalization controls allow compensation for signal attenuation over cable lengths of up to 250 feet or more; 800-ALTINEX; 714-990-2300; fax: 714-990-3303; www.altinex.com.

Circle (395) on Free Info Card

VIDEO MONITORING SYSTEM

BARCO iStudio: single module contains a high-resolution display, a graphic controller and Web-based operating software for complete video and audio monitoring, as well as advance warning and alarm handling; can monitor embedded audio for up to 30 video windows or 112 external audio channels simultaneously; also monitors real-time view-associated information such as computer data, clocks, animated logos or source identifications; allows graphical control of all source types, including composite, S-video and SDI video on PAL, SECAM and NTSC in 4:3 and 16:9 aspect ratio; 800-992-5016; 770-590-3600; fax: 770-590-3610; www.barco.com.

Circle (404) on Free Info Card

IEEE 1394 PACKET SWITCH

Omneon Video Network MPS1016 switch: serves as the primary component for scaling in Omneon's Video Area Network, to allow collaboration of resources across the system; the content-aware switch connects and routes IEEE 1394 data packets and carries real-time isochronous data and asynchronous data simultaneously; provides 400Mb/s and 800Mb/s IEEE 1394 capability; 408-585-5000; fax: 408-585-5090; www.omneon.com.

Circle (405) on Free Info Card

ROUTING MANAGEMENT STRATEGY

Grass Valley Group Routing Strategy: spans a low-cost, PC-based, scalable system to a high-speed, networked full-function facility control system; provides a step-wise, affordable path to full facility control; the line includes multiple new, low-cost Ethernet-interfaced control panels that connect with master central processing unit (MCPU) control systems to provide distributed control throughout their facilities; routing control system is Windows-based and uses the real-time VX Works hardware platform to enable the support of multiple networking formats; 800-998-3588; 800-547-8949; fax: 503-627-7275; www.grassvalleygroup.com.

Circle (406) on Free Info Card

DELAY ERROR CORRECTOR

Tektronix AVDC100: provides in-service monitoring and correction of A/V delay errors that occur during compression or other processing; allows user to reliably deliver video of definable quality; uses digital watermarking technology to embed audio time reference signals into video programming near the point of audio/video content creation, so lip-sync error can be detected by analyzing the watermark later in the distribution chain and corrected by adjusting the audio delay; 800-835-9433; 503-627-7111; fax: 503-222-1542; www.tektronix.com.

Circle (408) on Free Info Card

NT WORKSTATION

Post Impressions SpiRINT: workstation uses a dedicated video sub-system with separate processing and a high-bandwidth bus architecture to handle HD video I/O and storage, allowing true random access of HD I/O; the sub-system is connected at bus level to the NT computer for fast internal data transfers, leaving the multiprocessor NT computer to run applications such as Tremor compositing software from Nothing Real; 310-287-0210; fax: 310-287-0211; www.postimpressions.com.

Circle (409) on Free Info Card

COMPOSITING SOFTWARE

Nothing Real Tremor: features real-time I/O in 601 and HDTV, tracking/stabilizing, keying, color correction and 3D compositing; also provides CakeS asset management, distributed rendering and EDL support independent of resolution and bit-depth; can be run on Post Impressions' SpiRINT workstation; 310-664-6152; fax: 310-664-6157; www.nothingreal.com.

Circle (410) on Free Info Card

VIDEO LOGGING SYSTEM

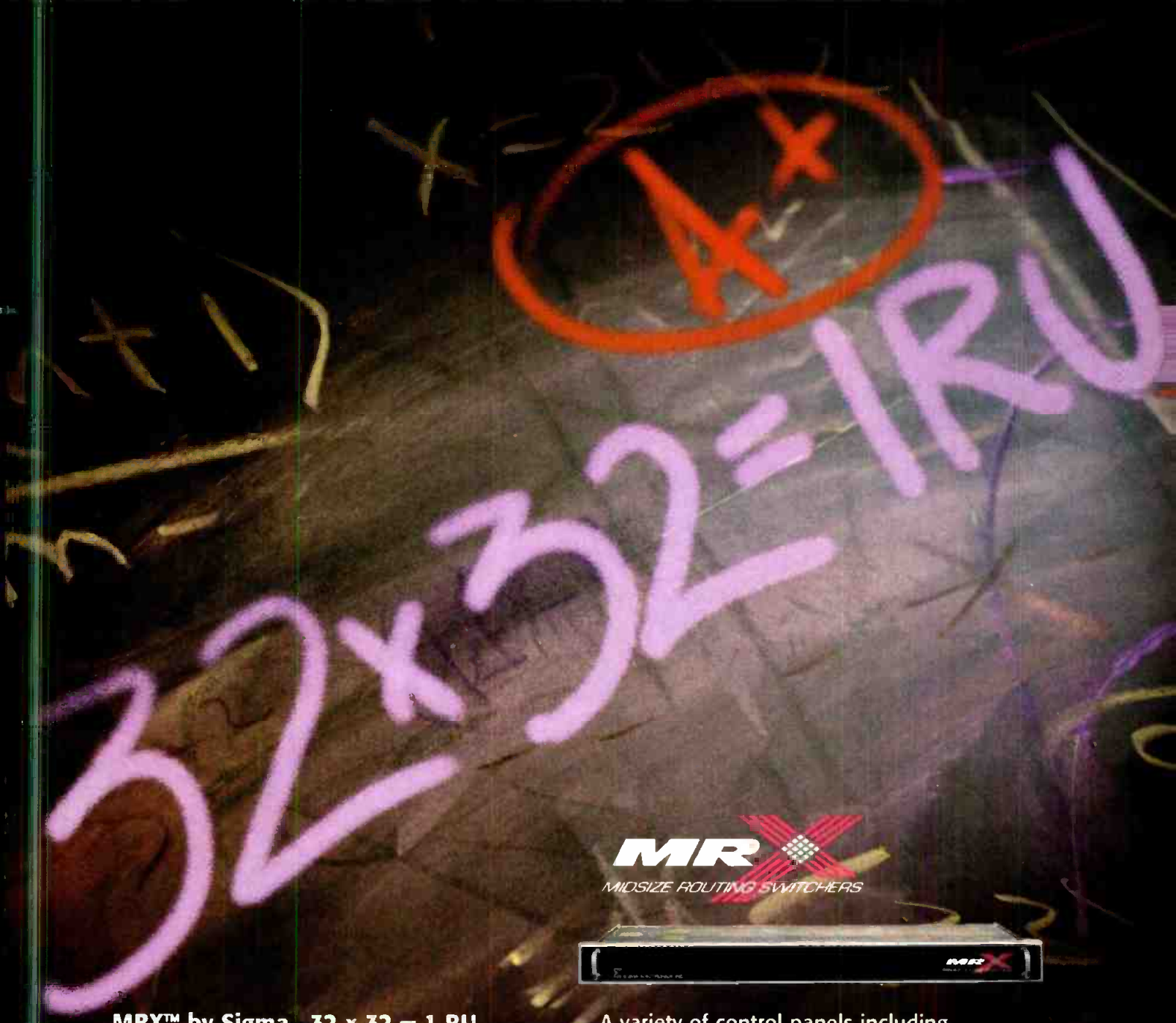
Omnibus SceneChange: developed by AVS Graphics and Media, a division of Omnibus, the PC-based system uses a simple low-cost video capture card to introduce images onto the system from video tape or video feeds; images represent scene changes that are then logged and displayed on the screen; the operator can set the sensitivity threshold of video to enable more frequent logs to be taken of an action film sequence in which the scene is constantly changing; will be available as a stand-alone system or with AVS Graphics and Media's Multi-Browse solution; 530-470-1700; fax: 530-470-1718; www.omnibussystems.com.

Circle (411) on Free Info Card

VIDEO SERVERS

SGI Media Server: two new versions of SGI Media Server, one designed for broadband and the other for production and broadcast; both feature the Origin server in an integrated solution; the broadband version utilizes Kasenna MediaBase media streaming software to deliver content over the Internet, enterprise and virtual private networks to multiple client platforms; this version can deliver 100,000 high-quality MPEG streams daily; the production and broadcast version supports DVCPRO news format and is available in four-channel and eight-channel configurations; it manages video as data, distributing it over the existing LAN/WAN infrastructure in a facility; 800-800-7441; 650-960-1980; fax: 650-933-0819; www.sgi.com/go/broadband.

Circle (412) on Free Info Card



MRX™ by Sigma. 32 x 32 = 1 RU, the formula for compact routing.

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

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Circle (169) on Free Info Card

DIGITAL CAMERA SYSTEMS


Philips LDK 6000HD

Philips LDK 6000HD/LDK 7000: lightest high-definition cameras available, and the first native multiformat cameras on the market to use 9.2 million pixel CCDs in switchable and non-switchable versions; the LDK 6000HD series supports 1080i and 720p as native formats, while the LDK 7000 series Digital Cinematography Camera supports native 1080p24/25/30, 1080i and 720p formats; both systems use the TriaxHD transmission system, enabling them to transmit HD video over 3300 feet of industry-standard triax cable without any loss in signal quality; 800-962-4287; 818-729-7700; fax: 818-729-7710; www.broadcast.philips.com.

Circle (413) on Free Info Card

HIGH-OCTANE WORKSTATION

SGI Octane2: visual workstation features an optimized crossbar architecture, a high-performance MIPS RISC processor, and two VPro graphics configurations for IRIX — V6 with 32MB graphics memory and V8 with 128MB memory; also features full hardware acceleration of the OpenGL 1.2 core feature set and imaging extensions on a single chip; 800-800-7441; 650-960-1980; fax: 650-933-0819; www.sgi.com/go/broadband.

Circle (414) on Free Info Card

INTEGRATED CG CLIP OPTION

Pinnacle Clip Deko: available for standard-definition systems Deko500, Deko2000 and FXDeko; offers users the ability to record digital video clips with audio, and play them back synchronized with Deko graphics and sequences; can store and playback key signal at the same time as video; 650-526-1600; fax: 650-526-1601; www.pinnaclesys.com.

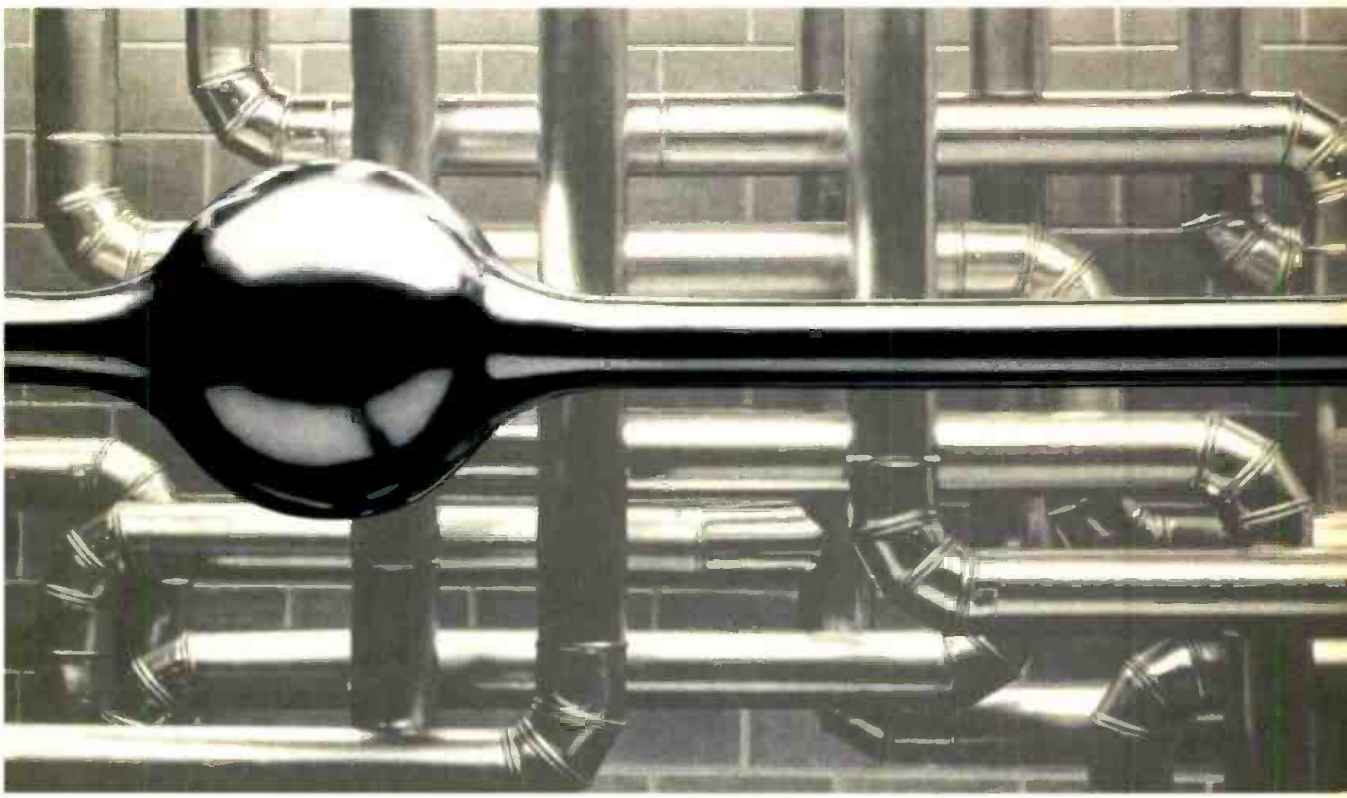
Circle (415) on Free Info Card

HD CHARACTER GENERATOR

Pinnacle HD Deko 500: provides real-time, no-render effects, including rolls, crawls, dissolves, cuts, pushes and wipes; provides unlimited font details, type on a curve, fit-to-fill and real-time typing to air in HD, as well as texture on character faces; allows manipulation of font characteristics including font size, shadow blur and direction; uses same user interface as SD Deko products; permits live composition of CG pages directly onto the HD output; supports commonly used HD formats; 650-526-1600; fax: 650-526-1601; www.pinnaclesys.com.

Circle (416) on Free Info Card

DTV Transmission
So Much Content–So Little Bandwidth



Your allotted DTV bandwidth may look like a big pipe today, but—tomorrow promises greater opportunities for more services:

- High Definition Television
- Multi-channel Standard Definition Television
- Program Information
- Datacasting
- Streaming Video
- And more...

The DigiCipher® II ATSC compliant encoding system employs sophisticated compression and multiplexing technology to make the most of your bandwidth—while maintaining the highest quality pictures. And it's backed by the resources of an unparalleled technology innovator: General Instrument, now Motorola's Broadband Communications Sector. With nearly a decade of experience in helping customers deliver more digital content in less space, we have the track record and experience to act as your partner throughout the entire digital migration process. When choosing encoding systems for the long term remember...nobody delivers DTV better than Motorola.

Motorola's DigiCipher® II HD Encoder.

Contact us at 800-385-5843 for more information or visit us at www.motorola.com/broadband

MOTOROLA
Broadband Communications Sector

Circle (170) on Free Info Card

Now Shipping

STREAMING APPLIANCE

Optibase MGW-2000: now shipping; 19-inch multichannel streaming server is rack mounted and modular, with field-upgradeable slots for new modules; features an embedded operating system and a variety of network interfaces for business TV, distance learning and video over DSL; 800-451-5101; 408-260-6760; fax: 408-244-0545; www.optibase.com.

Circle (396) on Free Info Card

PLAYOUT SERVER

InnovaCom TransPEG Storage Playout Server: now available; server with optional Translock Encryption software provides back-to-back playout of MPEG audio and video; features removable hard drives for continuous playout of up to 40 hours of jitter-free MPEG-2 program content encoded to disk at 6Mb/s; allows playlists to be downloaded via modem or other network interface; 888-464-6734; 408-727-2447; fax: 408-727-6625; www.transpeg.com.

Circle (397) on Free Info Card

GRAPHICS SOFTWARE PLUG-IN

Inscriber TitleExpress: plug-in for Adobe Premiere allows users of the Matrox RT2000 MPEG-2 nonlinear editor to create video titling; offers over 170 templates and over 150 custom fonts; allows editors to import a background image, credit rolls and crawls; now shipping bundled with Matrox RT2000; 800-363-3400; 519-570-9111; fax: 519-570-9140; www.inscriber.com.

Circle (400) on Free Info Card

MONITORING SOFTWARE

Grass Valley Group NetCentral: now shipping; SNMP-based software allows for remote diagnostics and monitoring; ships as an option for the Profile XP Media Platform; provides centralized error reporting for network connected systems; sales have exceeded the $1 million mark; 800-998-3588; 800-547-8949; fax: 503-627-7275; www.grassvalleygroup.com.

Circle (403) on Free Info Card

MEDIA STREAMING

Avid Xpress DV for IntelliStation (IBM): system for editing and delivering video content for Internet streaming, CD, DVD and other media now shipping; 800-949-AVID; 978-640-6789; fax: 978-851-0418; www.avid.com.

Circle (398) on Free Info Card

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Kris Binder, Manager of On-Air & Studio Operations, **WNBC-NBC 4, New York, NY**

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Manager, Engineering & Technical
KTVU-TV
San Francisco, CA

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"This is a company that is on the move..."
Brad Gilmer
Broadcast Engineering Mag.

Meets Future Needs

'After an exhaustive due diligence on automation software providers, Cosmos selected Crispin, who or the last year, has been developing refinements n their automation products that we agreed were essential for NTSC multi-channel operations and nandatory for DTV Multicasting in the future..."
Steve Smith
VP of Engineering & Technology
Cosmos Television Stations

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"Our people mastered in minutes what it used to take them many days to learn with the old system we had. The support has been very good. Our people love the software".
Paul Serio
Chief Engineer
WXVT-TV, Greenville, MS

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Business Wire

Business highlights from broadcast and production

BY LAURA COLLINS, EDITORIAL ASSISTANT

Avid announced its acquisition of Pluto Technologies International, a provider of video storage and networking solutions. The acquisition will enable Avid to provide an end-to-end broadcast solution for ingest, editing, storage and playback.

Inscriber's Qscribe is seamlessly integrated with Quantel's new iQ platform to allow editors to access its text generation capabilities directly from iQ.

Quantel and Imagine Products have integrated the Imagine Mine asset management system with Quantel's Clipnet gigabit Ethernet fibre network. The first stage of the integration features an Image Mine workstation digitizing offline video for transfer via Clipnet to Quantel systems. Future phases of the Image Mine/Quantel system will allow management of online media assets as well.

WGTE-TV 30 in Toledo, OH, chose Ikegami HDK-79D cameras for digital broadcast of documentaries and its weekly series, "The Editors."

NBC used Tektronix's test and monitoring equipment to evaluate compression technology under consideration for use in NBC's satellite distribution systems.

CBS affiliate WCAX-TV3 has installed a System 5 high performance digital console from Euphonix for use on four major daily news programs, as well as pre-records.

North Texas Public Broadcasting in Dallas has reached an agreement with ADC Broadcast to test ADC's new Bandwidth Enhancement Technology on its digital broadcast channel KERA-DT. ADC's technology seeks to solve interference problems and protect services outside the channel by allowing more aggressive RF filtering to be used on the DTV signal.

Tandberg reached a non-exclusive agreement with Triveni Digital to resell Triveni's PSIP Builder Pro AE-10 system as part of its ATSC system configurations.

Telecast Fiber Systems' fiber optic interface systems were chosen by Times Square Studios to link their facilities with the ESPN Sport Zone restaurant. The production house will use the link to broadcast ESPN's programs from the restaurant each week.

NASA also awarded Telecast a multiyear contract for up to 230 Viper II fiber optic systems to modernize the Operational Television Video at Kennedy Space Center.

Telex's corporate headquarters is now located at 12000 Portland Ave. South, Burnsville, MN 55337. The main telephone number is the same, but with a new area code: 952-884-4051.

Telemetrics' Slam Dunk camera robotics system with PT-CP compact pan/tilt head has been employed by the Indiana Pacers. The system was installed on each of the backboards in the new Conseco Fieldhouse to capture images for broadcast, as well as for display on large screens and monitors in the arena.

Cue Corp., the parent corporation of QTV, DCM and O'Connor, was sold in a $28 million management buyout. The corporation provides software solutions and prompting, scripting, newsroom and transmission automation products for broadcast and production.

WCNY in Syracuse, NY, recently installed a multichannel Sundance Digital FastBreak NT Spot Playback system to control program promos and spot playout from a SeaChange MediaCluster server.

Automation software from Sundance was also selected for multichannel operations at Albany, NY, station WXXA-TV.

POP Sound installed a Logic 2 digital mixing console from AMS Neve in its newly upgraded Studio H for mixing television and radio commercials, documentaries, and music specials.

The new Logic 2 console is the ninth AMS Neve console installed in the audio post facility.

The Associated Press' Electronic News Production System (ENPS) was used by KPOM-TV24 and KFAA-TV51 for the stations' relaunch of their local news broadcasts. The systems will be utilized to gather and produce news, sports, weather and community programming.

DST created a centralized, automated design for the Ackerley Group's Syracuse, NY, station, WIXT. The station serves as a Digital CentralCasting hub transmitting digital signals for six stations located throughout New York state.

An interface between Video Networks Inc.'s (VNI) Newstracker and Grass Valley Group's Profile XP play-to-air servers will provide broadcasters with a tapeless news environment. Editors will be able to move material directly from a VNI server to a Profile platform or digital hard news production systems and edit it without dubbing the content to tape first. The new capability will improve time to air and allow multiple users access to the same media.

VNI also announced an agreement to connect their NewsTracker system with Leitch's video servers to allow broadcasters to receive, manage and send content directly to air without tape. It will also simplify processes such as content search and retrieval and the management of scripts, synopses and rundowns.

BARCO has announced that BARCO Communication Systems will become an independent company called BarcoNet. The new company will focus on four main application areas: headends for integrated multimedia services (including digital TV), high-speed fiber optic backbone systems, network management and digital TV distribution.

Pixel Power and Vertigo Multimedia recently announced an alliance enabling Pixel Power to distribute Vertigo's Producer On-Air and Producer Interactive integrated with Pixel Power's Clarity, Graphite and Collage graphic systems.

PBS Network used Pixel Power's Clarity HD graphics platform for their nationwide live high-definition broadcast of the Milwaukee Circus Parade. The Clarity HD was used in HD Vision's new HDV-5 multicamera HD production mobile unit.

Fox affiliate XETV in San Diego launched its newscast with an i-NEWS (formerly Avstar) Newsroom Computer System (NRCS) and Broadcast Control System (BCS), Grass Valley Group Profiles, and Avid NewsCutter nonlinear editors.

Continued on page 143

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Sessions coordinated by Doyle Technologies

Continued from page 137

iNEWS also announced plans to integrate the iNEWS newsroom computer system and Media Browse 2000 with Grass Valley Group's Vibrint NewsEdit, Profile XP Media Platform and Content Share software platform to create a complete newsroom solution.

CNN International purchased ClipMail Pro from Telestream to provide digital delivery of commercials from CNN's international bureaus to its on-air operations center in Atlanta.

SBC Communications has reached a $1.308 billion deal giving SpectraSite Communications the exclusive right to lease 3900 communications towers. SpectraSite will also gain 800 new towers over the next five years.

Leitch has acquired DPS in an $86.5 million transaction. The acquisition will enable Leitch to strengthen its core video processing technology and expand it into new markets.

Teranex recently announced that it has raised an additional $30 million to develop products and services for broadband Internet video.

NBC affiliate WFLA is using three AutoCam robotic camera systems from Vinten in their new facility. Two of the systems are in use in the WFLA Weather Center, with a third in the Tampa Tribune newsroom.

PEOPLE

Michael D. Patten, age 53, recently passed away due to a stroke.


Michael D. Patten

Patten left Grass Valley Group to form Graham-Patten Systems in 1980 and was recognized by the Academy of Television Arts and Sciences in 1991 with a Technical Emmy for the D/ESAM product. Patten was active in SMPTE and AES.

CPI Wireless Solutions appointed Mike Cheng president of the Eimac Division.


Ray Stephens

Ray Stephens was named president and general manager of Professional Communications Systems.

John Andrews was appointed to broadcast development director for Solid State Logic.

Robert Hansen was appointed senior vice president of sales for Leitch's U.S. operations.

Wilbur Brann was appointed Southeastern regional sales manager for ParkerVision.

Ed Burakowski was recently appointed vice president of strategic sales for NDS Americas. ■

ScreenShot

Fujinon outfits Déjà Vu

Soljay Productions' new 50-foot expando truck, Déjà Vu, includes twelve Fujinon lenses on its Philips cameras.

Déjà Vu is used to cover business meetings, concerts, and sporting and religious events, as well as more demanding remotes.

The truck was recently used to shoot a concert by artist Mandi Moore at the Houston, TX, Six Flags theme park. It was also used by RJ Productions for the SPCA Telethon in Hurst, TX.

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Pinnacle Systems: Pinnacle Systems' broadcast products give professionals the cutting edge tools needed to create dazzling productions faster and more affordably than ever before. These innovative digital video manipulation tools perform a variety of on-air, production, and post-production functions such as the addition of special effects, image management, capture, storage, and play-out, as well as graphics and title creation.

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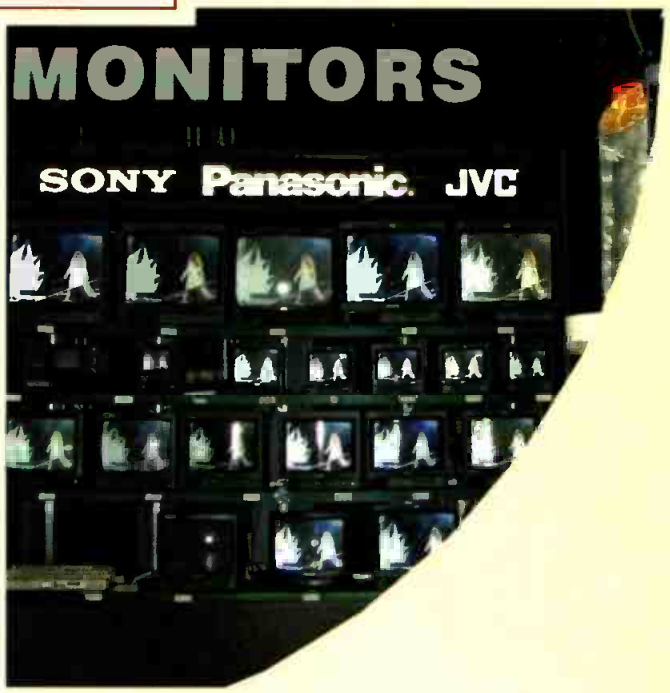

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SONY

DSR-250 3-CCD DV & DVCAM

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

- **1/3 inch x three 380K pixel** (effective 340,000 pixels) **CCD's** that allow two scanning modes: 480 progressive (for still) or interlaced (for video). They also provide high quality acquisition with increased resolution and sensitivity at reduced noise and vertical smear.
- **530 lines of horizontal resolution**, allowing you to capture your subject with tremendous detail
- **Switchable aspect ratio** 4:3 (TV mode) or 16:9 (Movie mode)
- **DXF-801 high resolution 1.5" black & white viewfinder** (same as on DSR500WS & DXC-D35) enables easier focusing. Automatically switches from 4:3 aspect to 16:9.
- **Records in DVCAM or DV**, standard tapes or mini. Up to 270 minute recordeding in DV mode onto a 184 min. DVCAM tape.
- One touch auto focusing in manual focus mode.
- 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
- **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
- **Built in edit controller.** Equipped with an i.LINK interface, allowing camcorder to serve as edit player or recorder
- Soft shoulder pad • **Wireless remote controller.**
- Uses sony's lithium ion batteries (BPL series)
- External 12V supply/Connection for light. The DSR-250 is equipped with light output (DC 12 V, maximum 30 watts).

DSR-300A 3-CCD Digital (DVCAM) Camcorder

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.

- The DSR-300A has three 1/2" IT Power HAD CCDs to deliver 800 lines of horizontal resolution, 62dB S/N ratio and high sensitivity of F11 at 2000 lux.
- Power HAD CCDs also gives you a low smear level of -110 dB (DSR-300) allowing more freedom to shoot highlighted subjects
- With built-in 26-pin VCR interface, they can feed composite or S-video output signals to an external recorder for parallel or back-up recordings. VCR recording modes including Parallel, Internal (only) and External (only) are selected via the trigger switch positioned on the operational panel.
- With the DSR-300A, a picture previously recorded on tape can be superimposed on the viewfinder screen (Freeze Mix Function), allowing you to easily frame or reposition the subject just as in the previous shot. Combined with the SetupLog function, the retake shot becomes a breeze
- 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-184ME (standard), a maximum recording time of 184 minutes can be achieved. They can also play back tapes recorded in the consumer DV format
- For operational convenience while shooting, the Time Code is superimposed on the viewfinder screen or MONITOR OUT screen, even during playback
- DXF-801 viewfinder featuring variable peaking, 3 level tally light and a white LED light with 2 levels of intensity to illuminate the lens setting. • IEEE1394 i.Link (out only)
- Color Temperature Shift allowing the operator to manually shift the white balance either towards blue or red to compensate for conflictive (color temp mix) and because of the wide range it also provides creative artistic painting.

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 only allows adjustment of H-sync 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
- The DSR-20 adds a **Control S Output** connector allowing two or more (up to 50) DSR-20s to be daisy-chained and controlled from one DSRM-20

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.
- It also has a simple recording function which can be controlled either manually or via its RS-422A interface.
- 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 ID with no loss in quality
- Analog audio and video input/outputs make it fully compatible with non-digital equipment. Playback compatibility with consumer DV tapes allows you to work with footage recorded on consumer-grade equipment. Tapes recorded in the DSR-30 are also compatible with Sony's high-end DVCAM VCR's

SONY

DCR-VX1000 3-CCD Digital Camcorder

The DCR-VX1000 records 500 lines of horizontal resolution, and has a higher S/N ratio than cameras costing ten times more. Also records audio digitally, using PCM technology, the same as used in CDs for a breathtaking dynamic range of 96 dB. Most important though, since video and audio signals are recorded digitally, you can copy or edit multiple generations with no loss in quality. Analog tape artifacts like color bleeding, dropouts and generation loss are all a thing of the past.

B&H SPECIAL $2495

- Eight-speed 10X optical zoom lens goes from 5.9 to 59mm in 4.1- 20 secs. Also provides a digital 20X zoom
- Records 12-bit/32kHz audio with two pairs of stereo tracks.
- Automatic and manual audio level record controls.
- Built-in time base corrector (TBC) delivers jitter-free playback and dead-perfect stills.
- Digital effects include audio and video fade (to black), overlap and slow shutter • Time-lapse recording
- Sony's Super SteadyShot reduces high frequency camera shake without compromising image quality.
- Records "extended data codes". Automatically stores date/time, shutter speed, iris and other data for easy recall.
- Records drop-frame time code for accurate editing.
- Record still image pictures with audio for up to seven secs
- Focusing, exposure and white balance are all automatic or can be manually controlled.
- Zebra pattern indicator just like professional cameras
- Preset, store and recall your own custom settings for color intensity, white balance, sharpness, brightness and gain shift (0dB/-3dB).
- Precision 180,000 pixel color viewfinder incorporates a separate information sub panel which displays time code, battery time, tape remaining and other camcorder functions without cluttering up the viewfinder
- Control L terminal for communication between camera and edit controller
- Built-in ND (neutral density) filter
- Square lens hood reduces external light flare effects.

JVC

GY-DV500 1/2-inch 3-CCD Professional DV Camcorder

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

Professional Specifications

- Applies JVC's DSP with advanced 14-bit video processing to bring out more natural details, eliminate spot noise, accurately reproduce 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. Ensures efficient light conversion with a sensitivity of F11 at 2000 lux
- CCD Defect Correction function evaluates white defects with the lens closed and then stores their addresses in memory. When the camera is turned on, the data is sent to the DSP for storage and real-time correction.
- Black Stretch/Compress function ensures accurate reproduction of black areas on the screen. Advanced color matrix circuits give even difficult images a very natural appearance.
- Multi-stream parallel digital pipeline processing at 40 MHz creates an ultra-smooth gamma curve, calculated using a true log scale algorithm. The result is a dynamic range of 600% to accurately reproduce fine details and colors in shadows or highlights.

Professional Performance

- Multi-zone iris weighting system gives priority to objects at the central and lower portions of the picture for accurate auto exposure under any condition, even if a bright subject moves into the picture.
- Adjustable gamma for adjusting the "feel" of the picture according to taste. Adjustable detail frequency for setting picture sharpness for a bolder or finer look.
- Viewfinder status display uses characters and menus to diplay selected information, including audio indicator, tape and battery remaining time, VCR operation and warning indicators. Camera settings and setup parameters can also be checked at a glance. A built-in menu dial lets you quickly navigate through the viewfinder menu.
- Highlight Chroma Processing maintains color saturation in highlights. The result is natural color reproduction, even in bright highlight portions of the picture.
- Smooth Transition mode ensures a smooth transition with no jump in color or light level taking place when manually changing gain or white balance settings

Professional Audio

- To complement its superior video performance, the GY-DV500 offers outstanding digital PCM sound. You can choose between two 16-bit 48-kHz channels or two 12-bit 32-kHz channels with a dynamic range of 85 dB.
- In addition to camera mounted mic, has two XLR-balanced audio inputs with 48v phantom power and manual audio control. Phantom power can be switched off when not in use.
- Side-mounted speaker lets you monitor audio in playback and recording modes without headphones. The speaker also delivers audible warnings.

SR-VS10U MiniDV and S-VHS VCR Combo

The HR-DVS1U 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
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- 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

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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 (88kg)
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 fast 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 NP-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 strenght.
- 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 282 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

DIAL 74

SONY

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.
- Both read LTC Time Code) and UB (User Bits). The UVW-1400A also generates LTC and UB (Free-Run/Rec-Run)
- 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.
- Control of jog, shuttle, playback, record, pause, FF and REW with the optional SVRM-100A Remote Control Unit
- Composite and S-Video as well as component via BNCs which are switchable to RGB output. The UVW-1400A has two switchable sync connectors and a Sync on Green.
- Built-in diagnostic function and hour meter.
- Initial set-up menu for presetting operational parameters. Settings are retained even after power is turned off.

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. In the insert mode of the UVW-1800, video, audio Ch-1/2 and time code can be inserted independently or in any combination.

PVW-2600/PVW-2650/PVW-2800

BETACAM SP PRO SERIES

Whenever versatility and no compromise performance is needed, there is only one choice. Legendary reliability and comprehensive support for its many users has established the PVW series as the standard in broadcast and post production. The PVW Series includes the PVW-2600 Player, PVW-2650 Player with Dynamic Tracking and the PVW-2800 Editing Recorder. They feature built-in TBCs, LTC/VITC time code operation and RS-422 serial interface. They also offer composite, S-Video and component video inputs and outputs. Most important they are built for heavy, every day duty.

- Built-in TBC's and digital dropout compensation assure consistent picture performance. Remote TBC adjustment can be done using the optional BVR-50 TBC Remote Control.
- The PVW-2600, PVW-2650 and PVW-2800 (generates as well) read VITC/ LTC time code as well as User Bits. Ext/Int time code, Regen/Preset, or Rec-Run/ Free-Run selections
- Built-in character generator displays time code or CTL data

PVW-2650 Only

- Dynamic Tracking (DT) playback from -1 to +3 times normal speed.
- Set-up menu for presetting many functional parameters
- Two longitudinal audio channels with Dolby C- type NR
- Recognizable monochrome pictures at up to 24X normal speed in forward and reverse. Color at speeds up to 10X
- Two types of component connection: three BNC connectors or a Betacam 12-pin dub connector. They have composite and S-Video signals as well.

PVW-2800 Only

- Built-In comprehensive editing facilities
- Dynamic Motion Control with memory provides slow motion editing capability

PVM-20S1WU

20-inch 16:9 Color Production Monitor

The PVM-20S1W incorporates all of the superb features of Sony production monitors for 16:9 viewing in post-production and broadcast stations. It features multi-system compatibility, blue gun, underscan and H/V delay. It also offers flexible signal connections, a full range of optional functions and ease of operation

- 16:9 aspect ratio CRT with dark panel for high contrast image reproduction • Accepts component (Y/R-Y/B-Y), RGB, Y/C and composite signals • Beam current feedback circuit for stability in the color balance
- Optional component serial digital interface kits BKM-101C (video)/102 (audio) available • Switchable aspect ratio (4:3 and 16:9) • Color temperature D65, D93 or user preset (3200K to 10000K) selectable
- On screen display for adjustment/ operation • User preset function
- Underscan, Blue Only and H/V delay mode available
- Auto chroma/ phase setup
- Accepts external sync

B&H SPECIAL $999

- Digital 3-line comb filter • Auto/Manual degaussing
- Mountable into an EIA standard rack with the optional SLR-103 slide rail kit.

PVM-14M2U/14M4U & 20M2U/20M4U

13-inch and 19-inch Production Monitors

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

- HR Trinitron CRT enables the PVM-14M4U and 20M4U to display an incredible 800 lines of horizontal resolution. The PVM-14M2U and 20M2U offer 600 lines of resolution. M4 models also use SMPTE C phosphours for the most critical evaluation of any color subject.
- Dark tint for a higher contrast ratio (black to white) and crisper, sharper looking edges
- Each has two composite, S-Video and component input (R-Y/B-Y, analog RGB). For more accurate color reproduction, the component level can be adjusted according to the input system. Optional BKM-101C (video) and BKM-102 (audio) for SMPTE 259M serial digital input
- Beam Current Feadback Circuit
- 4:3/16:9 switchable aspect ratio.
- True multi-system monitors they handle four color system signals: NTSC, NTSC 4.43, PAL & SECAM.
- External sync input and outputcan be set so that it will automatically switch according to the input selected.
- Switchable color temp. 6500K (broadcast), 9300K (pleasing picture). User preset (3200K to 10000K)
- Blue gun, underscan and H/V delay capability
- On-screen menus for monitor adjustment/operation.
- Parallel remote control and Tally via 20-pin connector.

PROFESSIONAL VIDEO TAPES

DIAL 71

FUJI

Professional Grade VHS

PG-30	2.29	PG-60	2.39	PG-120	2.59

Broadcast Grade VHS Box

BGR-30	3.49	BGR-60	3.99	BGR-120	4.69

H471S S-VHS Double Coated

ST-30	6.99	ST-60	7.49	ST-120	7.99

M221 HI 8 Double Coated

Metal Particles			Metal Evaporated		
P630HMP		4.49	E630HME		7.69
P660HMP		6.29	E660HME		10.49
P6120HMP		8.49	E6120HME		13.99

M321SP Metal Betacam (Box)

05S	10.99	10S	11.99	20S	12.99
30S	13.99	60L	20.99	90L	32.99

DP121 DVC PRO

12M (Med.)	7.49	23M	8.79	33M	10.99
63M		19.99	66L		22.50
94L		30.99	126L		39.99

maxell

Broadcast Quality Hi8 Metal Particle

P6-30 HM BQ	5.39	P6-60 HM BQ	6.09
P6-120 HM BQ			7.99

P/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

HGX-PLUS VHS (Box)

HGXT-60 Plus	2.69	HGXT-120 Plus	2.99
HGXT-160 Plus			3.99

BQ Broadcast Quality VHS (Box)

T-30 BQ	3.89	T-60 BQ	3.99	T-120 BQ	5.99

BQ Professional S-VHS (In Box)

ST-31 BQ	6.79	ST-62 BQ	6.99
ST-126 BQ	7.45	ST-182 BQ	13.99

Betacam SP

B30MSP	13.49	B60MLSP	19.99	B90MLSP	27.95

Panasonic

Mini DV Tape

AY DVM-30	5.49	AY DVM-30 (10 Pack)	ea. 5.99
AY DVM-60	7.49	AY DVM-60 (10 Pack)	ea. 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	19.49
AJ-P66L (Large)	20.99	AJ-P94L	29.99
AJ-P126L			38.95

SONY

Hi-8 Professional Metal Video Cassettes

P6-30 HMPX	4.79	P6-30 HMEX	8.19
P6-60 HMPX	6.79	P6-60 HMEX	11.99
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

MO Master Quality S-VHS (In Box)

MOST-30	7.49	MOST-60	7.69	MOST-120	7.99

BRS 3/4" U-matic Broadcast Standard (In Box)

KCS-10 BRS (mini)	8.99	KCS-20 BRS (mini)	9.99
KCA-10 BRS	8.99	KCA-20 BRS	9.49
KCA-30 BRS	10.69	KCA-60 BRS	14.99

XBR 3/4" U-matic Broadcast Master (In Box)

KCS-10 XBR (mini)	9.79	KCS-20 XBR (mini)	11.29
KCA-10 XBR	10.29	KCA-20 XBR	11.79
KCA-30 XBR	13.29	KCA-60 XBR	17.39

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

BCT Metal Betacam SP Broadcast Master (Box)

BCT-5M (small)	11.99	BCT-10M (small)	12.49
BCT-20M (small)	12.99	BCT-30M (small)	13.49
BCT-30M (small) (10 Pack)			ea. 12.99
BCT-30ML	14.99	BCT-60ML	21.99
BCT-90ML			30.99

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-120MEM	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	PDVN-64N	24.95
PDVN-124N	31.95	PDVN-184N	39.95

ALL ITEMS ARE COMPLETE WITH ALL ACCESSORIES AS SUPPLIED BY MANUFACTURER

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, 733/933 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-RDM) 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 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
- 32 levels of undo/redo, making changes, painless!
- Tight timeline with precise timecode editing
- Real time 3-band EQ, and 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 titling 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 Millenium G400 4X AGP with 16MB of RAM.
- Ultra2 SCSI 9 GB (7200 rpm)drive for operating system.
- 18.2GB 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) **6895.00**
or ..... (933 MHz) **7699.00**

Avid MediaDrive rS Plus

The MediaDrive rS Plus is the latest in the line of leading edge storage products from Avid. Designed exclusively for AV professionals, the MediaDrive rS Plus is available in 9 and 18GB capacities and utilizes the highest performance 10,000 rpm drives on the market today. Available in a stackable model with a rack-mount option, the MediaDrive rS Plus incorporates QuietDrive, a revolutionary sound dampening technology developed by Avid. The MediaDrive rS Plus 10K drives provide Avid customers with a very affordable, versatile, high-performance storage solution.

- Using 10,000 rpm drives, MediaDrive rS Plus offers 40% higher performance than 7200 rpm drives. The increase in data transfer rates results in fewer drives necessary to achieve higher resolutions. Real-time AVR 75 can be achieved on a single rS Plus drive. Striping only two rS Plus drives across one dual channel controller can provide dual stream AVR 77 quality throughout the entire drive
- Built-in thermal circuitry controls the speed of the fan for efficient cooling and an external indicator helps to protect your drive and critical data by signaling high temperature conditions
- QuietDrive technology reduces drive noise by up to 15 dB. This allows finer audio editing and lower operator fatigue
- An innovative vertical interlocking stacking feature provides the option to physically latch striped sets together permanently or temporarily
- With its own power and SCSI connectors (conforming to fast and wide SCSI standards), the rS Plus drive is ready to travel down the hall or around the world. You can hook up the rS Plus drive in any studio. No docking system is required
- Optional rack mount kit adds great flexibility by allowing two MediaDrive rS units to be mounted in a 2U rack format. Quick release allows drives to be removed easily for transporting or replacing with new project drives

Configuration

- MediaDrive rS enclosure. 3.5 self-contained (power, cooling and connections) stackable unit. SCSI-2 68-pin connection
- Rack mountable with MediaDrive rS rack mount option kit

rs-18 "MediaDrive" External LVD 18GB Drive $1049.95	is-18 "MediaDrive" External LVD 18GB Shuttle $949.95	ls-18 "MediaDrive" Shuttle (Older Station) $1149.95
rs-36 "MediaDrive" External LVD 36GB Drive $1599.95	is-36 "MediaDrive" External LVD 36GB Shuttle $1499.95	"MediaDrive" rs Rack Kit (2 Drives) $99.95

SONY

ES-3 EditStation

The Sony ES-3 EditStation is an extremely flexible, powerful and high picture quality non-linear video editing system. Its self-explanatory yet sophisticated editing interface is easy to use even for newcomers to the non-linear editing realm. Its open architecture also supports popular third-party software for graphics, paint, text, and effects. The Sony ES-3 EditStation also offers the unique Sony "ClipLink" interface, allowing you to transfer only the clips you want for editing, since The Sony DSR-300/500 cameras mark the in/out points of each shot and a still frame of every in-point called the "index picture" is recorded on the cassette memory of the DVCAM tape.

- The video and audio files stored on the disk drive of the ES-3 system can easily converted to AVI or QuickTime file format. Allowing you to create multimedia materials for CD-ROMs, or to be streamed to the web.
- Slow and fast motion are available. The playback speed for each clip can be set to be played back at the desired speed.
- Edits on the ES-3 TimeLine are converted to the Sony EDL format and displayed in a EDL window. Additionally the EDL can be printed out or saved to disk.
- Dual monitor display is available for more efficient operation.
- The ES-3 can be switched to operate in either 4:3 or 16: 9 wide screen aspect ratio.

Editor

You start with the Editor for uploading to create both video and audio clips. The Editor consists of the live picture window, In/Out point and duration windows, video/audio 1/2/3/4 selection buttons for uploading, a record clip button and VCR control functions. Using the Editor, you can upload video (including live upload) with or without VCR control.

ClipBin

This is where you store program material designated as clips. You can group clips and customize the ClipBin according to your needs. Two main display modes: picture mode and text mode. In picture mode you can select six different sub modes;

Timeline

The timeline is where you build your project. Each track may hold video, graphics, titles or audio. To build your project, clips (from the ClipBin), effects and transitions are dragged and dropped onto the timeline in sequential order. There are various timeline views available. You can select any items displayed such as Index Pictures of the head or tail of a clip, marker, name, duration, reel number, mark in/out and many others.

Trim Editor

A Trim Editor is available for precise trimming on the timeline. It is opened as an independent window, with the video of the out point of the "from" clip and the in point of the "to" clip displayed. Both single and dual trimming can be performed. Clips can also be played and trimmed directly in the Clip Monitor which is selected from the edit menu.

Audio Editor

With the Audio Editor, eight channels of assigned audio can be monitored in real-time. Each input channel can be assigned to any track in the timeline. Each channel has its own peak meter, level fader, level trim, phase control, three band EQ, panning and filters (low cut, high cut, echo, etc.). Volume and pan are processed in real-time and can also be modified in rea-time using the ESBK-7011 Control Panel.Audio level and panning for each clip can be controlled directly on the timeline with the rubber band editing function. Each track has it's own rubber band control.

Control Panel

In addition to controlling non-linear functions via mouse and keyboard, also includes the ESBK-7011 Control Panel for conventional operation. Combine familiar linear techniques such as jog/shuttle control, effects transitions and audio fading with convenience of non-linear editing.

Breakout box

The breakout box provides easy interfacing to analog or digital equipment. It offers analog composite, component and S-Video input and output. For digital video, an i.LINK input/output is standard, and QSDI(SDTI) can be activated via optional software and dongle. For audio, four input channels of XLR-balanced analog audio (two out) and AES/EBU digital audio I/O (XLR-balanced) are provided. Two RS-422 ports are provided for deck control. Finally, the ES-3 is also equipped with a genlock input and blackburst output for reference.

Starting at $9,995

Apple Authorized Reseller

Final Cut Pro

Professional Editing, Compositing and Effects Software for Macintosh

A breakthrough in non-linear video. Final Cut Pro combines professional editing, compositing, and special effects in one powerful application – turning a Power Mac into a powerful workstation. Designed from the ground up for DV. Final Cut Pro offers the easiest way to transfer material from DV sources to your hard disk; edit, composite, and add effects to the video and audio; and play the results. It has an advanced feature set that professionals will love, yet it's also easy enough for novice video producers who are just discovering DV and FireWire. Final Cut Pro supports DV and all QuickTime formats, including M-PEG and web-ready Streaming video. Provides plug-and-play capabilities with most digital video cameras. Just connect your computer to a DV camcorder, capture video and edit it with sophisticated tools. Create multiple layers of video using text, graphics, or additional video elements. Each layer can be still, or animated along a user-defined path using tools such as Bézier curves with acceleration control.Then you can output your results for TV, videotape, QuickTime movies, or the Web.

Professional Services

Classifieds For Sale

Classifieds Services

Classifieds Services

Classifieds For Sale

Classifieds For Sale

FOR SALE 640 feet of RCA 3 1/8 inch, 51.5 OHM transmission line; good condition. $5,000 or best offer. As is, where is. Contact: Duhamel Broadcasting Enterprises; Att'n: Director of Engineering; P.O. Box 1760; Rapid City, SD 57709-1760; Phone: 605-342-2000, ext. 600.

FOR SALE 300 feet of guyed tower with 2 feet face. Guy cables included, Make offer. As is, where is. Contact: Duhamel Broadcasting Enterprises; Att'n: Director of Engineering; P.O. Box 1760; Rapid City, SD 57709-1760; Phone: 605-342-2000, ext. 600.

Classifieds Help Wanted

BROADCAST ENGINEER - KUSI-TV has an opening for an experienced broadcast engineer to join our engineering team in the service and repair of state-of-the-art broadcast analog, digital and rf equipment. Successful candidate must have a solid understanding of digital equipment, computers, computer networks and troubleshooting to component level, with a "can-do" work attitude. Minimum of four years hands-on maintenance experience required. Excellent career opportunity with one of the finest technical facilities in the country. EOE - Send resumes to: KUSI-TV, HR, P.O. Box 719051, San Diego, CA 92171.

TELEVISION ENGINEER. KOAM-TV, Channel 7, a CBS Affiliate in the Joplin/Pittsburg market is searching for a full time engineer with diagnostic skills in analog and digital video/broadcast studio systems with knowledge, of RF/transmission and IS. Minimum of 2 years experience in related work and SBE certification or degree in broadcast engineering helpful. KOAM-TV is a dominant VHF facility utilizing DVC-Pro gear, on-site Doppler Radar and non-linear editing. Receive exceptional benefits and 401-K with this fast growing Television/Radio Group. Please forward resume and salary history to Larry White, Chief Engineer, KOAM-TV, P.0. Box 659, Pittsburg KS 66762. KOAM-TV is an Equal Opportunity Employer.

ENGINEERING SUPERVISOR: Responsible for supervising news department ENG operations, maintaining analog and digital television production systems, and repairing ENG/studio equipment. Need a team leader with good communication skills. Strong ENG background preferred. 5 yrs broadcast experience, 2 yr technology degree or equivalent SBE Certification preferred. ClearChannel Television, Attn: GM 2701 Union Ext. Memphis, TN 38112

TECHNICAL EDITOR: Intertec Publishing, a nationwide leader in the trade publishing industry, seeks a Technical Editor for *Broadcast Engineering* and *World Broadcast Engineering* magazines. Position located in Overland Park, a suburb of Kansas City, MO. This individual will be responsible for writing and editing broadcast television, video and computer video materials for both publications, along with verifying technical details and preparing articles for production. Will work with manufacturers, corporate users and broadcasters on the coverage of TV/video and other technology issues. Some traveling required for industry trade shows, technical conferences and editorial trips. Requirements: Must have solid technical writing skills and knowledge of video and television technology. 4 years of work experience of a technical nature with a newspaper or magazine is preferred. We offer a competitive benefits/compensation package, which includes 401k, retirement plan, a stock purchase program and casual work environment. Please send resume with salary requirements (mandatory for consideration) to Intertec Publishing, HR Dept., Attn: GH-BE Tech, 9800 Metcalf Ave, Overland Park, KS 66212. FAX: (913) 967-1846. Email: gail_halverson@intertec.com. EOE Please visit us: www.intertec.com.

Classifieds Help Wanted

ENGINEERS

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

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

Fax: 404-827-1835 • Phone: 404-827-1638
e-mail at: cnn.engr.jobs@turner.com
TBS is an equal opportunity employer.

CNN

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YOU'RE OBVIOUSLY LOOKING—SO ARE WE.

Professional Communications Systems is a victim of its own success. Our business is booming and we are in search of quality people. If you're an experienced Design Engineer/Project Mgr. and dream about and qualify for designing today's state of the art broadcast facilities, lets talk. Openings also exist for Installation Technicians in our sunny and warm Tampa office. We also have an opening for National Systems Integration Sales. Great company, location, salary, and benefits. EOE AA M/F Drug Screen.

Resume to HR Dept.
5426 Beaumont Ctr. Blvd., Ste. 350
Tampa, FL 33634
Fax 813/886-9477 or email pwolf@pcomsys.com

SENIOR TECHNICAL SPECIALIST

Responsible for deploying customer service systems in Latin America. Provide support for region countries after deployment. Conduct quality assurance checks.
Develop staffing requirements and personnel proformas. Bachelor's Degree in Business Administration or International Business and three years related experience in managerial position with customer service experience in Latin America; Fluency in Spanish and Portuguese languages required.

In return for your professional abilities, we offer an attractive compensation and benefits package. For immediate consideration, please send or fax a cover letter along with your resume and salary history to Galaxy Latin America, **REQ# A20003.**
P.O. Box 24800, Fort Lauderdale, FL 33307.
Fax: (954) 958-3341.
E-mail: hr@directvgla.com
No phone calls please.
Equal Opportunity Employer.

MIS DIRECTOR

Direct and manage operations of satellite broadcasting company's full range of telecommunications, including computer hardware, software, network, databases, and desktop tools. Oversee all engineering and technical staff related to MIS functions. Interface with all levels of organization, customer and vendors throughout Latin America. Bachelor's degree in Systems Engineering, MIS or Computer Science and five (5) years related experience; fluency in Spanish and Portuguese languages required.

In return for your professional abilities, we offer an attractive compensation and benefits package. For immediate consideration, please send or fax a cover letter along with your resume and salary history to Galaxy Latin America, **REQ# A20005.**
P.O. Box 24800, Fort Lauderdale, FL 33307.
Fax: (954) 958-3341.
E-mail: hr@directvgla.com
No phone calls please.
Equal Opportunity Employer.

CHIEF ENGINEER-WWDP: Experienced television engineer in the Boston, MA area needed. Fax resume to Robert Heon at 561-833-8616.

Classifieds Help Wanted

HARRIS

Does Your Career Seem Static?
Change the Channel.

Imagine what Harris can do for your career. As the global leader in Broadcast Communications, Harris is the leader in advanced transmitter equipment and systems for digital television (DTV) and digital broadcast equipment in the world. We've got the kind of challenges that can really make things interesting for you at our new Advanced Research Center in Cincinnati, OH. Contact Harris today. No static here—just great careers.

■ **Proposal Engineer-DTV Products**

The qualified candidate will prepare quotations and proposals and interface with customers, sales managers and Harris in-country representatives; complete compliance statements; and have in-depth knowledge of vendor and Harris pricing. Occasional travel may be required. BS/BA or equivalent is required. The ideal candidate will have five years of experience working with TV broadcast transmission systems including, but not limited to knowledge of MPEG-2 standards; encoding; multiplexing; data-casting; ATM technology; television studio systems design; knowledge of program input and test equipment and AC mains power requirements; and working knowledge of IBM compatible PCs with emphasis on spreadsheet and word processing. The ability to work within deadlines with limited supervision is necessary.

Here you'll find a creative technical environment where talent and ambition define your future-as well as competitive compensation, excellent benefits, and a real commitment to work/life balance. Please contact: **Harris Corporation-Broadcast Communications Division, 4393 Digital Way, Mason, OH 45040-7604; FAX: (217) 221-7082; E-mail: eagard@harris.com**
EOE

COMPUTER TECHNICIAN - KUSI-TV has an opening for an experienced computer technician to join our engineering team. Duties will include installation, service and repair of our computer network, along with other broadcast operations. Successful candidate must name a solid understanding of computers, software, networks and server technology, with a "can-do" work attitude. Minimum of two years hands-on electronics training required. Excellent career opportunity with one of the finest technical facilities in the country. EOE - Send resumes to: KUSI-TV, HR, P.O. Box 719051, San Diego, CA 92171.

EMC²

where information lives

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ADC Broadcast	95	139	800-726-4266	adc.com/broadcast
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Avid Technology	25	113	800-949-2843	avid.com
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Azden Corp.	101	142	516-328-7500	azdencorp.com
BarcoNet	67	133	770-590-3600	barconet.com
B & B Systems	151	207	818-551-5858	b-bsystems.com
Benchmark Media	144	181	800-262-4675	benchmarkmedia.com
B&H Photo-Video	146-149	183-4	212-239-7500	bhphotovideo.com
Boland Comm.	132	172	949-367-9911	bolandcom.com
The Broadcast Store	150	206	818-551-5858	broadcaststore.com
Broadcast Supply Worldwide	115	156	800-426-8434	bswusa.com
Broadcast Video Systems	112	153	905-764-1584	bvs.on.ca
Canon	27	115	800-321-4388	canonbroadcast.com
CEMA	121	161	703-907-7628	CESweb.org
Columbine Systems	75	137	303-237-4000	cjds.com
CPI/Eimac	73	136	650-592-1221	eimac.com
Crispin	135	175	919-845-7744	crispincorp.com
Devlin Design Group	127	166	858-535-9800	.com
Dielectric	119	159	207-655-4555	dielectric.com
Digibid.com	152	210		digibid.com
Digital Media Net	21		714-424-6100	digitalmedianet.com
Digital Media Net	47		714-424-6100	digitalmedianet.com
Digital Media Net	69		714-424-6100	digitalmedianet.com
DNF Industries	134	173	818-252-0198	dnfcontrols.com
Dolby Labs	65	132	415-645-5000	dolby.com
D P S	17	109	606-371-5533	dps.com
DTV 2000	138		800-288-8606	dtvconference.com
Enseo	145	179	888-478-2687	enseo.com
ESE	134	174	310-322-2136	ESE-WEB.com
Evertz Microsystems	111	152	905-335-3700	evertz.com
Extron Electronics	37	121	714-491-1500	extron.com
Fantozzi Company	151	208	408-297-2700	tfanco.com
Faroudja	71	135	408-735-1492	faroudja.com
FAST Sales US	125	164	800-249-3278	fastsalesus.com
Florical Systems	137	176	352-372-8326	florical.com
Folsom Research	57	128	916-859-2500	folsom.com
Forecast Consoles	112	154	516-253-9000	forecast-consoles.com
Fortel DTV	55	127	404-885-9555	forteldtv.com
Grass Valley Group	23	112	800-998-3588	grassvalleygroup.com
Harmonic	15	108	408-944-6700	harmonicinc.com
Harris Corp./Broadcast Div.	3	104	800-4HARRIS	harris.com
Henry Engineering	145	178	626-355-3656	henryeng.com
I-COM Industry	132	171	703-707-9094	i-comindustry.com
Ikegami	43	123	201-368-9171	ikegami.com
Industry Click	124	163	609-371-7759	digibid.com
iNews	117	157	608-273-8686	inews.com
Inscriber Technology	35	120	800-363-3400	inscriber.com
Keywest Technologies	143	177	913-492-4666	keywesttechnology.com
KTech Telecommunications	33	119	818-361-2248	ktechtelecom.com
Leitch Incorporated	31,160	117,103	800-231-9673	leitch.com
Leitch Incorporated	130a-l		800-231-9673	leitch.com
Lighthouse Digital Sys.	120	160	888-494-7300	lighthousedigital.com
Litton Electron	32	118	800-861-1UHF	littonedd.com
Maxell Corp.	53	126	800-533-2836	maxellpromedia.com
Miranda Technologies Inc.	9	106	514-333-1772	miranda.com
Motorola Broadband	133	170	800-385-5843	motorola.com/broadband
Network Electronics	102	144	201-854-8418	network-electronics.com
NOVA Systems	128	165	800-358-NTSC	nova-sys.com
Odetics	60,61	130	800-243-2001	odetics.com/broadcast/
Omneon	29	116	408-558-2113	Omneon.com
OTL	144	182	800-647-9110	otlighting.com
Oxtel Inc.	20	111	877-446-9835	oxtel.com
Panasonic Broadcast	5		800-528-8601	panasonic.com
PESA Switching	129	167	800-328-1008	pesa.com
Pinnacle Systems	109	150	650-526-1600	pinnaclesys.com
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EOM

The importance of an exit

BY PAUL MCGOLDRICK

As we look around the broadcast industry, we see a number of dominant suppliers who control the vast majority of the dollars that are spent. But whether they advertise or not, whether they have a small presence at NAB or no presence at all, this industry is dominated by smaller suppliers, in some cases very much smaller. They enjoy the niches that smaller companies everywhere have had to find when the superstore moves into town. In many of these cases the companies invented the niche, and many dominate their arenas.

The really small companies are normally safe from predatory corporations and are unlikely to come to the attention of the larger operations – which often could compete with the company's products quickly by simply turning a little of their resources in that particular direction, but do not, having bigger fish to fry.

When a small company needs an exit plan, all bets are off.

I have always felt — and I have a couple of family examples to show for it — that pure business partnerships are the most difficult to keep going for any length of time. When things start tough and then get tougher, the reasons for staying together seem to be fewer and fewer. The most enduring partnerships are when the parties involved are related, and the act of splitting the business part inevitably has to be balanced with the chances of splitting the family. I have consulted with a number of such companies and the most obvious failing, time-and-again, is the absence of an exit strategy. What happens if one of the partners dies, is disabled or simply doesn't want to be involved any more?

In one memorable example I managed one afternoon to persuade a substantial family business to fire the CEO/president (their mother/aunt) and appoint another much more aggressive, more qualified member of the family into that position. This poor woman had been forced into the business by the death of her husband and had no idea how to get out of the predicament in which she found herself: in a business she disliked and knew she didn't know how to run.

When a small company needs an exit plan, all bets are off.

Fatigue is a major reason why people divest themselves of what they have built up. One example that is close to home for me is a company that happens to be in the broadcasting market. Well established in its niche, internally the company had suffered business decision disagreements between the closely-related principals. The partners had taken over 20 years to build their business and they wanted out. It was clearly both a wrench for them and a necessity.

A buyer was found at the opposite end of the country and a deal was completed. Most of the principals decided not to stay, but a few key players did. After so much work, so much grind, over so many years, one cannot feel anything but joy for them for getting out in one piece with sufficient funds for their old age. But the rest of us also have to look at what is the inheritance of the sale — for the employees, the town and for a company put in the same position halfway across the country.

One other locally-acquired company (not in broadcasting) has seen the local CEO give up and leave town, making the future of what was a superb organization tenuous at best. The broadcast company I mentioned has not been left in good hands and is now incapable of defending the company's local interests. The head of R&D saw the corporate light, liked it not, and left.

So I'm watching a company with some fine individuals – not all, of course – who are rudderless. The hand on the helm is far away, as I can gauge by counting the number of neckties seen in our town. It is usually few: ministers, the mortician, the postmaster, and for some reason the appliance store owner. A tie coupled with a rental car stands out as a very obvious sight. At the beginning of this acquisition, they were in town thick and fast; now they are rarely seen. To me that says they have lost interest. I can foresee a squeezing of the talent in the company, continual pressure on reducing expenses, and a continuous worsening of morale.

It is sad to see talented, confident and honest employees increasingly having to ask themselves whether they should be looking for jobs somewhere else. It is even sadder that things could have been entirely different; that the problem should have been how to recruit even more talented people to the town. With an exit strategy in place in earlier years, everybody would have benefited and the founders could have continued to enjoy what they had accomplished. ■

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

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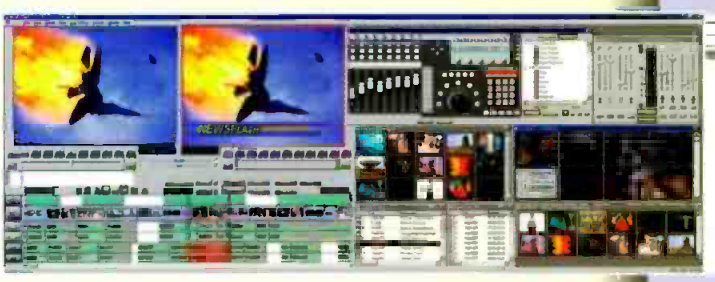

The instant news makes impact, you have to be ready to launch your crew into the action. The first one on air is reporting the news; everyone else is just reporting history. As every second passes, you're in danger of missing your target. Leitch's news server ensures that you never crash and burn by supplying direct, unrestricted access to our V-SAN — the Video Storage Area Network. Your crew can simultaneously record multiple feeds, edit complete packages and instantly play to air. In no time you'll be shaping stories that once remained up in the air. Your crew will be on the air before the competition loads its tapes. It's all possible with NEWSFlash™, the only 'in-the-server' Non-Linear Editor designed specifically for quick, hard news. And you can simultaneously attack with a fully armed squadron using BrowseCutter™ and Instant Online™, a complete set of ammunition allowing for browse, edit and instant story to rundown conformance of digital video and audio content right from the journalist's computer desktop. The sky's the limit with Leitch's integrated news system. Call 800-231-9673 for more information or visit our website at www.leitch.com.

Using NEWSFlash™ and Instant Online™ newsroom generals can coordinate with outside forces using the following compatible newsroom interfaces: ANN, AvStar, Comprompter, DCM, ENPS, Generation Technologies and Newstar

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