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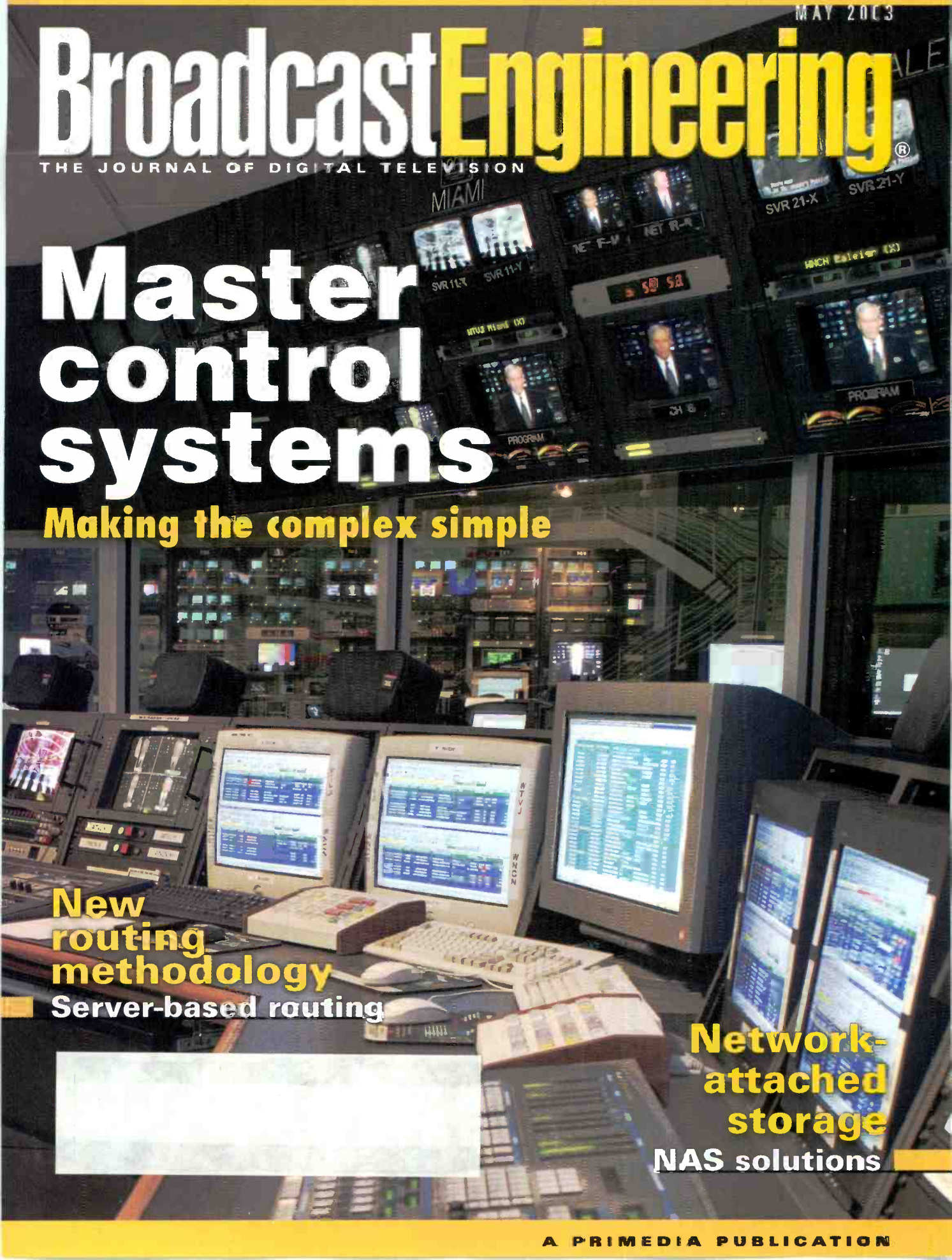
THE JOURNAL OF DIGITAL TELEVISION



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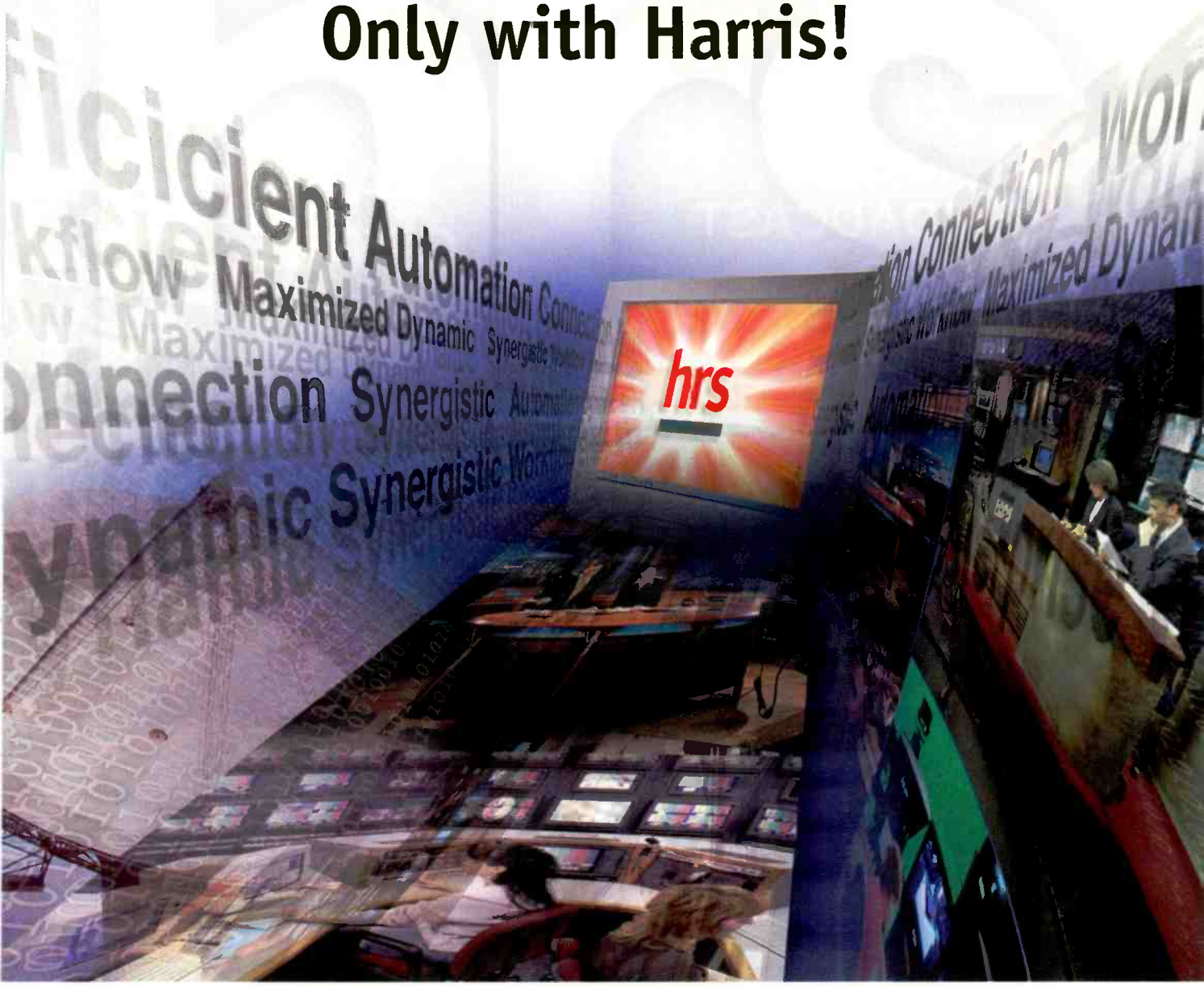

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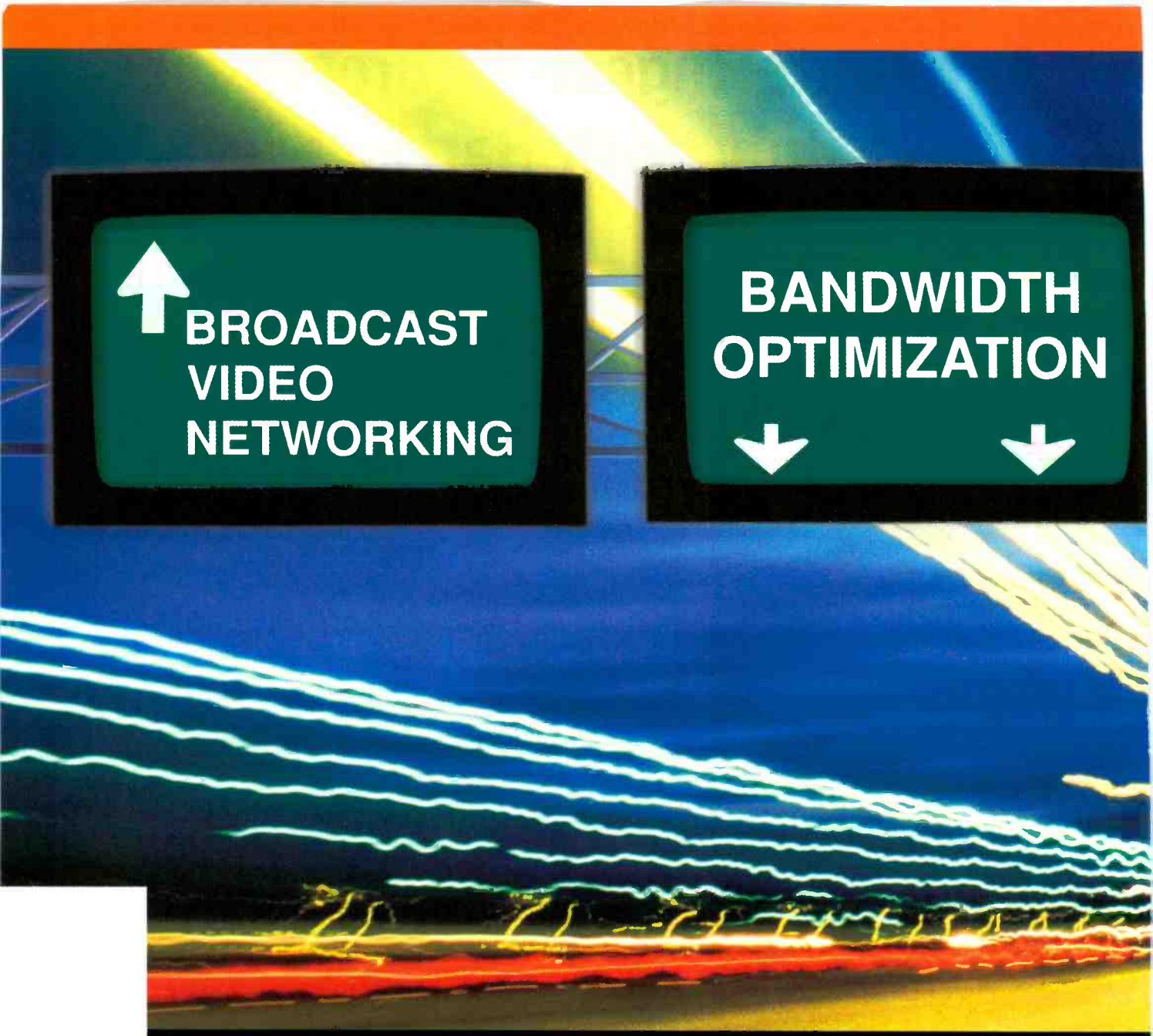

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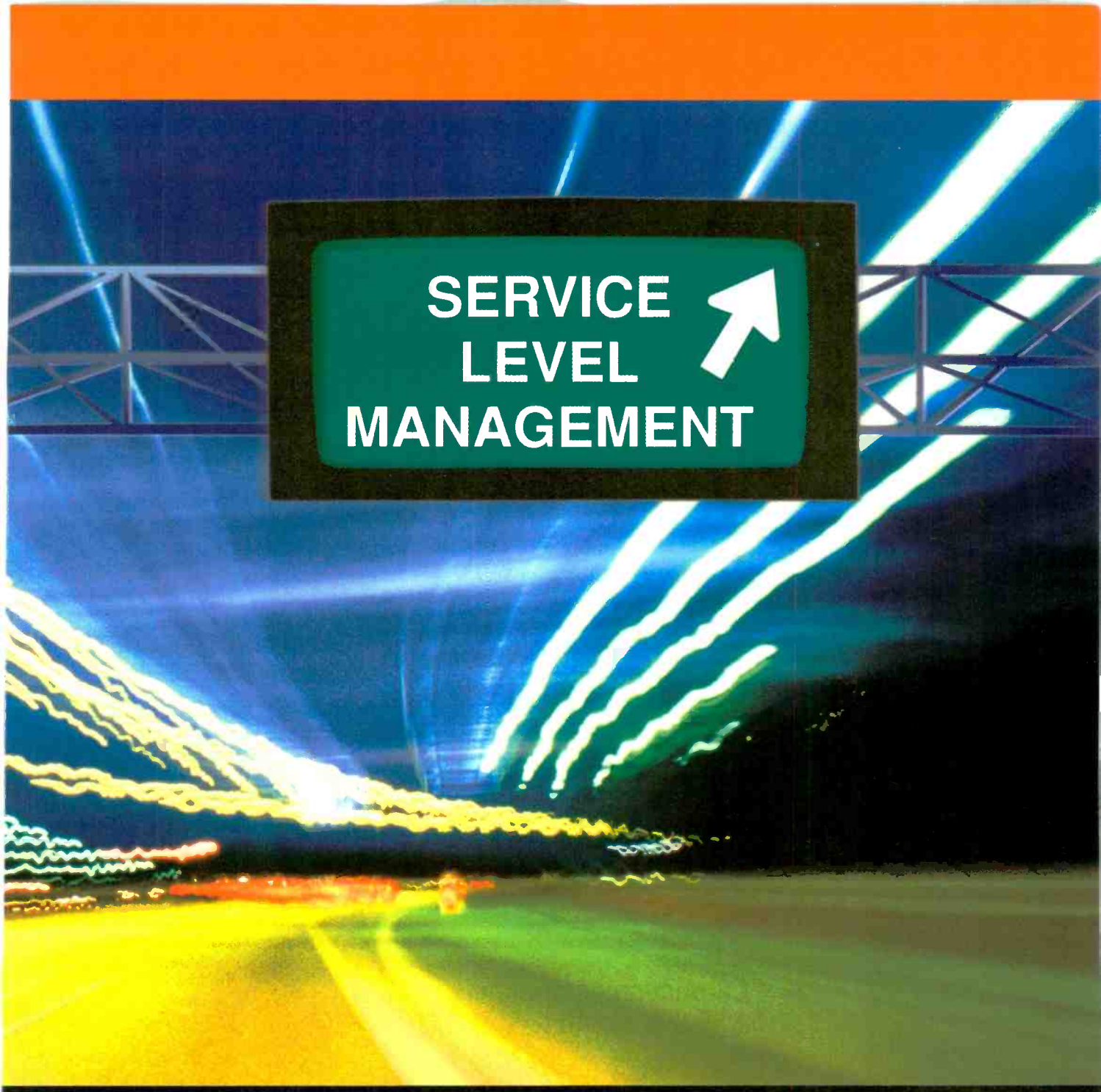

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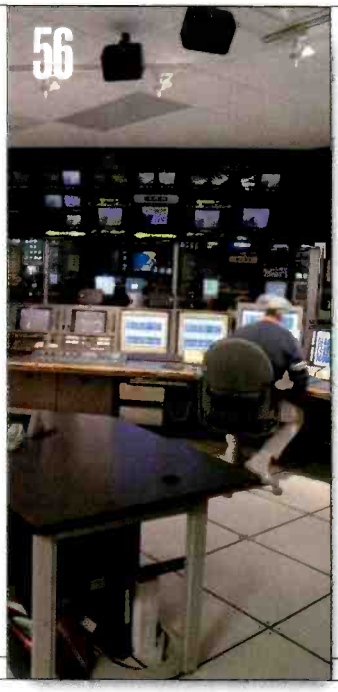
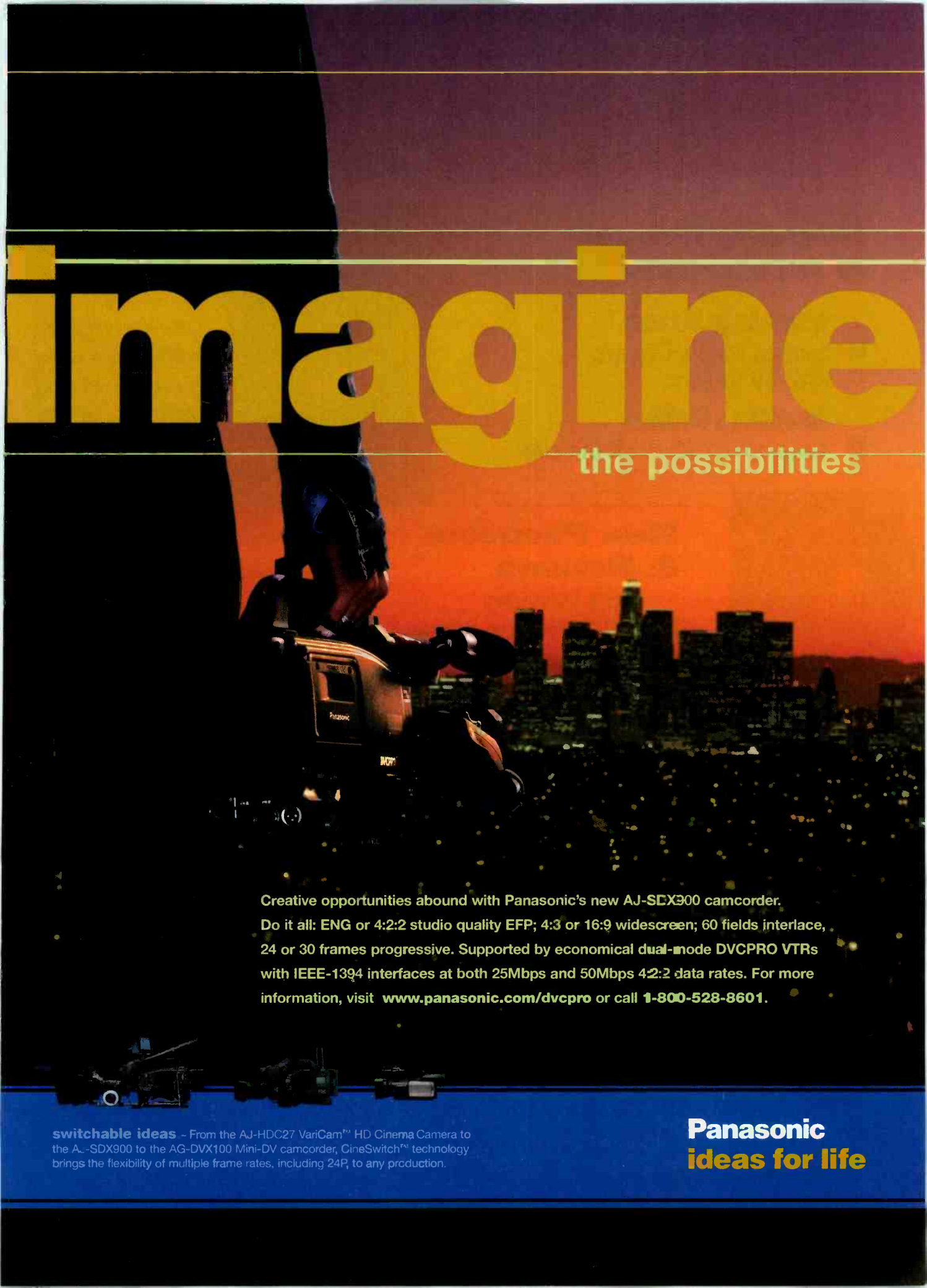


BEYOND THE HEADLINES

DIGITAL HANDBOOK

ON THE COVER: The NBC Miami ShareCasting hub in Miramar, FL, uses Florical automation to originate broadcasts for NBC owned-and-operated stations in Miami (WTVJ); Dallas (KXAS); Birmingham, AL (WVTM); and Raleigh, NC (WNCN); as well as the NBC-owned Miami Telemundo station (WSCV). Photo courtesy Florical Systems.

(continued on page 8)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Systems Design & Integration

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Camera features

In the mid-80s, JVC developed a series of cameras under the PROCAM name. What was the key marketed feature of this series of cameras, and what technology was used to enable it? You must name both for your answer to be considered correct. Correct entries will be eligible for a drawing of *Broadcast Engineering* T-shirts. Enter by e-mail. Title your entry "Freezeframe-May" in the subject field and send it to: bdick@primediabusiness.com. Correct answers received by July 17, 2003, are eligible to win.

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Great show,
PLUS a garage sale

This year's NAB convention was the opposite of last year's show. No more downtrodden exhibitors. No more look-but-don't-spend attendees. No more doom-and-gloom faces.

Lower attendance, yes. But also higher quality attendance. Just like the good old days, sales were made from the show floor and some were significant. One company reported selling out of the entire first run of their new product. Exhibitors reported that while booth

traffic was down (disregard NAB's attendance figures) they were pleased with who they saw.

The sessions were filled with strong presentations and speakers covering just about every topic you could imagine. Additional eating venues were available with adjacent seating. Yea! Sometimes all you want is a cool drink or a cup of coffee and a place to sit for 10 minutes. Note to NAB: Adequate seating near food venues is as important as catsup for the fries. Besides, you can now afford to devote the space.

There was lots of high technology on display... Sony's optical disk system, Panasonic's solid-state camcorder and new HD products. Also, there was JVC's new HD camcorder and the Focus Enhancements FireStore DV5000 DVR. You might have missed some of these products because of standing room-only crowds in the booths.

Mixed among the TBCs and video servers were at least two nontraditional booths. The first was the golf club booth in the South Hall. Yep, right there on the NAB show floor you could buy your next set of golf clubs, a new bag or golf accessories. The guy seemed to be doing good business.

But wait, there's more. The best example of a nontraditional exhibitor was located in the Central Hall next to the concession stand. For want of a better description, it was a garage sale. For instance, you could buy all the consumer software you wanted. Each software CD was $10 or three disks for $25. Hot titles, too, like Landscaping, Hackers and Crackers tips and cheats, Puzzles, and Clip Art. Just the thing for that professional application, right?

Next to the software was the really good stuff. Want a combination screwdriver and flashlight? How about a reading light shaped like an eagle? Key chains, small books, you name it. How about tools? This booth had them. A complete socket set for five dollars. A drill for three dollars. Are you into knives? Complete sets of knives, from steak knives to throwing knifes, were available for sale. Just don't leave those in your carry-on luggage!

However, the best item for sale in the booth was a Slim Jim. This is the tool thieves use to unlock car doors. In this booth you could buy your own Slim Jim kit, complete with multiple tools and rods that allow you to unlock any car door ever made. And the best part of the kit is that it came with complete instructions! Simply look up the model of car you want to get into and the manual shows you the correct tool and exactly how to use it to break in, I mean unlock, that particular car.

Unfortunately, exhibitors must have felt threatened by all this high technology because by Day Two the garage sale had been booted from the show and the space transformed into a seating area.

NAB '03 had about everything from AARP to Zenith – plus a garage sale. Who could ask for more?

Brad Dick
editorial director

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Waving the broadcast flag

Brad,

I am writing to congratulate you on your recent editorials against the broadcast flag. I do not understand why the content providers believe that digital changes the landscape. As you point out, the movie studios are better off as a result of analog videotape, and I believe they will be better off down the road as a result of legal HD-quality, after-market distribution. It boggles my mind that they do not see this.

I have a large collection of MP3 and WMA audio files that I use because I find them more convenient to listen to on portable players, and because I can create collections of my favorite songs. Every one of these songs was copied from a CD that I already own. Not one was downloaded from the Internet. Am I an anomaly? I don't think so. But the content providers would have you believe that I must be stopped.

I hope the regulators agree that I should have the same flexibility with my digital video content that I currently enjoy in the analog world. I hope the content providers realize the same economic benefits from digital that they currently get from repurposing analog. I suspect they will.

MARK O'BRIEN

Evaluating audio compatibility

To John Luff:

In your December 2002 article on HD and SD conversion, you wrote, "Ideally, converters should be capable of handling all types of audio." At Dolby we are certainly interested in the performance of broadcast products and their compatibility with technologies such as Dolby E.

You mentioned latency as one parameter that manufacturers need to watch. In addition to latency, there are other parameters that we investigate as part of the evaluation of products for inclusion in the Dolby E Partner Program. The purpose of the program is to assist broadcast equipment manufacturers in the creation of new products, or in the modification of existing products to make them Dolby E compatible. Feedback and advice are provided to OEMs to assist them in making any corrections necessary for better performance of their products. For example, we have evaluated a number of different embedding and de-embedding products and found that the performance varied significantly among manufacturers. This points out one of the reasons that evaluation and qualification of products is important for broadcasters. Technology compatibility information is critical for broadcasters and systems integrators for project planning.

JEFF NELSON
DOLBY LABORATORIES

DAW history

To the editor:

I am looking for information on the origin and development of DAW products. I am studying for my BSc (Hons) in music technology at Staffordshire University, and as part of my final project, I am writing a piece on the impact of computers and microprocessors in the recording studio.

If you have any information you think would aid me in my work, I would be most grateful.

REGARDS,
HUW JONES

Yasmin Hashmi, Broadcast Engineering contributor and editor of The DAW Buyers Guide, responds:

The DAW originated simultaneously in the UK and the United States in the mid-1980s. My paper, entitled "The Tapeless Studio," provides background on the development of the DAW from 1985 to 1998. It can be found in the "Audio Engineer's Reference Book," second edition, published by Focal Press, ISBN 0-240-51528-5. The Audio Engineering Society Web site, www.aes.org, also allows you to search its convention papers and journal articles from 1953.

D3 conversion?

To John Luff:

I have a pretty specific problem. I have a client with an archive of D3 tapes that we're trying to digitize. Our encoder accepts SDI input (from the SDI output of various VTRs) but does not accept composite digital. Is there an outboard converter on the market that could convert composite digital to SDI? Is this even possible? How are people dealing with D2/D3 media in new SDI edit suite environments?

DOUGLAS SMITH

John Luff responds:

Your question is one that comes up only rarely these days, as there are not too many D2 machines in normal usage in most applications, and most people with the need to convert libraries acquired converters some time ago. Sony made an adapter (DFX-1201) for their D2 machines that did a conversion from composite digital to component digital (143Mb to 270Mb). It is still referenced on their Web site. The simplest way to make the change is to output the NTSC signal and convert that to component digital, at a cost of under $3000. An all-digital conversion can be done by a number of devices from other manufacturers. BE

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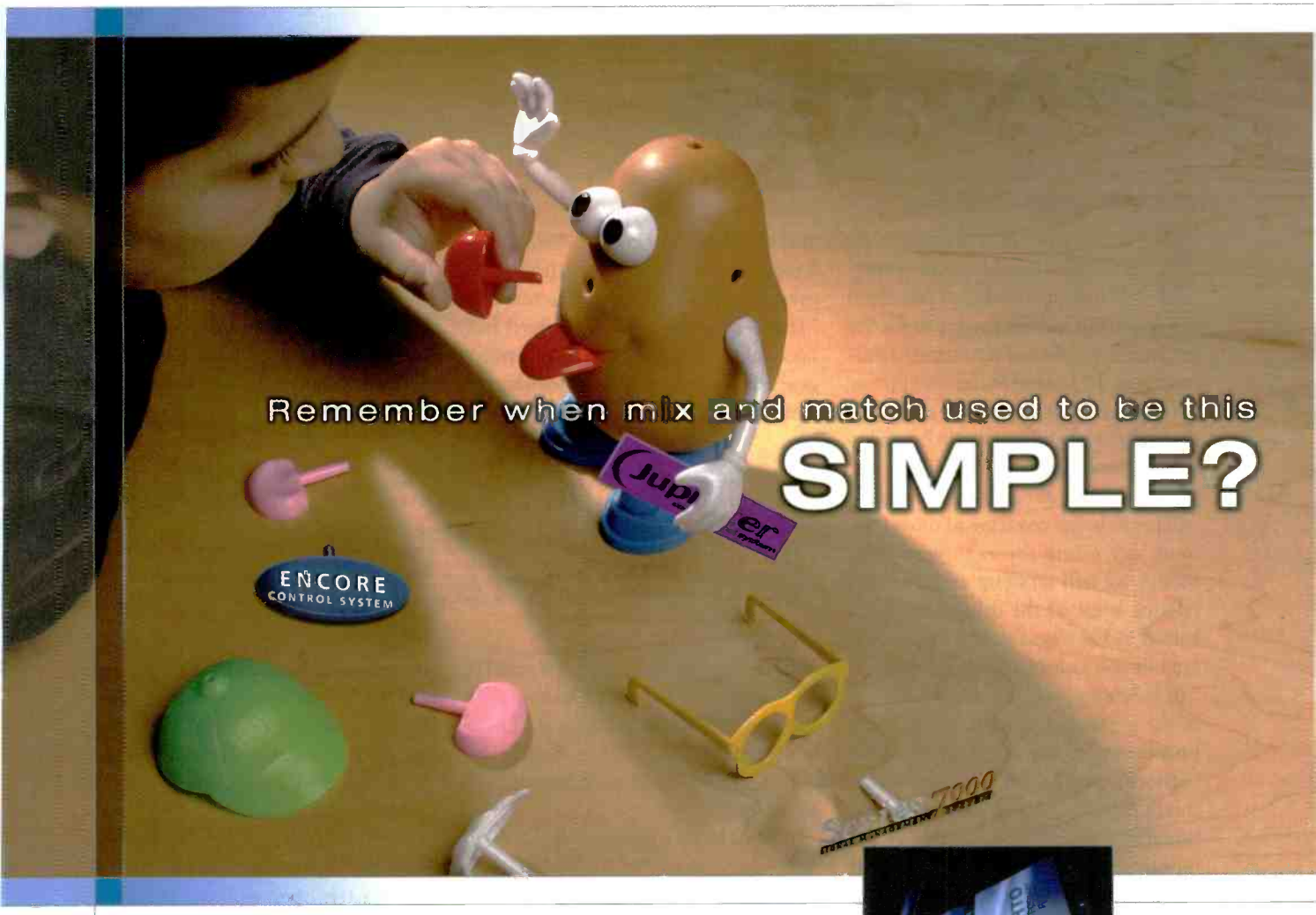

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Leapfrog

BY CRAIG BIRKMAIER

In recent months this column has been exploring the rapidly evolving landscape of digital television in an effort to put the prospects for the long-term viability of terrestrial broadcasting in the United States into proper perspective. That perspective came into sharp focus at the recent NAB conference and exhibition in Las Vegas.

Next month, *Broadcast Engineering* will provide full coverage of one of the most interesting shows in years; this month we will serve up an appetizer, relating some of the things that transpired in Las Vegas to the topics covered in this column since February.

In February we examined the impact of the geometric progression in computational resources described by "Moore's Law" – an observation by Intel's Gordon Moore that computational resources would double at 18-month intervals for the same cost. It was noted that there are now four to five times the computational resources available than in 1995 when the MPEG-2 video compression saw its first commercial use. Eight years later, the MPEG-2 compression standard has been fully exploited. At least four next-generation compression standards now seek to replace MPEG-2, including a new MPEG standard, MPEG-4 part 10, also known as Advanced Video Coding and ITU standard H.264. These next-generation compression technologies drew considerable attention at NAB 2003.

Improvements in compression and modulation enable an opportunity to leapfrog the first generation of digital television standards.

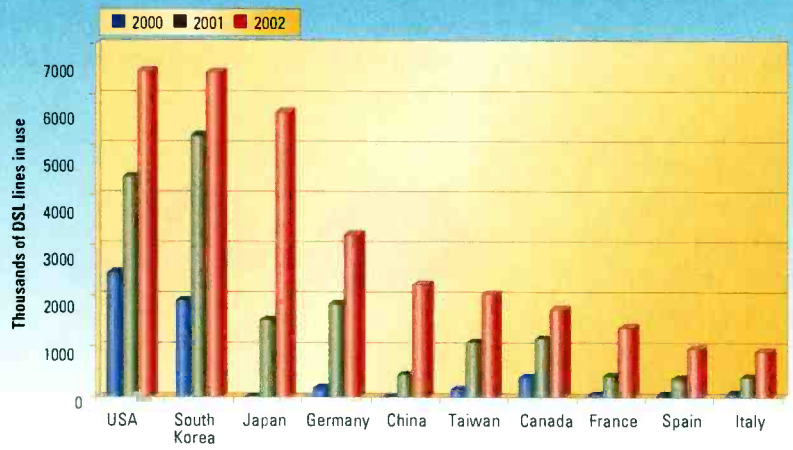
In March we examined the efforts underway in the ATSC to develop compatible enhancements to the 8-VSB modulation standard; the decision was still pending when we went to press. Taken together, these improvements in compression and modulation enable an opportunity to leapfrog the first generation of digital television standards. Just weeks before NAB, a consortium of countries including China, Brazil, Argentina, Chile and India announced that they are developing a "non-aligned" standard for digital terrestrial broadcast. An early prototype of one of the systems being evaluated was demonstrated at NAB.

In April we examined the techno-political landscape in which U.S. broadcasters operate. It was suggested that a new distribution food chain for television content is being developed; one in which broadcasters will be relegated to the bottom of the barrel as the big media conglomerates consolidate their grip on the creation and distribution of television content for the masses. At the NAB Chairman's Breakfast, FCC Chairman Michael Powell talked about the golden age of television broadcasting using the term "The Golden Oligopoly," to describe an era when ABC, CBS and NBC dominated the landscape. This term was quickly picked up by broadcasters, who are concerned that a new Golden Oligopoly is forming as a result of media consolidation. It was noted that the big four, Disney (ABC), GE (NBC), Viacom (CBS) and Newscorp (FOX) now control nearly 80 percent of the television audience again, as they gobble up

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

Leaders in DSL

U.S. leads in number of lines as South Korean market matures



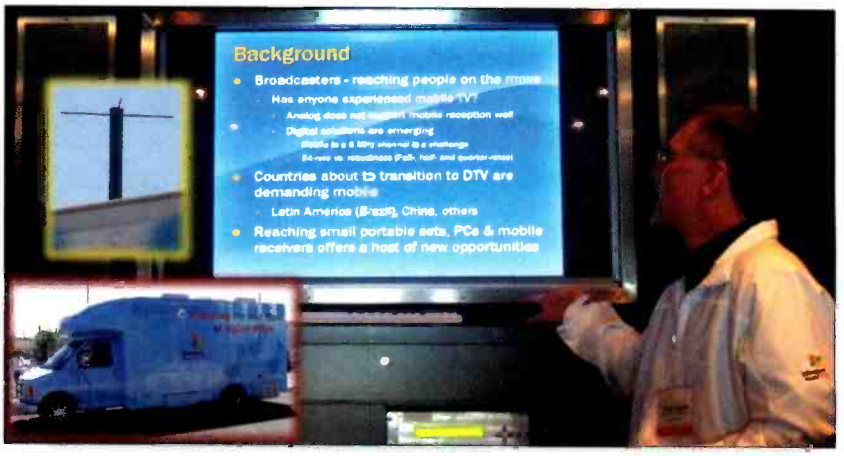
SOURCE: Point Topic www.point-topic.com

cable networks and rights to popular sports franchises. Needless to say, media consolidation was a major subject of discussion as the FCC prepares to release updated radio and TV ownership rules June 2.

Goin' mobile

One of the main competitive advantages of terrestrial digital broadcasting vs. cable and DBS is the ability to serve receivers that are not tethered to a fixed antenna or cable. A digital broadcast system is agnostic to the content that it carries. A properly designed system can carry audio services, television services and data services, and it can dynamically reallocate spectrum resources to support a mix of services for fixed, portable and mobile receivers.

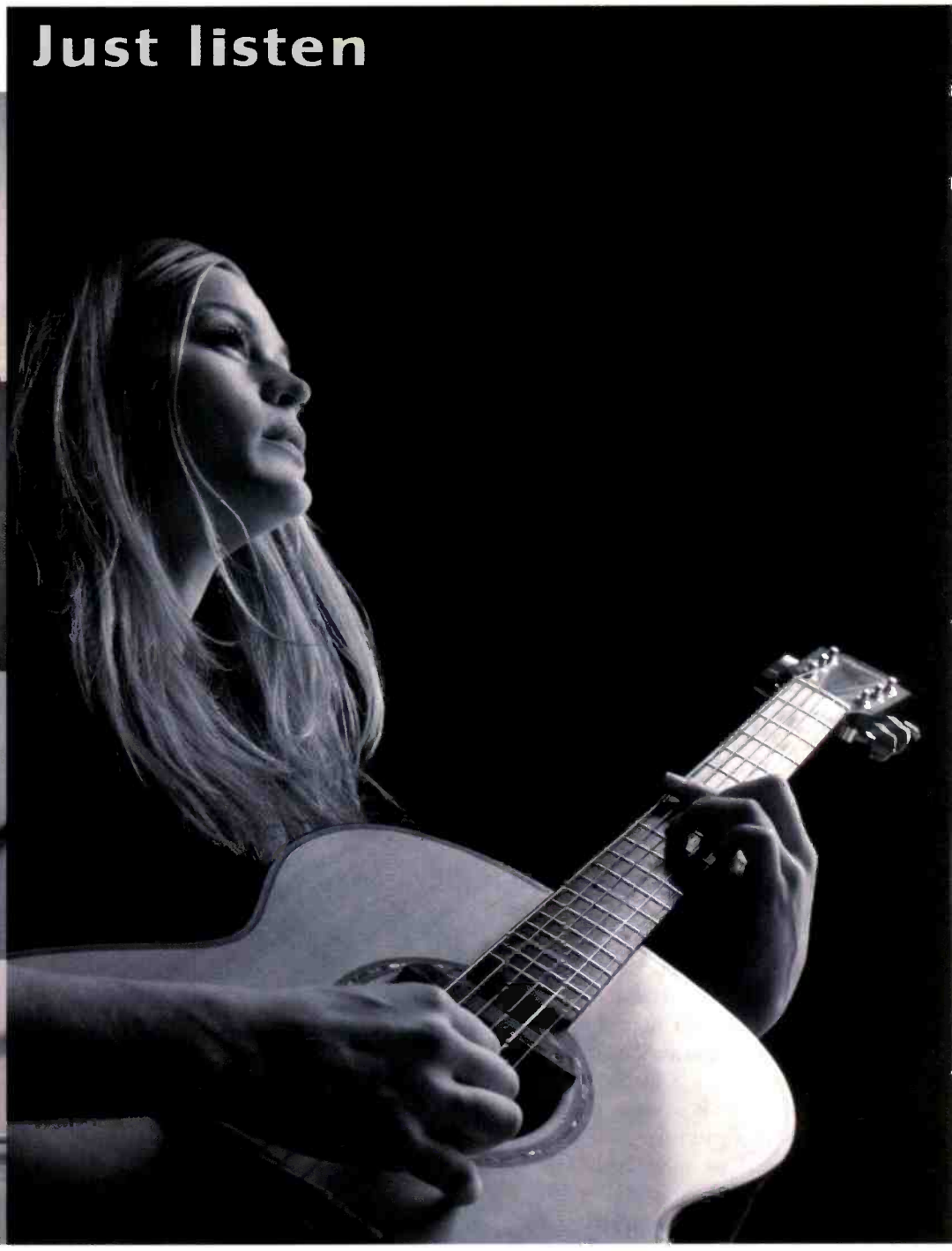
This is the potential that many countries, just now evaluating digital broadcast systems, seek to exploit. Three years ago a hierarchical modulation system based on the DVB-T standard was demonstrated at NAB. That system provided about 12Mb/s of data throughput for fixed receivers, and nearly 6Mb/s of robust data for portable and mobile receivers. A Nokia Mediascreen receiver with simple whip antenna was used to demonstrate both portable and mobile reception; the sys-



The main image of this composite of the mobile 2-VSB demonstration at NAB shows the inside of Microsoft's mobile theater vehicle, used to demonstrate their Windows Media technology. An image of the outside of the vehicle is inset on the bottom left, and a close-up of the antenna used to receive the 2-VSB transmission is inset on the upper left.

Trust your ears

Just listen



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tem worked quite well, both inside the convention center and traveling down I-15 at 75 miles per hour.

Several weeks prior to NAB, the consortium of countries listed earlier announced that they are developing a new terrestrial broadcast system with portable and mobile capabilities. And it was learned that one of the partners in this venture is U.S.-based Linx Electronics, which demonstrated a significantly improved 8-VSB receiver at last year's NAB. Recent tests of the Linx receiver technology in the United States and Canada have shown significant progress in dealing with reception in severe multipath-impaired environments, such as downtown Chicago.

Several weeks before NAB, reports surfaced of testing of a 2-VSB modulation system in Shanghai, China. These reports suggested that the system was performing at a level equal to or better than the DVB-T system that is delivering television content to busses in Shanghai. Then it was announced that a nearly identical system would be demonstrated at NAB. The system is called a half-rate system, as its total throughput is 9Mb/s, roughly half of the 19.3Mb/s throughput for 8-VSB. All of these bits were said to support both portable and mobile reception. According to a white paper available on the Linx Web site, like DVB-T, the 2-VSB system can support a mixture of services that are more or less robust for fixed, portable/mobile, and low complexity data receivers.

Several U.S. companies participated in the demonstration. Linx provided the modulator and receivers. Microsoft provided two bitstreams compressed using their WMV9 compression technology, a 5.8Mb/s stream of 1280x720@24p HD source with 5.1 surround sound, and a 1.3Mb/s standard definition real-time encoding of the NTSC feed from KFBT, the Las Vegas Sinclair Broadcast station used to host the full-power digital broadcast. Microsoft also provided a "mobile theater," which is normally used to promote their Windows Media technology. The van was outfitted with a single cross dipole antenna, about 12 inches in diameter, feeding a Linx receiver. Spectra Rep hosted an off-air demo in the Microsoft booth using a rooftop antenna. Linx used a cross dipole antenna to receive the broadcast in their booth.

Several weeks before NAB, reports surfaced of testing of a 2-VSB modulation system in Shanghai, China.

Unfortunately, the demonstration was plagued with glitches. One of the major contributing factors was multipath interference. Looking at a spectrum analyzer, one could see strong (near 0dB) echoes, apparently reflecting off of the huge hotels along the strip. The Linx receivers connected to the fixed and indoor antennas were able to deal with this, but the mobile demo was plagued with frequent breakups, due to a combination of factors. As the cross dipole antenna moved through the constellation of primary signals and echoes, it would alternately lock onto one or the other. Depending on where the vehicle stopped it might lose signal, while moving just a few feet would restore service. The problem was compounded by the structure of the HD stream prepared by Microsoft. The stream used a long GOP structure of about 10 seconds. If the receiver buffer emptied out due to loss of signal, it could take up to 10 seconds after re-establishing lock to refresh the buffer and re-establish picture. Audio service was somewhat more reliable, as was the 1.3Mb/s SD stream.

This is a Nokia publicity photo of the Mediascreen receiver demonstrated at NAB in 2000. The transmission was a DVB-T (COFDM) using hierarchical modulation as explained in the article. The receiver handled both portable and mobile reception all around Las Vegas.

According to Linx and Microsoft, the mobile reception problems can be overcome using a diversity antenna system. While this is the most promising demonstration of robust reception of a single carrier transmission system to date, it clearly did not equal the DVB-T demonstration that took place three years earlier.

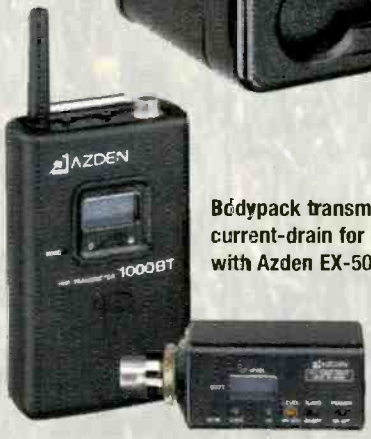
While the demonstration did little to impress the NAB audience, it does demonstrate that the consortium working to leapfrog the ATSC and DVB-T standards is making progress. There are several key issues

Attn: Anton Bauer Users

The Azden 1000URX-AB UHF receiver is a 1000URX receiver pre-assembled into the Anton Bauer "Gold Mount" for easy and secure mounting to your camera. Designed to perform at broadcast-quality levels, this true diversity receiver with 2 complete front-ends, has 121 user-selectable UHF channels in the 723-735MHz range. For complete features and specifications visit our website: www.azden.com.

Here's what Buck McNeely, of the TV Show *"THE OUTDOORSMAN WITH BUCK MCNEELY"* has to say about the 1000:

"My choice of wireless microphones is the AZDEN 1000 series. I can mount up to 2 receivers in line between the camera body and the battery on the gold mount adapter and it's powered by the attached battery with little noticeable extra drain. We have hundreds of channel options and appreciate the clear reception and range these Azden units deliver."



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that are being addressed in the systems developed by this international consortium:

1. Evolutionary advancements in the underlying digital modulation and video coding technologies
2. The development of new intellectual property that will allow them to bypass the royalties associated with the implementation of "first generation" digital terrestrial broadcast (DTTB) standards such as DVB-T and ATSC
3. The ability to deploy DTTB systems that are more flexible and cost-effective than first-generation standards. (This is of particular concern to the developing economies of the countries involved in this development partnership.)

It is still too early to tell what impact, if any, this may have on countries that have already committed to first-generation standards. There are already strong indications that DBS systems around the world may leapfrog themselves and move to next-generation compression technologies, replacing the millions of set-top boxes they have deployed. In turn, this is likely to force the cable MSOs to do the same to prevent further erosion of their subscriber base. Meanwhile, U.S. broadcasters seem resigned to having cable and DBS deliver their bits to the masses.

With all of this going on, the ATSC is moving the ball forward on the compatible 8-VSB enhancements that it has been considering. The proposal from Zenith and ATI Technologies has been advanced to a ballot of the T3 technology committee. If it survives this ballot it will then be presented to the entire membership for ballot. This enhancement will reduce the 8-VSB payload by 3Mb/s in order to provide a robust channel with 1.5Mb/s throughput. It is claimed that portable receivers and indoor antennas can receive the robust channel reliably, but it does not support mobile reception. BE

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

Web Links

Linx Electronics White paper on 2-VSB system: www.linxelectronics.com/pdf/Adtb.pdf

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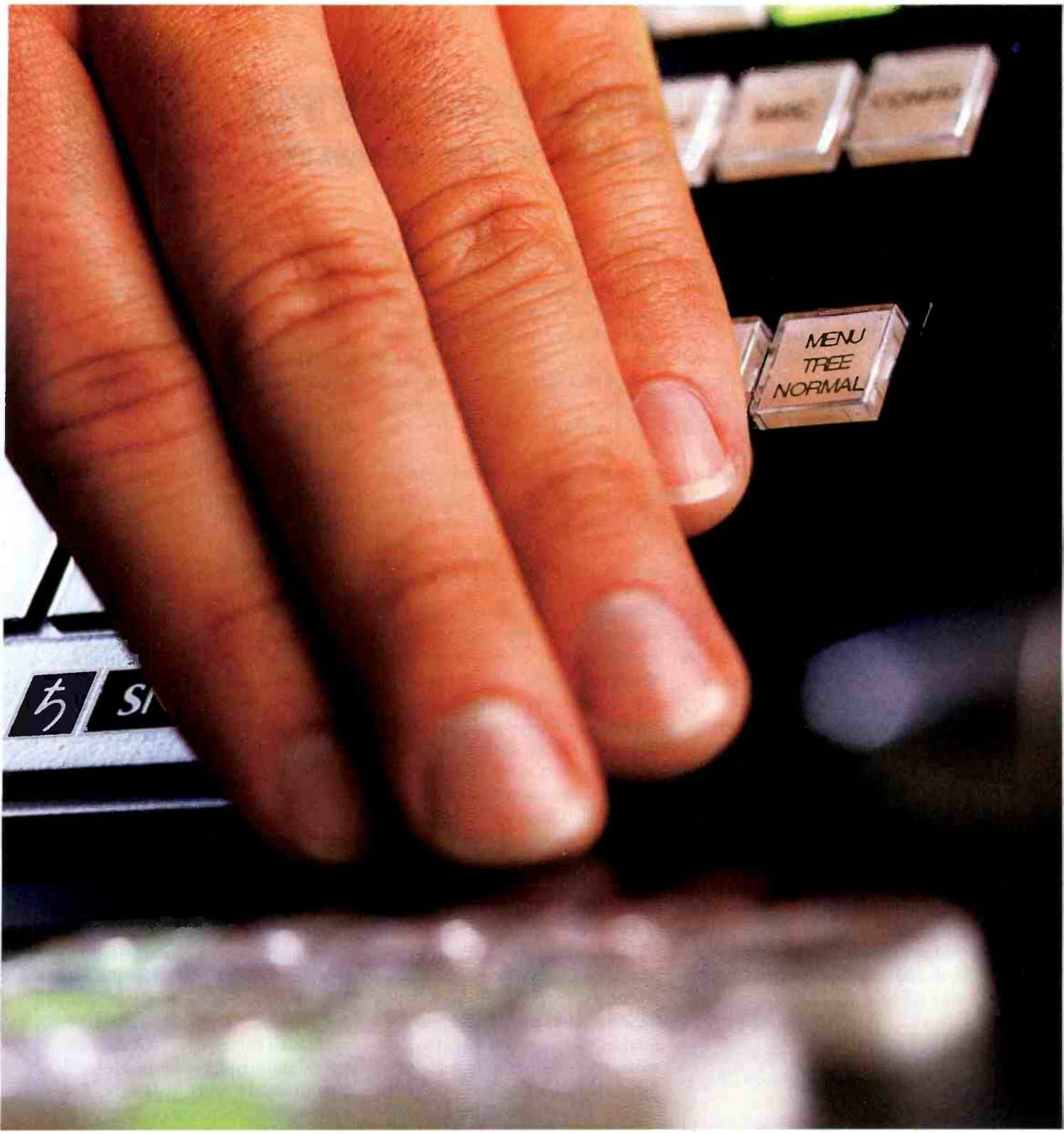

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BEYOND THE HEADLINES

FCC auctioning channels 52-59 this month

BY HARRY C. MARTIN

On May 28, 2003, the Commission will open the final auction of spectrum in the lower 700MHz band, now used for analog TV. The channels to be auctioned are 52-53 and 56-58. The auction will also include the spectrum that remained unsold following last September's auction of the C and D blocks of the 700MHz band, which involved frequencies currently used for channels 54, 55 and 59.

These channels are being offered for advanced wireless services, such as mobile Internet, as well as interactive TV and new video services using COFDM technology. However, because this auction is necessarily tied to the transition to digital television, the auction winners will not be able to use the frequencies until the broadcasters who now occupy them have completed the switch to digital operation on channels outside the 700MHz band. This transition will not be complete until 2006, at the earliest.

The Commission has established an early buyout policy it hopes will facilitate voluntary clearing of the lower 700MHz band. The idea is that, while the Commission may not be able to force incumbents to vacate their channels immediately, private deals between incumbents and successful bidders, *i.e.*, those who will be taking over the spectrum, may expedite the transition. To encourage initiatives along those lines, the Commission may afford limited technical rule waivers to the new service providers. However, under the Auction Reform Act of 2002, the FCC may not waive broadcast interference standards and minimum spacing requirements if any degradation or loss of service will be caused.

The FCC's motives are not entirely altruistic. The proceeds of the auction go to the government. The FCC's would like to maximize the apparent value of the available spectrum so that the auction will generate as much income as possible. If the spectrum for sale is subject to conflicting uses or claims that will prevent the new owner from developing it right away, that would depress the bids. As a result, it is in the Commission's interest to convince bidders that the FCC will be willing to cooperate in efforts to clear the spectrum sooner rather than later.

The FCC's motives are not entirely altruistic.

Broadcasting for the disabled

The Commission has issued a reminder to all video programming distributors, including broadcasters, cable operators and satellite television services, that they are required to make emergency information available to people with hearing and vision disabilities. This is particularly important given the current international situation, in which emergency announcements relating to both foreign and local news are more frequent.

In the case of people who are hearing impaired, emergency information that is provided in the audio portion of the programming must be provided using closed captioning or other methods of video presentation, such as open captioning, crawls or scrolls. Emergency information that is provided in the video portion of a regularly scheduled newscast or a newscast that interrupts regular programming requires the oral description of emergency information in the main audio, such as open video description. If the emergency information is provided through "crawling" or "scrolling" during regular programming (as opposed to a regularly scheduled or interrupting newscast), the information must be accompanied by an aural tone, so that people with visual disabilities are made aware that emergency information is being broadcast and that they should tune in to a radio station or seek assistance for more information.

The rule applies to emergency information useful to protect life, health, safety or property and can include information about immediate weather situations or other emergencies, such as power failures, toxic gas discharges or industrial explosions. Critical details that must be made available include the geographic area that is or will be affected, evacuation orders, evacuation routes, approved shelters, safety information, road closures and how to obtain relief assistance. For more information, check the FCC's Web site at www.fcc.gov/cgb (scroll to "Disability." BE

Dateline

Stations in the following states (and Washington, DC) must file their biennial ownership reports with the FCC, and place their annual EEO reports in their public files and on their Web sites by June 1: Arizona, Idaho, Maryland, Michigan, New Mexico, Nevada, Ohio, Utah, Virginia, West Virginia and Wyoming.

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

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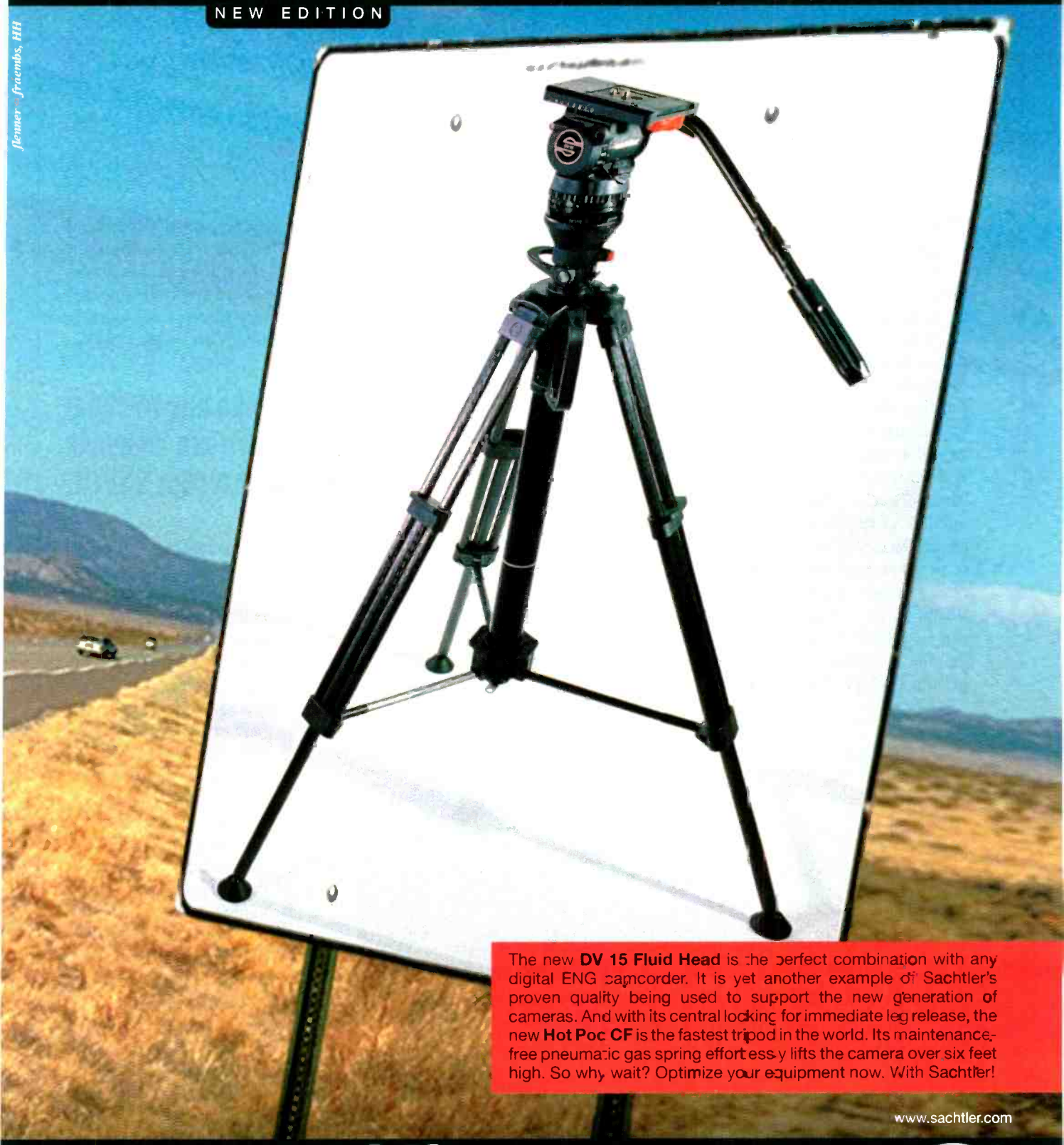

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BEYOND THE HEADLINES

Broadband coax

BY BRETT GRANDCHAMP

Television and radio broadcasters face an expensive problem if they want to multiplex additional channels into an existing single-channel transmission system.

Among the equipment that will need to be added or modified to facilitate such a change is the coaxial transmission line. The bolted flange joints used to connect the individual sections of rigid line cause small reflections that add constructively whenever the length of each section is a multiple of one-half of the electrical wavelength at the frequency of operation. This constructive addition of small reflections may result in unacceptably high VSWR on the transmission line if the run is sufficiently long. The result is that for a transmission line run comprising multiple bolted sections of single length there are channels that are unusable because of a high VSWR.

With this in mind, the transmission line manufacturers are careful to select the proper length for the desired operating channel. When multiple channel performance is required it is often necessary for the manufacturers to employ a scheme whereby the length of the individual sections vary throughout the transmission line run, thereby avoiding the constructive addition of small reflections. In the past the only option available when broadband performance was required from an existing run of transmission line was complete replacement.

For a transmission line run comprising multiple bolted sections of single length there are channels that are unusable because of a high VSWR.

EXH has developed a patent-pending method to eliminate the constructive addition of the flange reflections in existing rigid transmission line. This method consists of opening the flange joints at regular intervals and inserting custom-designed transmission line sections throughout the length of the run. These custom sections are typically inserted between every three of the existing sections and they are nominally two-feet long. The material cost is a small fraction of the cost to replace the entire run. In addition, because of the relatively small size of the custom sections and the fact that the original run does not have to be removed from the tower, the rigging charges are also reduced to a fraction of the cost to replace the entire run. The ease of installation also facilitates a staged project completed at night if a station must be kept on the air during the modifications. Finally, the electrical performance, once the method has been applied, rivals that of some of the best broadband lines available.

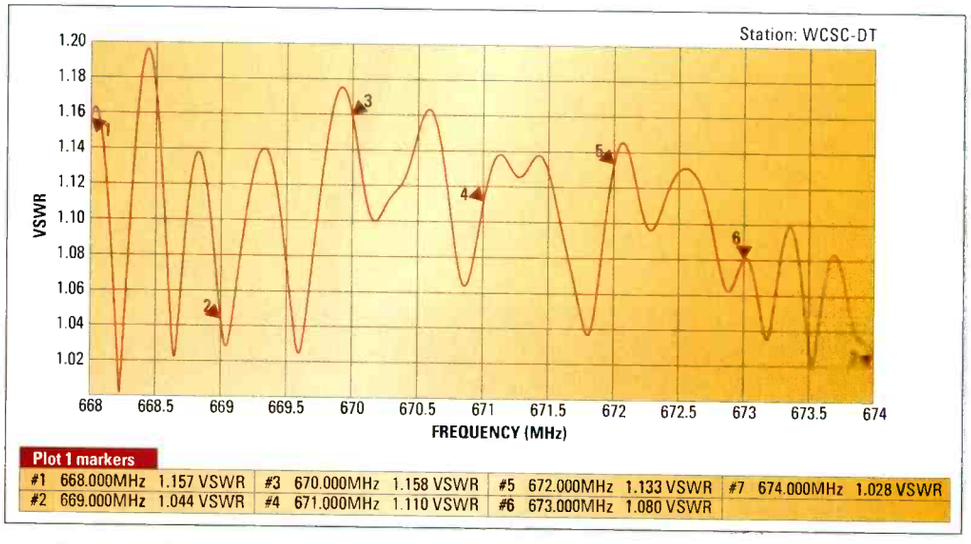

Figure 1. The final measured data for the WCSC transmission line at Channel 47

The first application of the EXH solution occurred at the WCSC transmitter site in Charleston, SC. The team from Jefferson Pilot Communications had installed a premium run of 7 3/16", 75Ω line. The design channel was 52, and so it was cut for a single channel at 19.75 feet per section. There were 85 sections of this line reaching to the centerline of the new panel antenna at

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1700 feet. Two years later the requirements had changed. The new requirement was an operating channel of 47 with additional channels multiplexed into the system on channels 34 and 49. Fortunately, the panel antenna and the elbow complexes in the system had been designed to accommodate this wider bandwidth. The coaxial line, however, was narrow-banded and channels 34 and 47 presented a VSWR of approximately 1.6:1.

The first step in applying the EXH method to broadband transmission line is to collect benchmark data and create a mathematical model of the existing system. D. W. Sargent Broadcast Service provided both broadband VSWR and time domain reflectometry (TDR) measurements of the WCSC transmission line. This data was then used to determine the magnitude and location of the small discontinuities that created the VSWR characteristics of the existing line. These values were then plugged into a wave transmission matrix model. Once the theoretical data was adjusted to match actual measured data, the model was modified to simulate the insertion of the custom lengths that would break up the addition of the flange reflections and result in a line with broadband VSWR performance. In the case of WCSC, the model showed that a VSWR of 1.2:1 could be achieved using custom sections inserted every three line-lengths along the vertical run. The total number of new line sections was 27 and their length ranged from 13 to 22 inches.

The actual installation of the line sections was done over the course of two weeks. The station supervised the installation, while D.W Sargent and EXH provided on-site technical support. Tower & Communication Services handled the rigging. They removed the fourth and fifth vertical section of the coaxial run, inserted the first custom section, lowered the next three vertical sections, and then repeated the process for the entire length of the vertical run. During this process the line was monitored with a network analyzer to ensure that all of the bolted flanges were seated properly. While the vertical run was being modified, the elbow complex at the base of the tower was returned to the manufacturer for re-optimization over the new frequency band. Finally, a new cut section was made at the tower top to compensate for the difference in overall line length. Discounting weather days, a five-man rigging crew completed this modification in only five days. The short lengths of the new line sections allowed the riggers to make the modifications using only the tower elevator and eliminated the time and expense of having to rig the tower with a winch. The final measured data for the transmission line at Channel 47 is shown in Figure 1. The measured data for the transmission line over the band from channels 34 through 49 is shown in Figure 2. The measurements include the effects of six elbow miters that help make up the horizontal run of transmission line, and the transitions used in the measurement. The inclusion of the transitions in a measurement of this type is significant because it is impossible to perfectly match them over wide bandwidths. They add a margin of error of 1.02:1 VSWR. Even so, only one small spike reaches a 1.23:1 VSWR in the entire band.

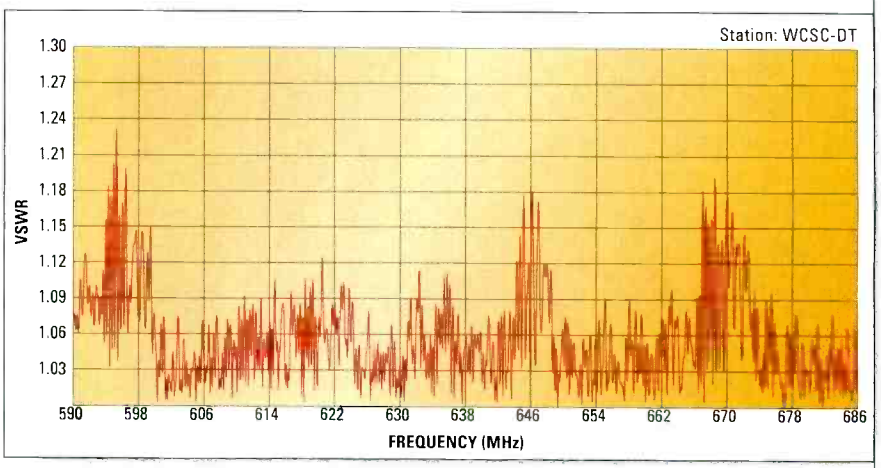

Figure 2. The measured data for the transmission line over the band from channels 34 through 49

EXH has developed a patent-pending method to eliminate the constructive addition of the flange reflections in existing rigid transmission line.

An understanding of what the EXH solution does not do is important when making a decision to re-task the transmission system. It does not correct for old transmission line that should be replaced for mechanical reasons. It does not affect the power handling capacity of the transmission line in either a positive or negative manner. It also does not correct the poor VSWR of any narrowband devices in the system. These devices may include the antenna, elbow miters, gas barriers and filters. The solution does, however, provide an alternative for television and radio broadcasters who for any reason need to change the operating frequency of their coaxial transmission line. BE

Brett Grandchamp is the vice president of engineering for EXH.

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The 1920x1080/60i HDTV format

BY MICHAEL ROBIN

The SMPTE standard 274M defines 11 HDTV 1920x1080 scanning systems, of which eight are progressive and three are interlace. Its ITU counterpart, Rec. ITU-R BT.709-4, defines 10 HDTV scanning systems, of which eight are progressive and two are interlace. The formats described in both standards share a common image format (CIF). CIF means that all formats have a 16:9 aspect ratio, 1920 active Y horizontal pixels and 1080 active scanning lines, independent of the picture rate. In addition, Rec. 709 defines the colorimetry standard for HDTV. These two standards are complementary. It is interesting to note that the 274M standard uses different symbols to identify the analog and digital representations of the coded signals, which could lead to some confusion. This article uses ITU-R BT.709 symbols, which are the same as are used by ITU-R BT.601.

Item	Parameter	Value
1	Frame rate (Hz)	30Hz (30/1.001)*
2	Field rate (Hz)	60Hz (60/1.001)*
3	Interlace ratio	2:1
4	Number of total lines	1125
5	Number of active lines	1080 (21-560, 584-1123)
6	Blanked lines	45 (1-20, 561-583, 1124-1125)
7	Line frequency (f_H)(Hz)	33750 (33750/1.001)*
* NTSC - friendly in parenthesis		

Table 1. Picture scanning characteristics of the 1920x1080/60i format are listed above.

The picture scanning characteristics

Table 1 shows that the 1920x1080/60i format has a nominal frame rate of 30Hz or 30/1.001Hz (NTSC-friendly). Each frame consists of two interlaced fields with an interlace ratio of 2:1, resulting in a field rate of 60Hz, or 60/1.001Hz for NTSC-friendly applications. There are a total of 1125 lines per frame. In an analog system this would imply 562.5 lines in each field. However, because a digital interface has to be supported, only whole numbers of lines in each field are allowed. This permits the unambiguous identification of the lines by the digital timing reference sequences (TRS). As a consequence, the interlace versions define integer, and hence unequal, numbers of lines in each of the two fields comprising a frame. Field 1 has 563 lines and Field 2 has 562 lines. The horizontal scanning frequency is 33750Hz. It is interesting to note that this format uses analog sync signals that differ from those used by SDTV formats. The analog sync signals are not digitized, so they are rarely, if ever, encountered in practice. The reader is referred to the relevant SMPTE or ITU standard for details.

CIF means that all formats have a 16:9 aspect ratio, 1920 active Y horizontal pixels and 1080 active scanning lines.

The digital representation

The digital coding is based on one luminance (E'_Y) and two color-difference (E'_{CB} and E'_{CR}) analog signals, or on the use of the three primary analog signals – E'_G, E'_B and E'_R. This article will deal with some aspects of the 1920x1080/60i format using E'_Y, E'_{CB} and E'_{CR} analog source signals.

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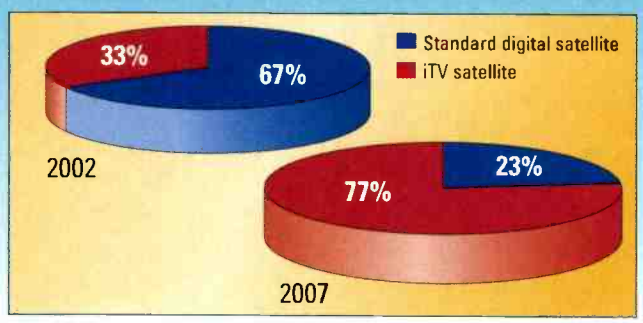

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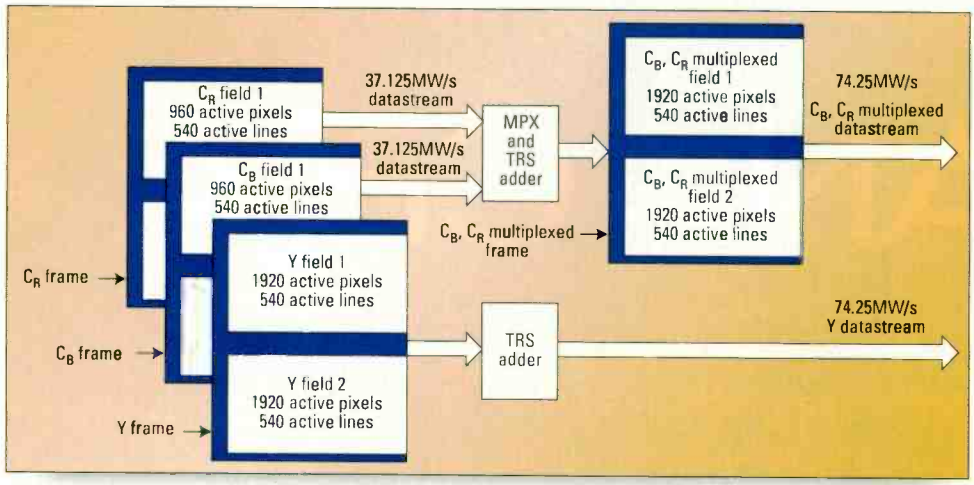


Figure 1. The digital representation of the 1920x1080/60i format assumes two separate bit-parallel datastreams: the Y and multiplexed C_B/C_R streams.

The coded signals' matrix coefficients are defined in ITU-R BT.709 and are significantly different from those specified by ITU-R BT.601. The implication here is that format conversion applications require matrixing recalculation.

The luminance sampling frequency of 74.25MHz is obtained from the analog input video sync signal using a PLLC oscillator operating at 2200 x f_H. This results in a Nyquist frequency of 37.125MHz. The specified anti-aliasing low-pass filter has a cutoff frequency of 30MHz. The color-difference signals' sampling frequency is 37.25MHz or 1100 x f_H. This results in a Nyquist frequency of 18.5625MHz. The specified anti-aliasing low-pass filter has a cutoff frequency of 15MHz. The selected sampling frequencies result in an active line with 1920 Y samples and 960 each C_B and C_R samples.

As shown in Figure 1, the digital representation assumes two separate bit-parallel datastreams consisting of:

- A digital datastream conveying a digitized luminance bit-parallel signal Y with a data rate of 74.25Mwords/s.
- A digital datastream conveying digitized time-division-multiplexed

bit-parallel signals C_B and C_R with a data rate of 74.25Mwords/s.

Each datastream carries the active video information, as well as its own TRS information (EAV and SAV) and the ancillary data if present. In a 10-bit system the digital information occupies a range extending from 000_h to $3FF_h$ (0 to 1023 decimal). Table 2 shows that the luminance (Y) signal normally extends from black [040_h (64)] to white [$3AC_h$ (940)]. The C_B and C_R signals normally extend from 040_h (64) to $3C0_h$ (960). In order to cater to overshoot and undershoot, the allowed range is extended to 004_h to $3FB_h$ (4 to 1019). Values from 000_h to 003_h (0 to 3) and $3FC_h$ to $3FF_h$ (1020 to 1023) are reserved for TRS signals (EAV and SAV).

Item	Parameter	Value
1	Coded signals	$E'_Y = 0.7152\ E'_G + 0.0722\ E'_B + 0.2126\ E'_R$ $E'_{CB} = 0.5389\ (E'_B - E'_Y)$ $E'_{CR} = 0.635\ (E'_R - E'_Y)$
2	Sampling frequency (MHz)	Y: $2200 \times f_H = 74.25$* C_B: $1100 \times f_H = 37.125$* C_R: $1100 \times f_H = 37.125$*
3	Sampling structure	-Orthogonal -Line, field and frame repetitive -C_B,C_R samples cosited with odd Y samples in each line
4	Samples per total line	Y: 2200 C_B: 1100 C_R: 1100
5	Samples per active line	Y: 1920 C_B: 960 C_R: 960
6	Coding	Uniformly quantized PCM
7	Black level Y	040_h (64)
8	White level Y	$3AC_h$ (940)
9	Lower peak C_B,C_R	040_h (64)
10	Upper peak C_B,C_R	$3C0_h$ (960)
11	Video data range	004_h to $3FB_h$ (4 to 1019)
12	Lower prohibited codes	000_h to 003_h (0 to 3)
13	Upper prohibited codes	$3FC_h$ to $3FF_h$ (1020 to 1023)

* Divide by 1.001 for NTSC-friendly signals

Table 2. A digital representation of the 1920x1080/60i format is provided.

The end of active video (EAV) and start of active video (SAV) signals each consist of a four-word sequence:

- The three synchronizing words with hexadecimal values of, respectively, 3FF, 000 and 000.
- The XYZ word that carries the V, F and H bits, which define the vertical and horizontal blanking. In addition,

bits P0, P1, P2 and P3, which assume values depending on the status of the V, F and H bits, provide limited error correction (single errors) and detection (two errors) of these bits.

Resolution considerations

The vertical resolution, expressed in "lines per picture height" (LPH), is equal to the number of active lines (1080) multiplied by the controversial Kell factor, taken as 0.7. So the 1920x1080/60i format has a vertical resolution of 1080 x 0.7 = 756 LPH. Given the active line duration, the horizontal resolution factor is 29 lines/MHz. With the specified anti-alias filter with a cutoff frequency of 30MHz, as per Figure 2, the resulting luminance horizontal resolution is equal to 30MHz x 29 lines/MHz = 870 LPH. For nearly equal horizontal and vertical resolution the bandwidth can be reduced to 26MHz. With the specified anti-alias filter with a cutoff frequency of 15MHz, as per Figure 2, the chrominance horizontal resolution is equal to 15MHz x 29 lines/MHz = 435 LPH. This format exhibits interline flicker with character generator signals. BE

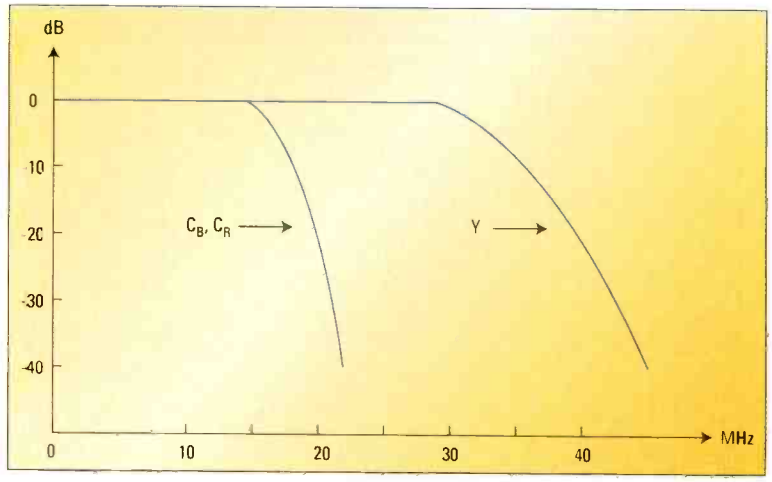
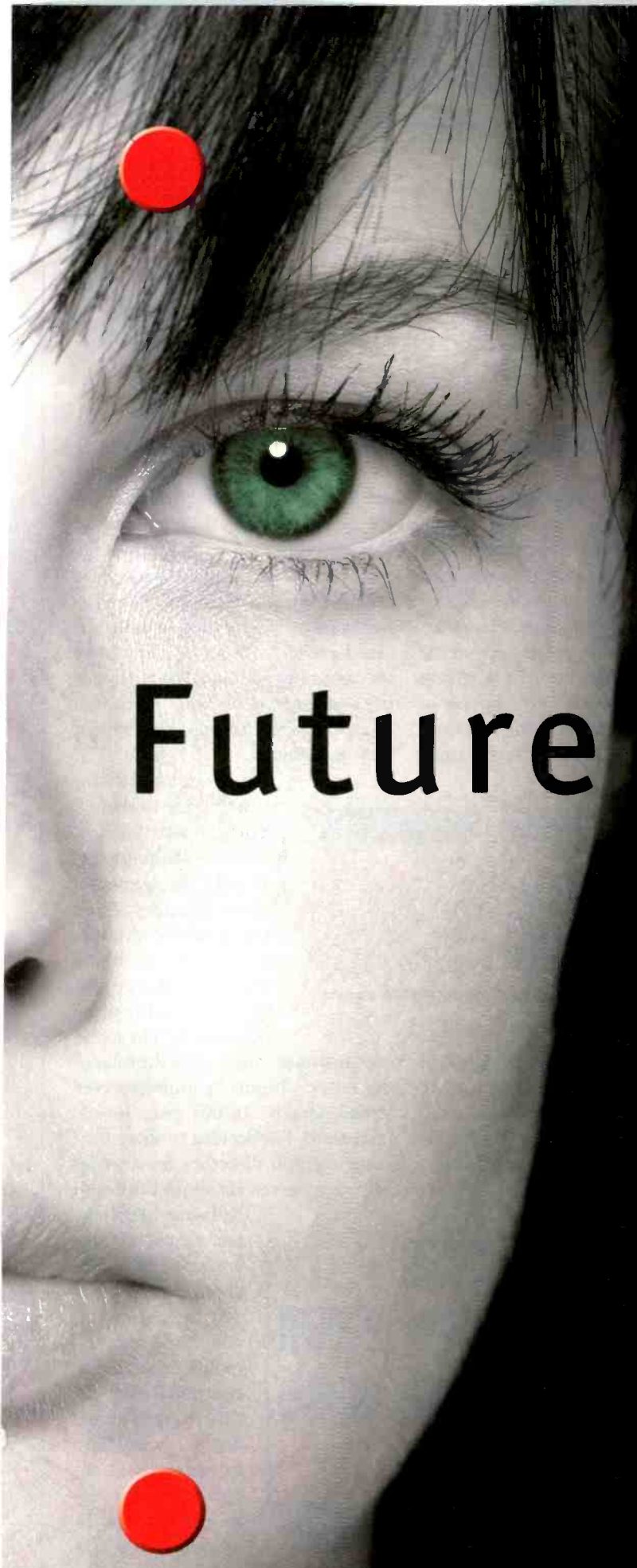


Figure 2. The typical frequency response of the C_B, C_R and Y channels is illustrated in this figure.

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

Send questions and comments to: michael_robin@primediabusiness.com



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Network-attached storage

BY BRAD GILMER

Last month we looked at storage-area networks (SANs). This month we will talk about network-attached storage (NAS). This type of storage allows users to share files on a common server even if they are using workstations with different operating systems. Figure 1 shows a typical NAS configuration.

In the past, it was hard to find a storage server that spoke several different protocols. Solutions were available, but they were expensive and took in-depth knowledge to install and maintain. The good news is that now these boxes are almost commodity products, and are available at amazingly low prices.

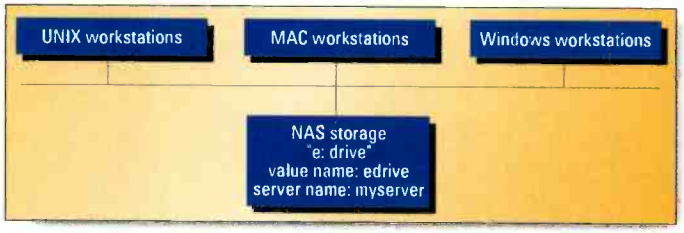

Figure 1. NAS storage makes the same files available across multiple platforms.

Parlez-vous protocol X?

If NAS device is to interface with a number of different kinds of workstations, it must emulate different protocols and network file systems. Examples of protocols include TCP/IP, NetBEUI, IPX and AppleTalk.

TCP/IP stands for Transaction Control Protocol/Internet Protocol. TCP/IP has become the *de facto* standard for network communications in most facilities. A wide variety of devices speak it, and it is used over the Internet. NetBEUI is a protocol used by Windows systems, frequently in peer-to-peer networking environments where routing and direct connection to the Internet is not required. IPX stands for Internetwork Packet eXchange, and was first widely deployed with Netware networks. AppleTalk is a networking protocol frequently used with Apple and MAC computing platforms.

Network file systems

Most of us are accustomed to seeing folders that represent directories on a storage system. Behind the scenes, a file system tells the computer how directories are organized and where files are located. Network file systems extend the file system across a network to a remote device. For a workstation to be able to read and write files on a remote system, the workstation and the server must have a common understanding about how directories and files are organized. Protocols provide a conventional set of rules for this organization. Some common network file systems include NFS, CIFS and AFP.

NFS

NFS, or Network File System, has been used on UNIX platforms for many years. NFS allows you to attach the shared portions of a disk at an NFS server to your local disk (see Figure 2). You can change to these directories just as you would a local directory. NFS is a client/server system. The server grants access to its local file system by answering queries and executing commands from the client. The client makes the remote server look as if it is attached to the local file system. NFS uses remote-procedure calls (RPCs), and every RPC has a parameter that can be used to authenticate the sender. The server administrator can add an additional layer of security to the system by requiring the use of a particular authentication system such as Kerberos.

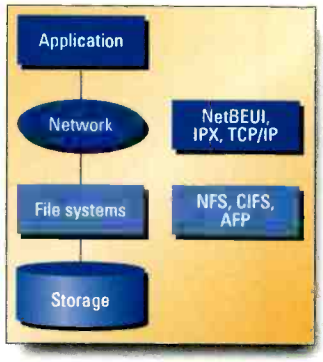

Figure 2. NFS extends a file system across a network.

The server administrator can decide to share a particular directory on his server by editing a file, typically /etc/exports. This file specifies which directories the administrator wants to make publicly available and what restrictions he wants to apply. The server administrator might make the following entry: /home/ftp/pubmyserver (rw,all_squash). In this case, the administrator has decided to share his /home/ftp/pub directory on a server named myserver. He allows both read and write in that directory and all users are mapped to the anonymous user.

At the client end, you could use the mount command to continually mount this share scheme. But you would have to manually re-attach to the drive after every reboot. To configure your sys-

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tem to reconnect to the remote volume every time you reboot the computer, edit the /etc/fstab file. A typical entry might look like this: myserver:/home/ftp/pub /home/mypub nfs rsize-8192, wsize=8192. During boot, the local machine will attempt to connect to the server named myserver. It will then map the remote directory /home/ftp/pub to the local directory /home/mypub. This will be an NFS drive, and the rsize and wsize parameters listed here perform well.

CIFS

Common Internet File System (CIFS) is based on SMB, the protocol used by Windows to share files and printers. CIFS specifies access to shared files and directories using the convention file://myserver.com/home/ftp/pub. A server that is parsing this request would understand that the client is asking for access to the directory /home/ftp/pub on the server myserver.com. A server administrator on a Windows server shares a selected directory by highlighting the directory using Windows Explorer and then choosing File/Sharing. This opens a dialog box that allows the server administrator to share the drive, establish a name for the share, set access parameters and so on. The administrator uses the User Administration utilities to select who he allows to have access to the share.

Make it simple

Companies such as Snap Appliance (www.snapappliance.com), and Network Appliance (www.networkappliance.com) are working on simplifying NAS for the network administrator. Snap Appliance makes everything from a small 80Gb desktop model to a 2Tb server with dual Gigabit Ethernet cards and RAID5 hot-swappable disks. The products support a number of protocols and network file systems to simplify the process of configuring a conventional server for NAS operation. While you can build an NAS server for next to nothing (see sidebar), it will take you some time, and the process is likely to give you a few white hairs. For an NAS solution to be competitive, it must be simple, it must have performance that meets or exceeds your requirements, and it must be easy to administer.

For an NAS solution to be competitive, it must be simple . . . and easy to administer.

If you want your NAS solution to perform well, you must put some thought into how you design your network. If you aggregate all of your network traffic on one segment, you are likely to be disappointed with the performance of any NAS solution. If, on the other hand, you design your network so that the traffic that is accessing the NAS is switched separately from applications that may be banging away at a network database, you will likely achieve the performance you imagined. BE

Building your own NAS box

If you have an old computer lying around, you can build an NAS server practically for free using functionality that is built into many open-source UNIX operating systems. If you want to learn more about UNIX, building an NAS server is an excellent way to get gain exposure to a wide variety of administrative tasks.

We do not have enough room here to give the details of setting up a UNIX NAS server, but at least we can get you started. The author prefers FreeBSD, but this information applies equally well to Linux and other UNIX variants. First, you will need to install and configure the operating system. One of the things the author likes about FreeBSD is that you download two floppies from the Web (www.freebsd.org). You boot from the floppies and then the installation program downloads the current distribution files from the Internet so you have the latest (most stable) software available. FreeBSD speaks NFS natively. So, to get NAS functionality with another UNIX box (and MAC OSX), all you need to do is follow the instructions for configuring NFS. A good place to start is nfs.sourceforge.net/nfs-howto/. If you want to enable NAS for Windows, your next task is to configure SAMBA (www.samba.org). FreeBSD is distributed with SAMBA. SAMBA allows UNIX systems to share disk storage with Windows computers. While it is not difficult to set up SAMBA, you really need to read the manual, especially the installation instructions. Also, if you are running a SAMBA server on a gateway, you probably do not want to share your drives with the entire Internet. To avoid this, read about the interfaces-configuration parameter in your smb.conf file – it limits the visibility of the SAMBA server to your local network. Once you configure SAMBA properly, you can see your new server from a Windows machine using the Network Neighborhood icon on your desktop. To use your NFS server with Apple computers, you must enable Apple File Protocol (AFP) on your NAS box. Check into the how-to at www.anders.com/projects/netatalk/.

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

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

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Battery basics

BY BENNETT LILES

The subject of batteries for field shooters used to be as simple as charging them until the red light went out, slapping them on the camera and shooting until they died. Now, the typical ENG/EFP crew carries a much wider array of battery-operated devices. Notebook computers, cell and satellite phones, PDAs, belt-clipped radios, micro-mixers and even GPS receivers may accompany camcorders and batt-lights. Modern field shooters must know their way around battery systems.

The players

Batteries are usually defined by the chemistry they use. The three most common types are nickel cadmium (NiCd), nickel metal hydride (NiMH), and lithium ion (Li-ion). Each has its strengths and weaknesses. We'll compare their performance later in the article. But first, let's define the specifications we use to judge them.

Basic specs

Regardless of the battery type involved, there are a few fundamental specifications that field crews will frequently encounter, including energy density, fast-charge time, self-discharge time, maintenance requirement and C-rate.

Energy density is a measure of how much power the battery will deliver for its weight, and is usually measured in watt-hours per kilogram (Wh/kg). This is one of the central factors in matching battery type to application.

Fast-charge time is another factor to consider. Usually measured as a fraction of the battery's rated capacity over time, this parameter has seen dramatic advances with the advent of battery-centric charging using smart batteries and chargers.

Another primary factor in matching batteries to their uses is a spec called "self-discharge time," usually measured as a percentage of capacity per month. This refers to the rate at which the fully charged battery will lose its charge while at rest. Self-discharge is an important parameter because this decline in voltage is not linear. Most battery types tend to lose a significant portion of their charge within the first 24 hours of storage, followed by a slower but steady discharge. Storage at higher-than-normal room temperatures will degrade internal resistance and accelerate self-discharge on any battery.

A significant specification is the maintenance requirement. This typically refers to how often an equalizing or topping charge should be applied. In the case of nickel-based batteries, the maintenance requirement will include "exercising" the battery by running it down to its end-of-discharge voltage and then fully recharging to combat the infamous memory effect in NiCd batteries.

This photo shows the two most common camera battery mounts. The camera on the left has the Anton-Bauer Gold Mount. The other has the Sony V-mount.

Modern batteries communicate digitally to chargers like the Anton-Bauer Dual 2702 Powerchager shown above while talking to the user through an LCD window.

The C-rate is a measurement of the charge and discharge current of the battery. A discharge of 1C will equal the published current capacity of the battery. A battery rated at 500 mAh (milliamp hours) will discharge at 1C to deliver that current for one hour. If discharged at 2C, the same battery should provide 1000 milliamps for a half hour. Note that the measurement is made from maximum capacity to the end-of-discharge level, not to 0V. On NiCds, for instance, the typical end-of-discharge level is 1V per cell. Li-ions generally discharge to 3V.

While there are many other battery specs, such as load current, cost-per-cycle, overcharge tolerance and cycle life, the specs mentioned above will form the basic stepping stones to a

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Cameras have shrunk while lenses and batteries have kept their size and weight, allowing each to balance the other. Without rear-mount batteries, smaller cameras would be front-heavy, and on shoulder-mounted cameras, balance rather than weight is the critical factor.

good battery-to-application match. Let's see how the various battery chemistries compare on these main specs.

Performance comparisons

Despite the emergence of new battery types, the nickel-cadmium or NiCd batteries maintain a prominent place in powering professional camcorders, batt-lights and portable comm radios. This is due to their exceptional performance in high-current applications. NiCds also accept fast charges quite well compared to the other battery chemistries. Typical fast-charge time on NiCd units is one hour, while NiMH batteries will fast-charge in two to four hours and deliver about one-fourth the load current.

NiCd batteries will self-discharge slightly faster than NiMH and much faster than Li-ion types. The big edge that the NiMH and Li-ion batteries have over NiCd is in energy density. In applications that require a high power-to-weight ratio, the Li-ion is the king of these beasts, with a typical spec of 100Wh/kg to 130Wh/kg. By comparison, NiMHs offer a power-to-weight ratio ranging from 60Wh/kg to 120Wh/kg, while NiCds range from 45Wh/kg to 80Wh/kg.

The Achilles heel of NiCd batteries is their maintenance requirement. They must be regularly exercised (some harried shooters might say exorcised) to avoid the formation of crystals inside the battery and the resulting tendency to discharge only as far as the minimum voltage level to which they have been frequently run. Also, since cadmium is an environmentally toxic metal, NiCd batteries are increasingly seen as a liability. Some countries now severely limit their use due to disposal problems.

The Achilles heel of NiCd batteries is their maintenance requirement.

Memory or mismatch?

Frequently, what appears to be a memory effect may be a mismatch between the cutoff voltage level of the device and that of the battery. To get the full capacity of the battery, its end-of-discharge voltage must be higher than the cutoff voltage for the camcorder or other device being powered. A mismatch in these values will cause the device to quit while the battery still has power. Mimicking the memory effect, this will cause a nickel-based battery to be repeatedly recharged before reaching its own end-of-discharge voltage and eventually develop a real memory.

Getting simpler again

The latest "smart" batteries, chargers and cameras can communicate digitally. The battery can control the smart charger for the perfect charge cycle and the cameras can display all the needed power parameters right in the viewfinder. Just when the mix of battery chemistries and their characteristics was becoming increasingly complex, the advent of digital communication between the central components promises to make things a good bit easier. BE

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

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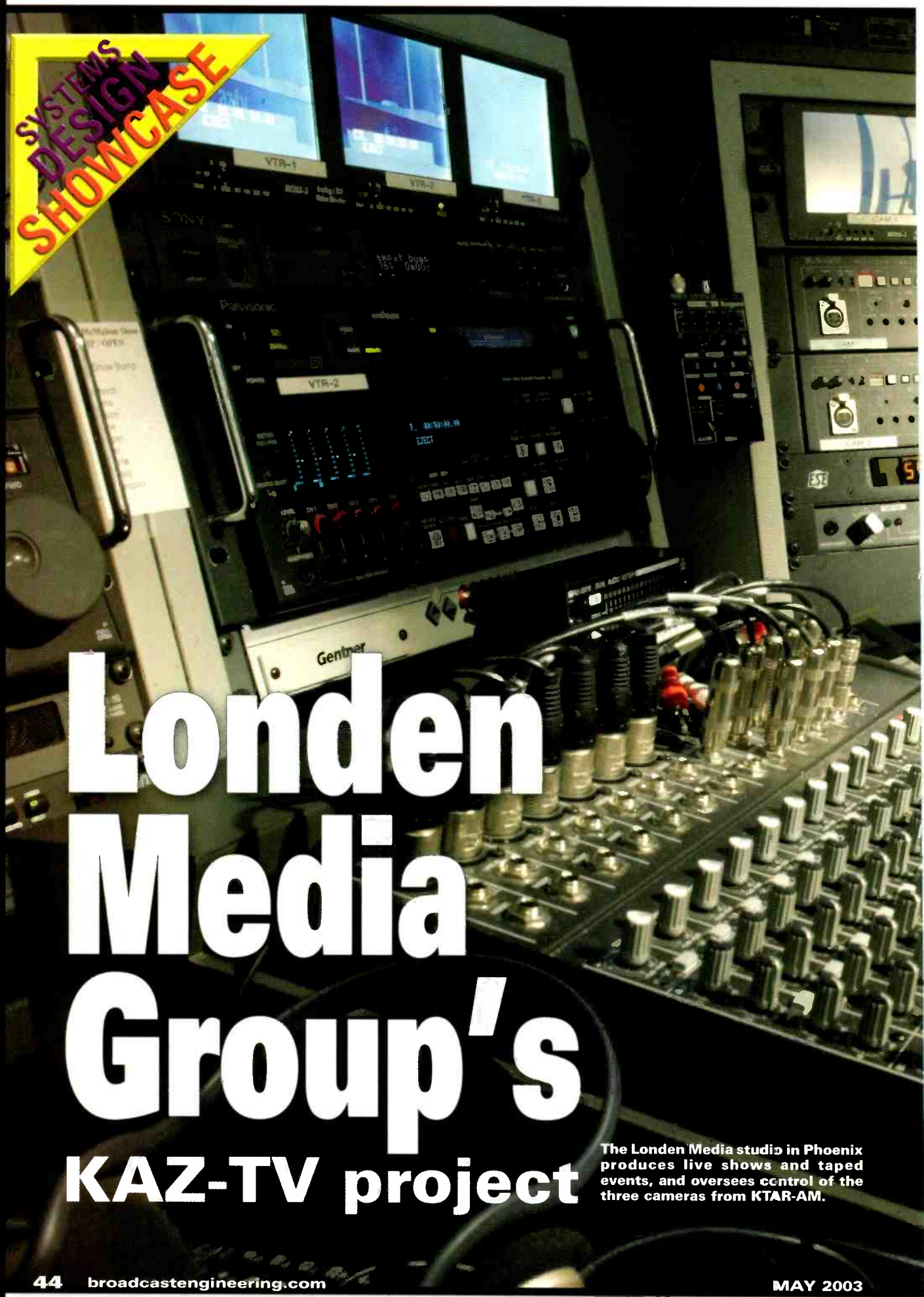
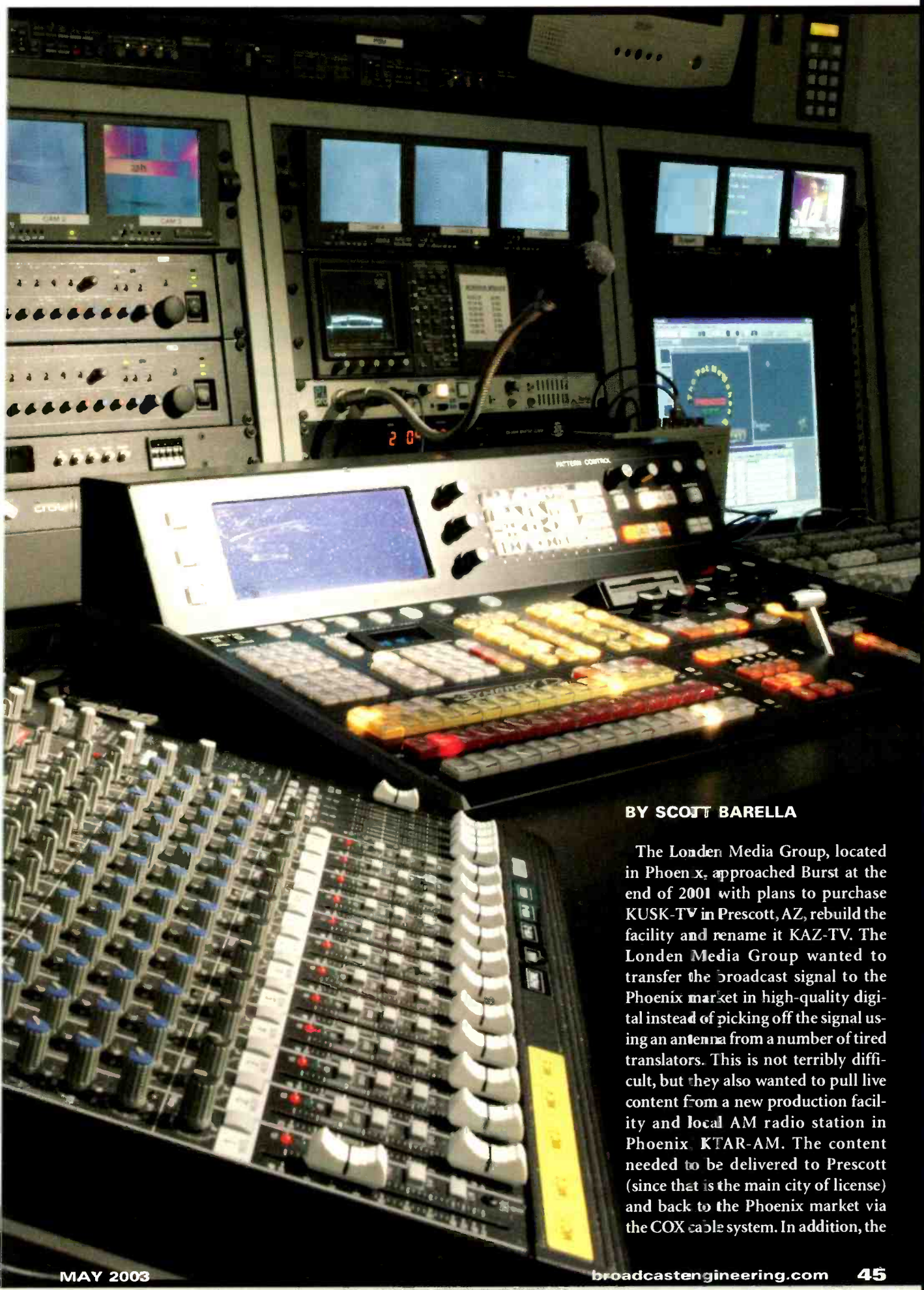


Londen Media Group's KAZ-TV project

The Londen Media studio in Phoenix produces live shows and taped events, and oversees control of the three cameras from KTAR-AM.



BY SCOTT BARELLA

The Londen Media Group, located in Phoenix, approached Burst at the end of 2001 with plans to purchase KUSK-TV in Prescott, AZ, rebuild the facility and rename it KAZ-TV. The Londen Media Group wanted to transfer the broadcast signal to the Phoenix market in high-quality digital instead of picking off the signal using an antenna from a number of tired translators. This is not terribly difficult, but they also wanted to pull live content from a new production facility and local AM radio station in Phoenix, KTAR-AM. The content needed to be delivered to Prescott (since that is the main city of license) and back to the Phoenix market via the COX cable system. In addition, the

SYSTEMS DESIGN SHOWCASE

Londen Media Group required a connection to receive sporting events from the University of Arizona and Arizona State University.

The plan

Burst began the design by focusing its efforts in Prescott, where the master control foundation would have to be built. This would become the backbone for final program delivery. All of the other elements would eventually feed into the Prescott master control room. They decided that an embedded SDI signal platform offered the most overall flexibility for a plant infrastructure and future considerations. They selected Leitch equipment to accomplish the task, including the Opus master control switcher, VR-440 servers, Digibus and the Integrator routing system. They selected the systems because they offered a high degree of interoperability. Sundance Automation was a logical choice for automation, along with the Panasonic DVCPRO50 tape format. Burst also needed to replace three consumer-grade satellite TVRO antennas, so they brought in Superior Satellite to handle the integration of three new 4.5m dishes that were outfitted with computer controls for the automation system to steer and control. They also found it necessary to build up the electrical plant. They found a used generator to beef up the emergency electrical needs along with new power distribution. Then came the hard part of determining how to transport the signal to Phoenix.

Londen Media selected CSG Telespectra in Phoenix as a distributor for a number of reasons. Namely, Telespectra could provide a robust DS-3 microwave infrastructure to and from Prescott and tie in the two sites (Londen Media Studios and KTAR-AM in Phoenix). It could also provide key deliveries to the COX headend and gather the sports feed for the University of Arizona and Arizona State University. But Burst was now facing some tough decisions on how to encode signals and deliver them through the DS-3 wireless topology.

The Leitch Opus and Sundance automation are the key ingredients of the master control console for KAZ-TV in Prescott, AZ. This control room utilizes an embedded SDI infrastructure.

An MPEG-2 compression scheme seemed in order. So, after a bit of research, Burst chose Scientific-Atlanta encoders. These boxes can compress the signals and transport them over standard G.703 topology that CSG Telespectra has set up. The only trouble encountered was that the CSG Telespectra network required DS-3 framing. Even though Burst didn't have the exact M13 framing, it selected the G.754 framing standard. The layout, as shown in Figure 1, is rather unusual.

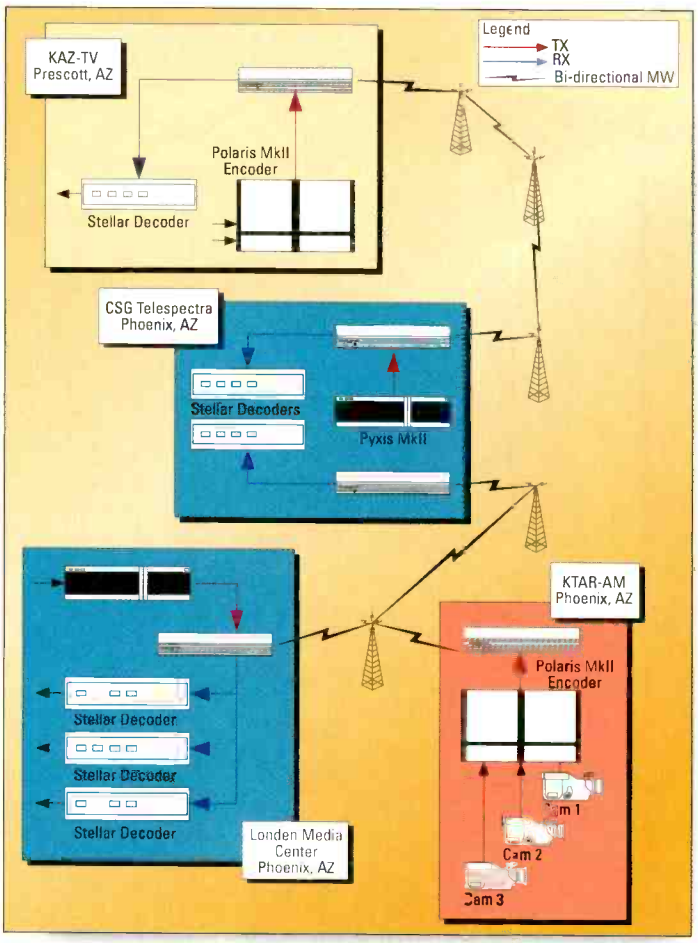
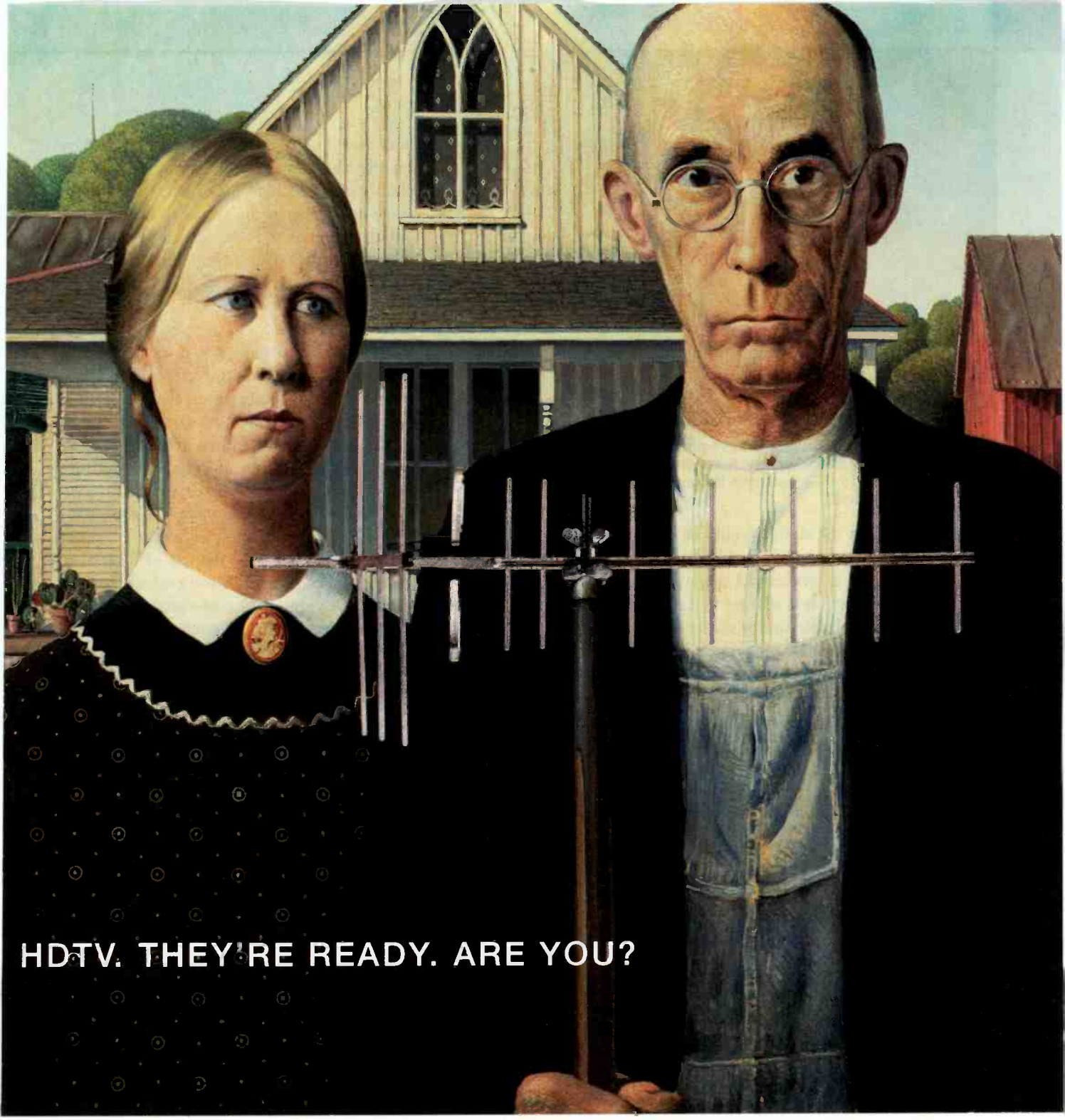


Figure 1. This MPEG-2 encoding/decoding scheme is featured in the master control center in Prescott, AZ, the CSG Telespectra microwave hub, the Londen Media Production Studios and the KTAR-AM morning show studios.

The originating signal begins in Prescott, where it is delivered to the transmission chain as a G.703 packet (DS-3). It is then sent to two DS-3 radios. One radio goes to the transmitter site on North Mingus Mountain and the other goes to Phoenix via South Mingus Mountain.

Since the primary signal was already encoded for DS-3 transmission, it made sense to make the STL the same. The Burst Group chose to put in a DS-3 Nucomm 7GHz STL link featuring their DS-3 modulator and demodulator. Now, the signal quality going to Phoenix would



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KAZ-TV's production studio in Phoenix consists of an SDI video and stereo analog infrastructure featuring Ross Synergy Series switching. The facility also features Ikegami cameras and Wohler monitoring equipment.

be the same as the signal quality at the transmitter site, resulting in perfect digital quality on both ends. The Phoenix signal is terminated at the Telespectra hub site in Phoenix, where it is sent on to the headend.

The Londen Media studios originate several live shows and post-produce most of their material. Whether it's live or tape, it is sent to the Telespectra hub site and relayed back to Prescott to air or record, depending on the day's log. The KTAR-AM morning show has three Panasonic cameras that are remote-controlled by the Londen Media studios and then sent on to Prescott. University sports feeds are switched at the hub and sent back to KAZ-TV in Prescott for sporting events.

The encoders

The MPEG encoding rate is set at 10Mb/s, allowing for high quality pictures and sound to all locations. Furthermore, there is enough bandwidth for 19.39Mb/s compressed HD transmissions in the future, along with more program channels out of Prescott. Scientific-Atlanta's single-channel Pyxis and multichannel Polaris MkII MPEG encoders were chosen for their flexibility and performance, along with Stellar decoders. These boxes allowed the use of SDI, SDI-embedded, analog and even the ability to genlock the output signal in the same combination of signals. In the future, it will be possible to ride a separate SMPTE 310M stream by simply adding option cards – no need to supply new decoders.

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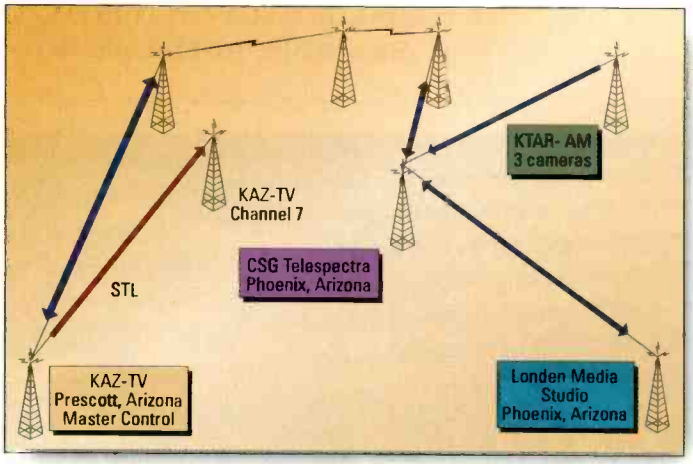

Figure 2. End-to-end MPEG-2 digital delivery from Prescott to Phoenix and back. Additional delivery is available within the Phoenix metro area.

In Prescott, the plant infrastructure is SDI-embedded, so the encoder there was fitted to the signal using the ROSA management software. However, at the hub in Phoenix, the plant is entirely analog, as was the case for the present Mingus Mountain transmitter site. Fortunately, it was no problem configuring the decoder to output analog signals at both of these locations. Should either of these two sites upgrade to SDI plants, it will simply be a matter of reconfiguring the Stellar decoders.

At the Londen Media studio in Phoenix, the plant was a hybrid using analog audio and SDI video. The Pyxis encoder was easily configured for this combination.

The most complex site was the KTAR-AM site. All three cameras were SDI with one main analog program audio tagged to one of the cameras. The Polaris MkII was configured and, at the Londen Media studio receive site, all three Stellar decoders were genlocked and timed for the SDI production switcher. The analog audio was retrieved and sent to the analog mixing console. The goal was to transport these signals and maintain a lossless signal, and it was achieved – the signals at all locations maintained their pristine images and sound.

The Londen Media Group successfully implemented a number of cost-effective new technologies for this project. The Scientific-Atlanta encoders and decoders were important in distributing and maintaining signals that might be a challenge using more traditional, expensive equipment. The DS-3 distribution topology proved to be a key ingredient, and a close look at the components revealed a compelling argument for rethinking traditional analog microwave topology. It is certainly less expensive and will allow for signals originating from Prescott since only a fourth of the bandwidth has been utilized. There is certainly room for HDTV distribution and more standard-definition program channels. BE

The production control room in Prescott, AZ, uses both Sony and Panasonic VTRs.

The KAZ-TV master control room features Leitch VR 440 video servers and the Integrator routing system, and Scientific-Atlanta MPEG-2 encoding gear.

Design Team

Burst:
- Scott Barella, vice president of engineering
- Tony Roccanova, engineering project manager
- Pat Pintus, sales engineer

Londen Media Group:
- Ron Bergamo, vice president and general manager of KAZ-TV
- Rich Howe, KAZ-TV station manager

Equipment List

Leitch:
- Integrator router
- Opus master control switcher
- VR-440 servers
- Terminal equipment and conversion

Sundance automation
Scientific-Atlanta encoders and decoders
Nucomm microwave
Burk transmitter controllers
Ross Synergy production switchers
Panasonic DVCPRO VTRs
ADC patch fields
Belden 1855A video cable
Canare BNCs
Ikegami monitoring
Wohler audio and video monitoring

Scott Barella is vice president of engineering of Burst.

THINGS HAVE BEEN A BIT UNSTEADY FOR YOU LATELY, HAVEN'T THEY?

AQUARIUS (Jan 21 - Feb 19)

If all's quiet on the romance front, don't worry as the moon in Neptune means that true love is around the corner, and it will be in the shape of a leggy model. I predict they will be robust, reliable and easy to position / set up. They will be 72% more rigid! I see unique shapely legs with locks that are conveniently positioned for quick release. With a Vision 100 pan and tilt head, they are as smooth as you are! I see a long-term love affair, you lucky old Aquarius! For more predictions about loving tripods, click on **www.fibertectripod.com** soon.

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"I used the Fibertec tripod while covering a feeding frenzy situation. Its long extension enabled me to shoot above other cameras even while providing a broad base of support, secure from jostling by adjacent cameramen. Its light weight gave me the mobility I needed to run with the pack of two person news teams as they pursued family members and attorneys, most of whom were trying to evade cameras. I also got the height I needed to shoot above the gaggle of heads crowding those subjects during the feeding frenzy situations. The Fibertec's lightness coupled with toughness is what really makes it great for ENG applications, where speed is of the essence and gear has to take plenty of abuse. Unlike many carbon fibre legged tripods, you don't have to sacrifice height or eliminate a spreader, for lightness and portability – this is the best of all possible worlds for a cameraman, especially for the individual, which many cameramen are.

"Fibertec looks very professional. The box legs have interesting geometry, with excellent feet and height adjustment controls. The legs are rigid, the pan control fantastically smooth. Its superior rigidity and panning action whilst carrying both a heavy production camera and long lens, meant every shot was super, professional and very smooth.

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Keeping intruders off the site

BY DON MARKLEY

Every station chief dreads that unwelcome, but almost inevitable, telephone call telling him that someone has hung something — a fraternity flag, a piece of unmentionable clothing or something equally inappropriate — on the station tower. The first worry is whether the fool who was on the tower is now on the ground in the immediate vicinity of the tower. Thankfully, some kind spirit seems to watch over these idiots to protect them from their own stupidity. Usually, the culprit is unharmed and disappears without further ado. But sometimes he doesn't disappear, and instead must be carried away in a bucket.

The problem is that the station's tower can present an attractive challenge to a testosterone-filled and chemically-enhanced individual. Towers bring up the challenge of expressing one's manhood by performing a feat of derring-do — much as the knights of old would attempt to poke someone with a big stick while riding a horse — just to prove their bravery. It is even more likely to occur when the performer's peers are present, usually equally chemically-enhanced, to cheer on the performance. Unfortunately, if some drunken fool is able to get on the tower without any difficulty and is harmed, the station may be found to be at fault.

The station's tower can present an attractive challenge to a testosterone-filled and chemically-enhanced individual.

Seek counsel

The process of securing a site and making sure that it doesn't attract nuisance trespassers is beyond the scope of this small article. If you remember only thing at all from this article, remember to discuss the issue with the station's local attorney — not the FCC attorney in Washington, but the local guy who is familiar with state and local laws concerning liability and how to avoid it. These laws and regulations vary from state to state — even from city to city within the same state — and the chief engineer should make sure that the station fully complies with all laws that apply to his station. A representative of your liability insurance carrier should inspect your plant to be sure that you meet all of the requirements of the fine print on your policy. Then, get a letter from the insurance company stating that you fully meet all required security and protection requirements. This doesn't guarantee to keep the station out of court, but it should at least give you and your insurance carrier a fighting chance.

Fence them out

FCC regulations require standard AM broadcast stations to have the towers fenced and locked. Stations can also fulfill that requirement by installing a single fence surrounding the entire site. While that will satisfy the Commission, it really isn't enough to protect the station. A simple farm-type fence is not a significant obstacle to even the most routine attempts to enter the site, although it should discourage our nation's youth from using the site for drinking or recreational sex. If kids really want to break into the site, they will. Such fences do little more than mark a border which, when crossed, establishes that those who have crossed it have committed the crime of trespass.

A chain-link fence topped with barbed wire can effectively deter casual would-be intruders. (Photo courtesy of Andrew Corporation.)

FRAME GRAB A look at the consumer side of DTV

Splitting time between TV and Internet

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How has internet use changed your TV viewing?			
	Less time	Same	More time
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Very experienced users (6+ years)	38.2%	60.3%	1.5%

SOURCE: UCLA Center for Communication Policy www.ccp.ucla.edu/

The usual solution is to put a chain-link fence around the base of the tower. The problem with this is that a physically capable teenager can climb such a fence easily. Placing razor wire around the top of the fence would afford a more imposing impediment.

You can, and must, make it so difficult for entry or access that it won't happen from a casual attempt.

But razor wire is really nasty stuff, and using it may be questionable in some areas. At one site, the station's attorney advised it not to use razor wire because an intruder might be significantly harmed trying to get over the fence. While the threat of serious harm might seem to be the wire's intended deterrent, the station's attorney worried that an intruder thus harmed might sue for damages and that a jury might award significant monetary damages. After considering this possibility, the station decided to use plain old barbed wire. This can also injure an intruder, but the attorney was much more comfortable with defending such damages.

You must make a full effort to keep people off of the tower. That includes fencing — not just the base, but also the guy points. Sufficiently motivated idiots have been known to try climbing up a guy wire. The result is always nicely ripped-up hands, sometimes arms and legs. If he — not being sexist, but girls seem to have more sense than to try this stuff — makes it far enough up the wire, the injuries can be far more serious.

Install climb guards

Any tower company will build climb guards that will make it extremely difficult for unauthorized people to get on the tower. One very simple method is to simply cover the tower faces with sheet metal to a height above which a person cannot reach from the ground. With no handholds, it is essentially impossible to climb the tower. When workers need access, they can use a ladder to reach above the guards. Stations have used various other methods over the years, primarily barbed wire and lockable gates to allow access to the tower.

Protecting the building

At a remote site, the building itself should have the normal security precautions. That should include, at least, heavy doors (preferably steel), good locks, barred windows and a good security system. Many services can provide window and door sensors that will send an alarm back to the studio through the remote-control system. Such services can also notify local law-enforcement officials. But the problem with these services is the delay between the time the incident occurs and the time that a person arrives at the site to investigate the incident. The alarm service first notifies some far-off computer. After someone at the alarm service duly notes the alarm, he attempts to call the station to remind you to turn off the alarm. Finally, either someone at the alarm service or someone at the station calls some police-type person who will, in turn, notify some other police-type person to wander by the site at his convenience — especially if the site is miles out in the boondocks. The result is that the intruder will have enough time to haul off the transmitter, if he wants, not to mention tools, test equipment, etc. Fortunately, this doesn't really happen often. Kids know that there is nothing to eat, drink, smoke or become friendly with in a transmitter building. And, professional thieves usually know that there is little or nothing inside the building they can fence. So the best security solutions for the building are simply good locks and bars, and a good insurance policy.

A simple farm-type fence and gate do little more than mark the border of trespass. The warning sign may offer a modicum of deterrence, or it may invite challenge, depending on the reader's frame of mind. Photo courtesy of Richland Towers.

The bottom line

The goal is to provide enough security to deter someone from trying to get onto your tower and/or into your building. You cannot keep a determined and well-equipped person from breaking into a local site — much less at a remote, isolated site where the trespasser has plenty of time to work. But you can, and must, make it so difficult for entry or access that it won't happen from a casual attempt. You might consider using razor wire, but you could end up with an intruder who bleeds to death from the cuts. This can create a far more costly situation than simply calling a rigger to remove a new flag from the tower. The decision to use razor wire is not one for the chief engineer to make alone. The station management must make this decision with full advice of legal counsel. Then, if something does go wrong, the CYA measures you've taken will at least keep you out of the line of fire. BE

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

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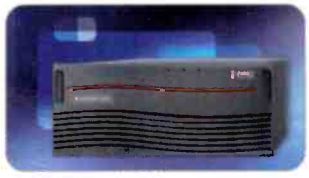

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Master control playout options

BY JOHN LUFF

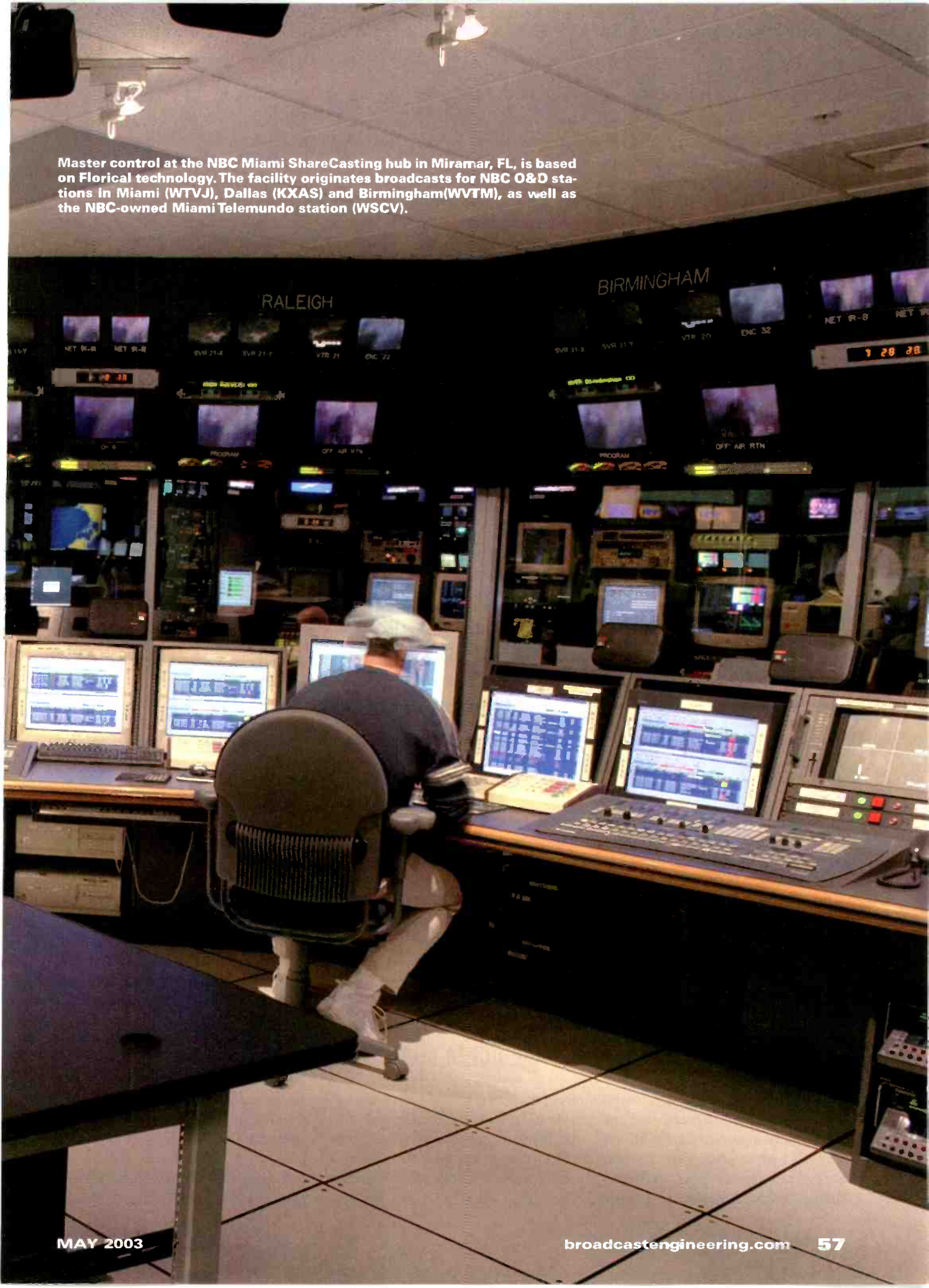
At any broadcast station, the final stop before the transmission chain has always been master control. Its function is simple: string programs, promos, commercials and emergency messages together into a compelling stream so that viewers should find no reason to leave to watch other channels. The programs are clearly the meat of this sandwich. But every station wants to deliver the whole sandwich, including interstitial content to generate revenue and, in the case of promos, to draw viewer interest to upcoming offerings.

A brief look back

Broadcasters are familiar with the history of the technology required to accomplish this task. At one time, all material played from film. Eventually, videotape replaced film, and videotape players of all types came into use, including robotic loading systems like Betacart, Ampex ACR-25, RCA TCR-100, Sony LMS and Flexicart, and Panasonic MARC and Odetics robots as well. These robots simplified and improved the reliability of air operations and reduced labor costs, but they also represented a slightly different way of delivering the same events to the switcher that concatenated the segments together. It was a parallel approach, with master control requiring more than a dozen sources, and perhaps many more, to achieve the goals of the programmers. Many small segments (promos and commercials) meant many individual players, which, together with character generators, still stores, network sources and satellite receivers, resulted in a large and relatively complex switching system. Such systems were, and are, designed to be highly flexible and easy to operate, either manually or under the control of an automation system. But one single development more than a decade ago changed the fundamental requirements completely.

Enter the server

The invention of the video server began to eliminate most stand-alone VTRs and cart machines for interstitial playback. Servers offered several critical and defining differences to the



Master control at the NBC Miami ShareCasting hub in Miramar, FL, is based on Florical technology. The facility originates broadcasts for NBC O&O stations in Miami (WTVJ), Dallas (KXAS) and Birmingham(WVTM), as well as the NBC-owned Miami Telemundo station (WSCV).

state of the art when they were introduced. First, they were capable of concatenating many segments internally and playing them out seamlessly on a single output. Second, they could hold an entire station's library of promos and spots online all the time, eliminating the need to have VTRs play back short-form material. Third, they were capable of tight integration with automation, allowing selection and playout of interstitials without operator intervention. The Holy Grail of broadcasters these days is reduced cost, and servers move us closer to the day when fully automated acquisition and playout might be a reality.

But there is debate about the form master control should take for different applications. For instance, when live programming is a major portion of the program schedule, a manual operator interface is clearly important. To the extent that servers can store all content and play it out automatically, a manual interface serves primarily as a backup, making full-featured control panels less important.

Stand-alone solutions

Many manufacturers provide full master control solutions. These include Thomson Grass Valley (M-2100 and Saturn both remain in the product line after the acquisition of the Grass Valley Group by Thomson), Sony (Isara product line), PESA (MC Lite), Leitch (Opus), Utah Scientific (HD/SD-2020), Quartz (QMC), Ross Video (DVM series) and Chyron (Pro-Bel TX series). These switchers have multiple inputs, or use external routing to achieve multiple inputs to a stand-alone mixer frame. They can offer multiple keyers, squeezeback, audio over and other capabilities. They are, however, primarily switching and keying devices intended to work in environments where multiple sources are common, and stand-alone control panels are important.

Branding solutions

The other class of master control solutions is a little more difficult to define because the features of this class overlap those of stand-alone solutions. Perhaps we can best classify them as "branding solutions" because their primary purpose is to take a feed and apply effects such as supers, squeezeback, audio over and, often, internally generated character generator pages. Manufacturers supplying this type of system include Pinnacle (Dekocast), Miranda Oxtel (ImageStore 2-3) and NVision (NV5128MC). Some of these manufacturers also offer stand-alone control panels that extend their functionality to replicate the broader and more traditional type of switchers. Some offer software touch screen interfaces, and some offer only remote control through Ethernet or RS-422. NVision's system is so new that the manual control panel they envision is just not done yet, but the company notes that the system can be fully controlled without a manual panel in much the same way that others are currently controlled. Obviously, a manufacturer that doesn't supply a manual control panel intends the features to be primarily or wholly controlled by automation.

Southern Cross Broadcasting's Australian facility features Quartz Electronics' QMC master control switchers.

Interfaces

Over time, makers of automation systems have devised interfaces that control the full range of features in the solutions that have been around for a while, for instance, M-2100 and Saturn. When the new generation of branding solutions evolved, automation interfaces were hard pressed to easily control the broader range of options and operational modes they offered. It might well have been easier to offer multiple ports and control the basic functions from a standard interface using an existing protocol, and perhaps move the advanced features to another interface specific to the device. While that might speed software development, it is less than desirable for operational reasons. Who wants to have to parse transitions into more than one interface?

More appropriate is the development of an entirely new interface specific to the device, with all functions fully supported and called out in clear language that can be translated cleanly from traffic. This points out a significant shortcoming in the broadcast chain. To make complete use of the range of expanded capabilities such systems offer, traffic must have a *lingua franca* – a common language – in which to write the commands for translation to operations. For instance, if three keys are to be inserted and deleted at will, as many as three secondary events might be required in the air log. Take the case of a commercial break at the end of a program, with credits following before the interstitial station break. When you come back to the program, the bug might be inserted, the program

Traffic must have a *lingua franca* – a common language – in which to write the commands for translation to operations.

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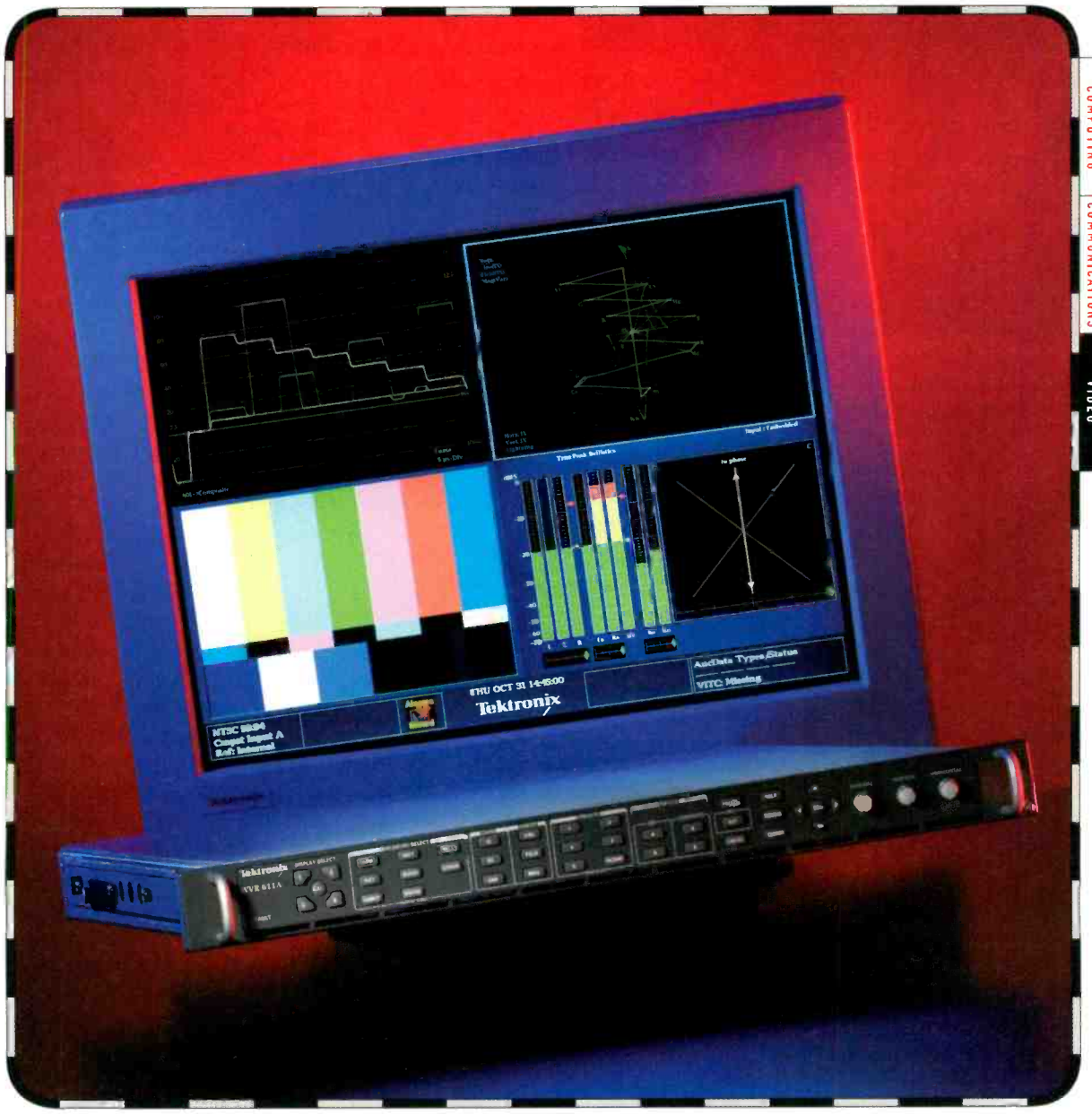

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The Miranda Oxtel Imagestore at the master control room at WHRO incorporates all the functionality required in a master control chain in a single box, including AB mix, four key layers, logo generator, character generator, DVE, still store, clip-playout server, audio mix, audio store and EAS insertion. Photo courtesy of CEI.

Racks of Pinnacle DekoCast systems, installed in the new Starz Encore operations center, are used to automate interstitials, bug insertion and other on-screen branding.

squeezed back to reveal a character generator page, which advances to a second page, and then a logo is inserted. Each of these is a new event whose time relationship to the program must be defined in traffic. Then, individual commands must be translated into the automation system in ways that are predictable. Key One might be used for the bug, while Key Two is the character generator, etc. This careful definition of how the switcher is going to be run is a key element in the installation of the system.

In the past, most master control switchers had a simple RS-422 interface to automation. With branding solutions, you have to add other interfaces that add rich text, logos and other content to the air signal. A lower-third crawl for weather, school closings or EAS might be input to the system as a separate (or multiple) source(s) of data. The formatting of the datastream must be specific to the device, and it may need to be buffered if the text stream is not synchronous with the program content. The branding/master control solution may have that capability in it, and perhaps even multiple channels for that use.

The same, but different

There is as much variation in these systems as there is commonality. In general, they all do the same thing, but some of the systems do not offer key features. For example, unlike Dekocast and Oxtel ImageStore, some do not offer an internal character generator. In the past, manufacturers assumed that broadcasters would use a stand-alone character generator for such applications. But it is compelling to have the capability built into a more general-purpose system, assuming control issues do not become so thorny that the feature is hard to use.

Dekocast is inherently a character generator and graphics-based system. Recently, Pinnacle introduced an offline creation station to allow operators to create rich graphics without tying up the air channel of the system. This permits operators to composite complicated graphics and text and to fully preview them offline before delivering them to the air system to be presented and called up by automation.

Branding systems have another characteristic in common. In general, they offer no internal crosspoints; just a pair of inputs for foreground and background for transitions. Of course, two inputs are seldom enough, and they rely on external routing switchers for the crosspoints needed to fill out their capabilities. If the same manufacturer supplies the crosspoints, you can be pretty sure it will work. For many years, Thomson (BTS, Philips, etc.) has offered the Saturn system with internal and external crosspoints. NVision, Quartz, Miranda and others interface with routers they supply as well as with routers from third parties, often including their competition. If you are contemplating such an installation, ask the manufacturer very specific questions about the routers it supports and the complications that accompany each interface. One supplier recently told us it supported a specific router, but the cuts were not frame accurate when commanded from the master control solution.

There is as much variation in these systems as there is commonality.

Don't forget audio

While much of this article has pertained to the visual part of the master control chain, we can't forget audio. (Television without audio is merely surveillance.) Just as with pictures, the composition of the output stream from audio elements is no longer quite as

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The Thomson Grass Valley M-2100 master control switcher, installed at KVEA-TV in Los Angeles, offers multi-channel operation, extensive keying flexibility, separate and embedded internal digital-audio processing, and a wide range of software-enabled options.

simple as it once was. Master control used to contain an NAB cart machine and an input from a booth microphone for voice-over inserts. Today, a parallel solution might have digital playback from CD, MD disk, and .wav and/or .MP3 files from computers, all for integration into the final program. These may be interfaced with AES at 44.1kHz or 48kHz sampling, or analog mono or stereo audio. Program segments may have any of the above, and may also come with embedded audio, Dolby E or AC-3 audio for multichannel sound.

Some branding solutions have internal storage for audio elements as well. This leads to a rich environment in which the elements are sent to the MCR solution and the automation playlist calls up items as they are needed. Indeed, at least one manufacturer offers internal video playback as well, so complex moving logos, or even repeated promos, might be played without tying up the video-server channels. This adds another level of complexity to the traffic-automation interface.

Implementation considerations

Injecting a system like this into an existing audio (or video) plant requires careful planning. If there is no AES in the existing plant, you may need to convert both the input and output for monitoring and air signals. When using embedded audio, be sure not to compromise the audio-to-video synchronization. If you are contemplating using mixed audio sample rates, be sure the manufacturer supports this capability before ordering hardware.

Though the engineer who is accustomed to looking at the control panel in an analog facility might not think of it as even a potential problem, many modern master control switchers and branding solutions offer no separate audio metering, either on the panel or as a stand-alone external box. This presents no particular challenge, so long as you are aware of the need.

If HDTV is part of the implementation – which, today, is the case for many broadcasters – it is important to review just how the HD and SD versions of the system under review integrate together. In virtually all cases, the control panels available from manufacturers can seamlessly control multiple channels of HD and SD flavors. It is not quite as obvious if the HD version is different in subtle ways. If you want simultaneous switching, perhaps for simulcast programming, it is important to ask the manufacturer if its control panel can execute identical commands on two processors at the same time, and closely couple synchronization that you may need for upconversion of spots and/or content.

If you use an external router, mapping crosspoints to achieve the one-to-one match needed for "simulswitching" is not difficult. If the two switches are internal to the branding/MCR solutions, it may be necessary to restrict the inputs to both frames to have identical input maps. This will make one-to-one equivalency exact when using a single control panel. Doing so does not necessarily mean automation can handle the two streams with one set of commands. You must address that question to the automation company.

Looking ahead

DTV also can carry metadata, especially for control of an audio encoder. It is not clear just how future switchers will handle this. What happens to the metadata for two programs when you perform a dissolve between them? Does a cut in the datastreams work logically, or even electrically? If not, how would you reset values for DIALNORM and other critical parameters? Much work remains to be done in this area.

Lastly, what is the future of master control? One thing is certain: More can be done in computer environments today than ever before, and automation and master control are tightly coupled already. It is not hard to imagine a system in which the master control function is performed entirely in a video server with internal effects and keying capability. This is remarkably close to reality today, and at least two manufacturers (Harris/Aastra, and Leitch/AgileVision) offer systems that allow much to be done with the MPEG stream without decoding. While these DTV "master control" solutions are not loaded with all the features of other systems, over time we may see output streams concatenated together without "conventional" video hardware at all. **BE**

Just as with pictures, the composition of the output stream from audio elements is no longer quite as simple as it once was.

John Luff is senior vice president of business development at AZCAR.

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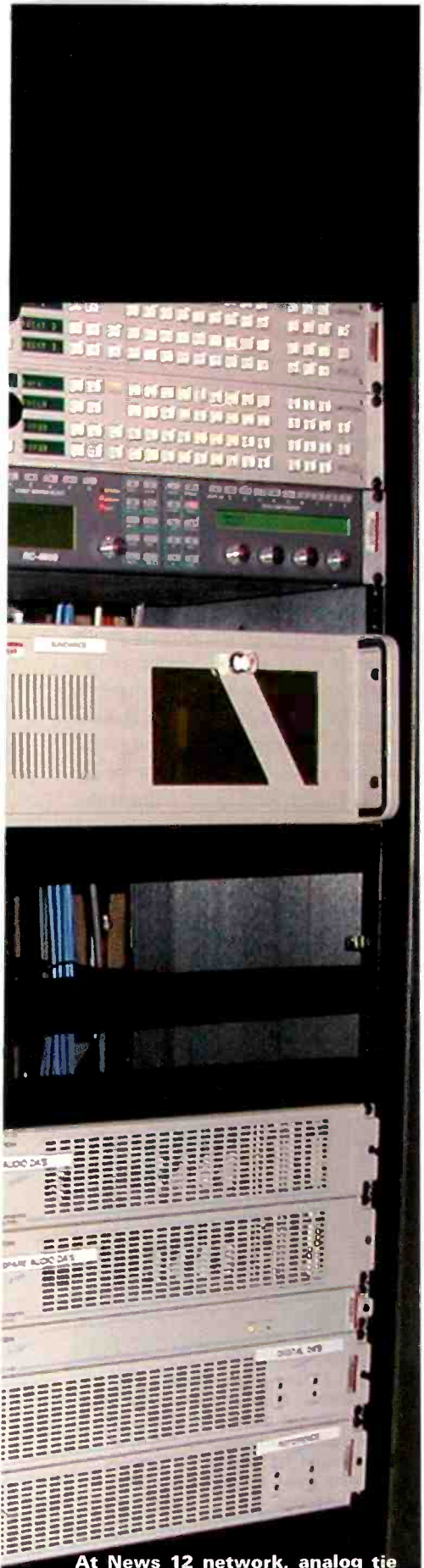


At News 12 network, analog tie lines are implemented over fiber. Eight DPS-575s convert the analog fiber to/from SDI into the Leitch Integrator routing switcher.

BY STAN MOOTE, TODD ROTH AND STEVE SULTE

Video servers have changed the landscape of facility design. Many facilities have enjoyed a one-third reduction in overall routing requirements simply by moving from tape- to server-based playout. And consolidating ingest, playout and tape-setup operations in a single, storage-area-network (SAN)-based server has afforded many facilities an even greater reduction in required routing capacity.

But traditional video servers alone cannot ultimately satisfy all routing requirements. Additionally, business models for pure centralcasting architectures are often hampered by unsolved issues such as "last mile" availability and centralized redundancy. Also, there is an increased demand for specialized content and localized programming.

Believe it or not, video servers and routers are really not that different. Both carry out commands to move video and audio around a facility. The commands can be manual, automated or both, depending on workflow demands. These similarities suggest that the functions of both can be combined. A hybrid router-server can improve a facility's ROI by providing improved workflow, scalable operations (both centralized and decentralized), and instant availability of stored material. By using interoperable router-server systems, a facility can accommodate a dynamic mix of centralized and localized services, allowing them to coexist seamlessly with content.

The historic need for large, everything-to-everything routing has started to shift to a more cost-effective approach – namely, routing only those signal paths needed for simultaneous playout instead of routing every possible signal path. The most practical and economical architecture for this is a collection of localized hybrid router-server domains. These domains use cost-effective, high-reliability, small-to-midsize routers for local facility routing, and they use the SAN for direct-server routing and remote-content access. This approach can deliver advantages such as affordability, scalability and system flexibility to facilitate the ideal mix of centralized and localized capabilities.

Why the paradigm shift?

A large central router has always been considered the primary "core" component of a broadcast facility. All possible sources that may potentially provide externally or internally generated content are wired to well-known input ports on the central router. All required output channels – or source points for downstream processing – are wired to router output ports. Everything is well understood and, at the touch of a button, you can instantly set up any desired signal path provided that it has been accounted for in the wiring plan.

This is all fine, assuming that the content is available at the specific ingest port when it is needed. Obviously, routing a VTR to anywhere without having a tape installed is pointless. After all, it is the content we want, not the black and silent output from an empty VTR. Since we will have to route this path at some point in time, we have to consider the routing requirement and allocate the port, which results in an inefficiency in overall port use. Also, we may need a specific type of downstream processing only a fraction of the time, or we may have omitted it altogether from the routing plan. Either we have to pre-allocate the specific routing resources, or we have to re-wire this operation through error-prone patch panels. These large core routers also

Believe it or not, video servers and routers are really not that different.

Ingest operations are simplified at News 12 by having both the Leitch VRNet Server solution and the Integrator router system managed by a single operator. A hybrid router-server solution improves ROI through improved workflow.

suffer from inefficient crosspoint use because of the partitioning required to segment signal distribution into protected distribution domains.

Now consider how this scenario improves as we introduce servers into the equation. We can replace a large portion of the required facility routing by combining several servers (capable of supporting multiple ingest and playout channels) and a local SAN. Not only do the benefits of random-access storage and playback reduce the need to have multiple VTRs for continuous playout, but the inherent distributed nature of the SAN makes all content available for immediate real-time playout, edit or processing as desired. Also, since each server input and output has unrestricted and non-blocked access to all content stored within it, along with real-time access to content stored elsewhere within the network, any program accessible by the server is internally routable. This eliminates the need for hard-wiring or pre-allocating router resources. Both servers and routers support effective control mechanisms to provide various levels of access security that is critical to shared-content environments.

This is not to say that we can entirely replace facility routing with direct server routing; but it does suggest that more cost-effective, small to mid-sized routers and utility routers can handle most of the remaining routing requirements. With today's comprehensive control systems, multiple routers can be installed and controlled within a single facility or across facilities, making the hardware infrastructure virtually seamless to the operator.

Partitioning services – centralized vs. distributed

Unlike the disjoint and non-interoperable systems of the past, or the idyllic systems envisioned by pure centralcasting models, an effective solution needs to accommodate a dynamic mix of centralized and localized services. As technologies evolve and business models adapt, broadcast facilities will need to capitalize on these changes by deploying cost-effective and scalable systems that will enable central services and content to coexist seamlessly with local services and content.

For example, the choice between push and pull distribution models depends largely on the context of the service we're providing. Distributing core programming or global news material will likely require a push model with control over distribution channels, quality monitoring and playout statistics. Local programming or interactive services will likely necessitate pull models. Ideally, these different types of distribution strategies will coexist within a single local facility and will operate simultaneously.

To support the required mix between centralized and distributed services, we need a hybrid strategy based on a SAN architecture coupled with peripheral facility routing. Server ingest and playout, storage, gateways and other LAN-based equipment share access to local content, remote content through WAN gateways, and other network resources. This network topology also provides for direct server routing for server-based ingest and playout.

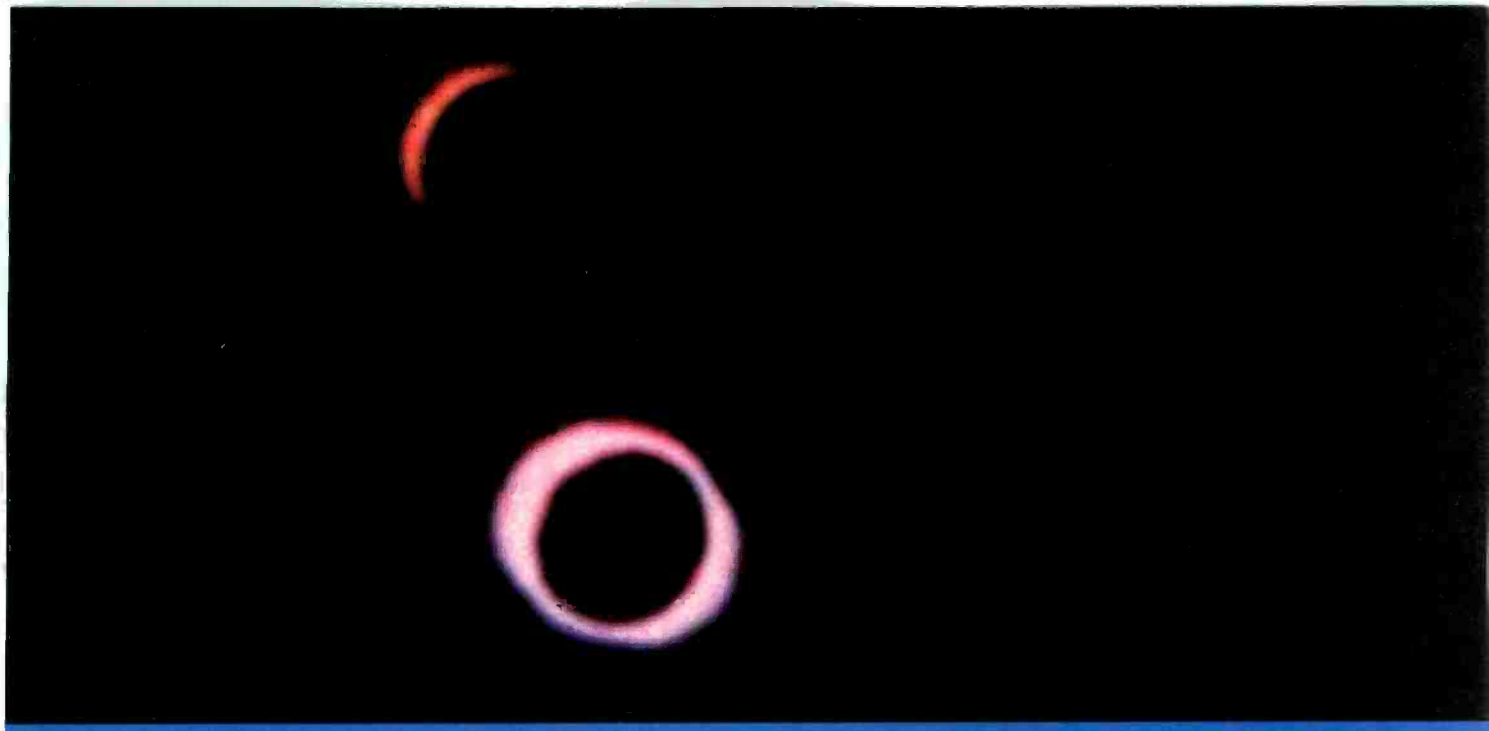
A case in point

An example of Leitch's hybrid system is implemented at News 12 in Long Island, NY. The system provides content management of single or multiple domains with activities such as view, search, copy, move and delete files. News 12 is planning to manage all assets with VRMediaNet, which has an SQL database providing an instantaneous view of online, near-line, offline and low-resolution proxy storage across multiple domains.

Small local facility routers provide routing to other local equipment in the facility such as additional processing or QC equipment. Partitioning the router ensures that live feeds never go directly to air without going through the plant QC. This is the same for all ingested material on the servers. Remote access to live or other critical content is also possible through inter-facility router tie lines. This topology allows for flexible access and monitoring of both local and remote content at the appropriate quality of service. Figure 1 illustrates this topology.

The full distributed solution consists of many hybrid domains interconnected by remote WAN and tie line links. This will provide the improved routing efficiency, along with the added

News 12 Network chose the Leitch VRNet Server system with Fibre Channel storage. This 2TB SAN solution inherently reduces the amount of router ports by one-third over traditional tape-based systems.



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flexibility of homogeneous localized or distributed access to media assets and content. Figure 2 shows this topology.

Key advantages of this solution are:

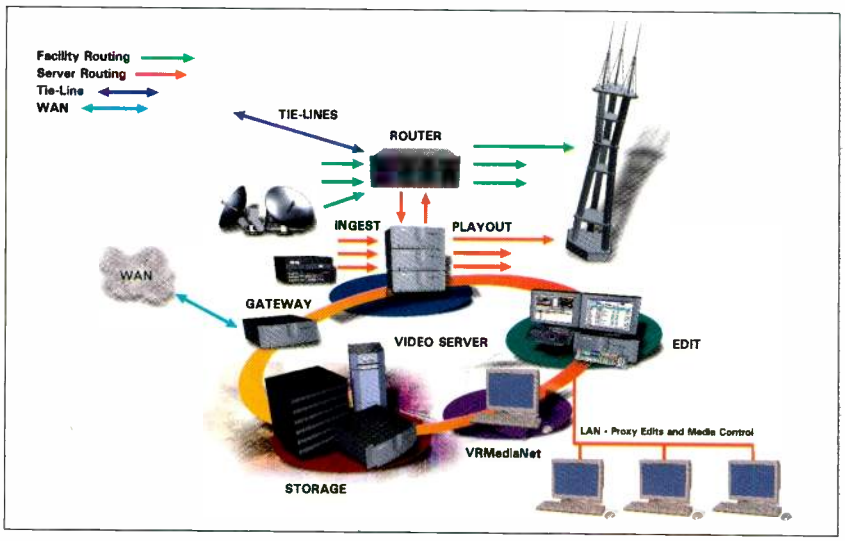

Figure 1. The combination of routers and servers creates a cost-effective hybrid domain simplifying operations within and among facilities. This strategy is based on a SAN architecture employing both server routing and facility routing.

- Lower cost, improved router efficiency and better crosspoint and port-use efficiency
- Improved flexibility in terms of accommodating complex route paths dynamically
- Scalability in both network and tie line bandwidth on an as-needed basis
- Ability to optimize the storage location of network content and media assets for efficient distribution as required
- Preservation of managed full-bandwidth connectivity through facility router tie lines (for live or other specific programming)

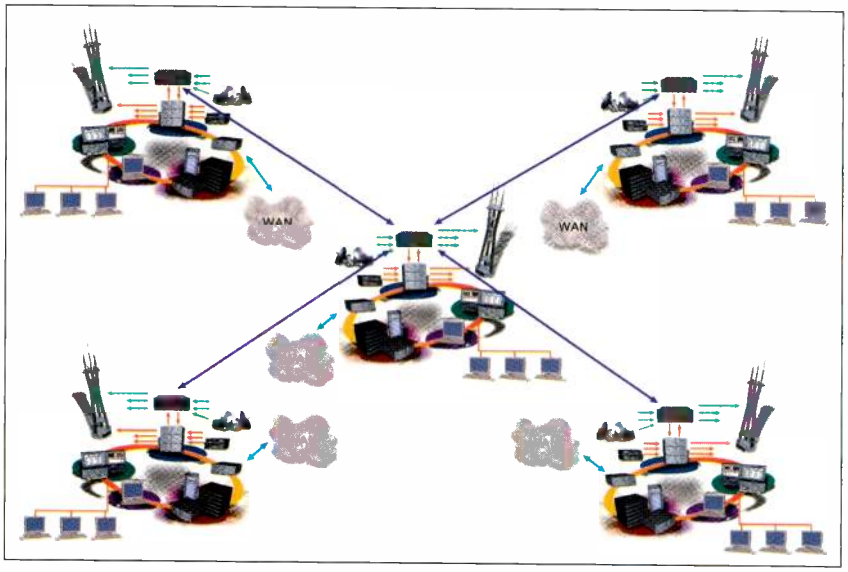

Figure 2. A combination of WAN and interfacility tie-line connections provide a solid foundation for content sharing across the News 12 Network with operations in Long Island, Connecticut, New Jersey, Westchester and the Bronx. As additional sites are added, WAN and tie-line traffic can be easily tailored to satisfy varying operational requirements.

- Capability of accessing low-resolution proxies for remote content browsing
- Extended file protection with ability to mirror systems to multiple locations for full redundancy.

Critical capabilities that are key to successful deployment are:

- Integrated command-and-control with the ability to manage potentially competing central and local priorities
- Media-asset and content management
- Content security and access control
- Resource management for ingest, playout and processing resources
- Network and bandwidth management
- Monitoring and reporting of content distribution and system use
- User-configurable GUIs for customized control and monitoring, simplified operations and management of complex networks.

Interoperability

Just as VTR formats change and improve, so do native storage formats and file structures on video servers. Providing for both multiple and standard formats such as DV, MPEG, SD and HD on the same server is key to successful implementation. Interconnection between various systems within and across facilities demands multi-vendor integration. Material eXchange Format (MXF), Advanced Authoring Format (AAF), Media Object Server (MOS) interface protocol and Simple Network Management Protocol (SNMP) ensure compliance.

Looking ahead

The dynamic technologies and changing business models that drive the current broadcast environment will likely continue to complicate business decisions for the foreseeable future. Hybrid solutions that embrace these changes – while at the same time offering customers a consistent and reliable set of resources and strategies that scale well to various types of applications – will remain the best alternative. BE

Stan Moote is senior vice president, Todd Roth is vice president of technology in the server division, and Steve Sulte is software systems architect in the VP&D division of Leitch Technology.

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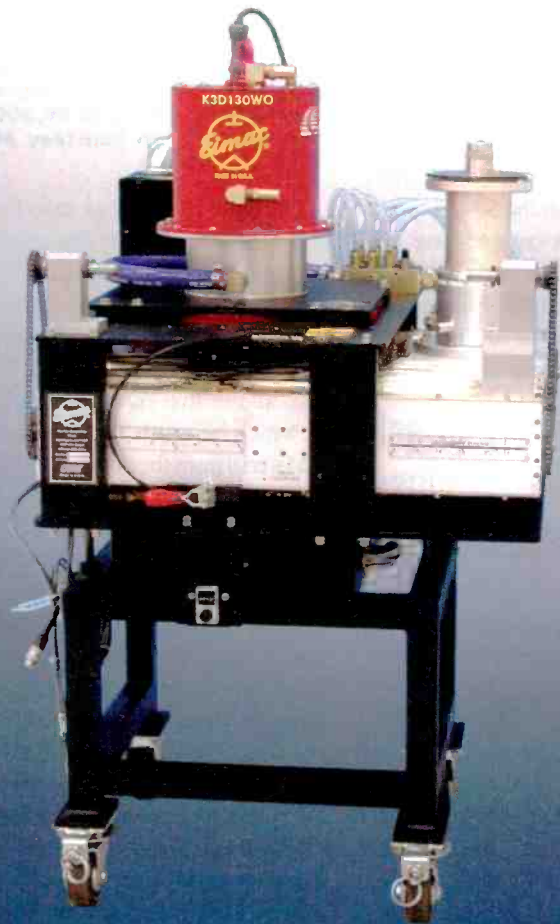

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DNF's Shotbox at New York's Shea Stadium

BY HARRY GARCIA AND DAN FOGEL

Server-based playout technologies are changing the way viewers experience televised sports events. The addition of a multitude of animated graphics and special effects, replays from virtually any angle and at any speed, and smooth graphical transitions in and out of live action have established a new standard for sports broadcast production. As audiences come to expect this visual spectacle as part of televised sports, production crews find themselves facing the challenge of providing an equally streamlined and stimulating experience for the thousands of sports fans within the stadium, arena or other live sports venue.

At the New York Mets' Shea Stadium in Flushing Meadows, Queens, the team's home-game production crew creates live big-screen shows for as many as 55,300 baseball fans at each home game. Control room technicians operate the video display screen and the scoreboard, and the technical director for the big-screen show works with up to 19 sources to insert content into the game and build a mini story around each play.

To create the drama that heightens the experience of the moment for the fans and players, the technical director needs a responsive system that provides immediate control over content playout. Prior to the 2002 season, the Mets production crew relied on a linear system in which clips were queued into one of the two available playout channels of an older, laser disc-based playout system. Without a better way to access the replay effects or other animated responses to a home run or great play, crew members were forced to keep one particular effect in line at all times, tying up half of the clip system's output capacity.

To overcome this bottleneck between the clip system and switcher, and also to free up the control room's other operators – including an Inscriber CG Supreme character generator operator, an Avid editing system operator and a video engineer – the Mets upgraded their existing DNF 4000CL system to a 2034CL-O-PBIO from DNF Controls.

The instant access clip management system includes DNF's full-featured ST300 controller and ST420 Shotbox. Relegendable keys on the ST420 display clip allows the Mets crew to have one-key access to single video clips or to fill clip/key clip combinations. Pre-recorded video – recorded on the fly or prepared in advance – is an integral component of virtually every broadcast.

The special transitions and replay effects brought the impact of the big-screen show closer to a television-broadcast look and feel.

The special transitions and replay effects, played out instantly, have brought the visual impact of the big-screen show closer to a television-broadcast look and feel.

Within the composite analog control room at Shea Stadium, the technical director uses the unit's remote panel to call up video clips and insert them live during the game. The box is linked to Fast Forward Video's Omega Deck digital disk recorder, which allows the TD to record clips on the fly in case he needs them on hand for immediate playout.

Control room technicians at Shea Stadium create live big-screen shows for as many as 55,300 baseball fans. Photo courtesy Marc S. Levine/ NY Mets.

Through the Omega interface with the Shotbox, the TD has access to as many as 270 clips at the push of a button. The TD inputs new clips into the clip controller, assigning each clip to a particular bank and button. The unit also allows the TD to set the in-point at which he wants the clip to start.

Material from the Omega Deck goes out to the TD's Thomson Grass Valley 200 switcher in composite form. The DNF unit serves as a keyable source, as well as a direct source, for the switcher. As a direct source, the unit is used for interstitials, bumpers and features that are of a longer duration. At the downstream keyer, it is also available for animated transitions that wipe over line sources.

Video is delivered to the unit via Betacam component inputs. Delivering material as a component source allows the crew to feed the unit the component outputs of nonlinear sources in addition to outputs from tape. As a re-

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sult, they get the best visual quality for any motion graphics or animations they capture and playback.

The switcher's auxiliary bus also serves as a composite router. The auxiliary bus has all of the sources that appear in the switcher's M/E buses, giving the TD the option to record anything during the game – including still stores and material from tape machines, the character generator and any of the 10 live cameras – while he's switching just by punching it up on the auxiliary bus.

For the 2003 baseball season, the Mets plan to implement another powerful feature of the Shotbox control system – the PBIO option – which allows clips to be cued and triggered by the Thomson Grass Valley switcher E-Mem. This will enable the technical director to build multi-layered transitions incorporating animated graphics and DVE moves that can be triggered from a single switcher button.

The story of the game

DNF's control solution is put to work throughout the entire production. Ten cameras located around the ballpark feed video to the control room. The big screen cannot display any of that live video when the batter is in the batter's box, so it pauses on a still image. If the batter hits a home run, the TD uses the Shotbox to run the fly-and-replay effect, which leads into the home run replay. Additional graphics leading into and out of player graphics and statistics may follow until the next at-bat. The whole process happens at an incredible speed to keep up with the flow of the game.

During the course of a New York Mets game, the graphics played out to Shea Stadium's big screen are a combination of pre-made graphics and new graphics with compositing. When there is time and the production team can anticipate a home stand with a big rival, Shea Stadium's graphics department will develop custom images in advance.

Animated replay effects and pre-edited features that last anywhere from one to three minutes are loaded onto the Shotbox before the game.

In a live situation, when a play happens and the production team needs to build a clip quickly, the character generator operator uses the CG Supreme to build video on the spot. An Inscriber CG Supreme character generator and an Avid editing system together provide the show with high-quality picture and audio editing, compositing, paint, animation and character generation.

Live shots that are recorded while the game is in progress are also recorded into the DNF box for later playout. All of this material comes together on the big screen, bringing the audience into the game's unfolding story. BE

Harry Garcia is technical director for the New York Mets, and Dan Fogel is president of DNF Controls.

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Chyron goes SOLO

BY RICH HAJDU

Networks are placing more emphasis on remote broadcasting to offer live, up-to-the-minute coverage, to the point where thousands of remote broadcasts now occur in the United States each year.

At the same time, viewers are continually looking for ways to enrich their viewing experience. To meet these demands, broadcasters have stepped up their efforts to offer as many dynamic and interactive experiences as possible.

These are just some of the main factors behind the development of Chyron's SOLO, a mobile graphics and character generation solution that combines portable hardware and software with a familiar user interface.

The system was first developed in response to the needs of FOX Sports,

Chyron's SOLO is a mobile graphics and character generation solution that combines portable hardware and software with a familiar user interface.

which was looking for a portable graphics solution that also offered the ability to do basic digital video effects (DVE), character generation and real-time animation. Already familiar with the Chyron CG systems, FOX was looking for a way to get standard branding and CG capability into the hands of their field producers.

This would enable field producers to create content offline, prior to an event, then interface directly to the sports production vehicle with the portable systems. The producer would not have to fly to an event early to create content, and last-minute changes would be simple to integrate into a program. This capability would even reduce on-site personnel costs and provide a higher degree of creative freedom.

The network also wanted a portable solution that was compatible with its custom Chyron Application Library (CAL). CAL enables any Duet SD, LEX or PCI+ to generate graphics using automated data sources such as the live event clock, current scores and other live events.

The most effective solution was a laptop-based system running CAL.

After evaluating several types of hardware options, the most effective solution was a laptop-based system running CAL. This solution became SOLO, capable not only of using a customized CAL application, but also of running Chyron's Lyric content creation and playout software, and CAL programs like NewsCrawl. As a result, users can create, preview and go to air from any location.

SOLO is configured using a Chyron-specified laptop, a PCI Squeezeback board and an external PCI carrier that interfaces directly with the laptop through a cable and PCMCIA card. The PCI carrier measures only about 14 inches long, 5.5 inches wide and 1.7 inches deep, so a complete system can fit into a standard laptop carrying case. Operators can have portable 601 video capabilities by setting up the system in about four minutes and connecting it directly to the on-site infrastructure with standard BNCs.

The system will be available in two ways. The user can either purchase the laptop directly, after confirming the specifications from Chyron, or buy the complete system with bundled software from Chyron.

The system's mobility makes it useful in applications where DVE, lower thirds, or other branding and CG applications need to be closer to the source of the video. It's a single-channel system that provides a digital downstream keyer with bypass, SVGA preview, dual inputs for the PCI Squeezeback card, and a background video input.

Software options include Lyric, which can be used to create CG graphics, lower thirds, flipbook or real-time animations, and iNFiNiT file import. In addition, Lyric can directly import up to 25 file types, can be set to operate in 4:3 or 16:9, and can create content for either SD or HD (SOLO is SD playout only).

While traditional CG systems are fully systemized offerings, SOLO represents Chyron's "user needs" approach. It can provide a robust, hardware system, but if only software or plug-in PCI cards are needed, Chyron provides that type of solution as well. This adaptability enables truly scalable applications, all with maximum flexibility. BE

Rich Hajdu is vice president of sales and marketing for Chyron.

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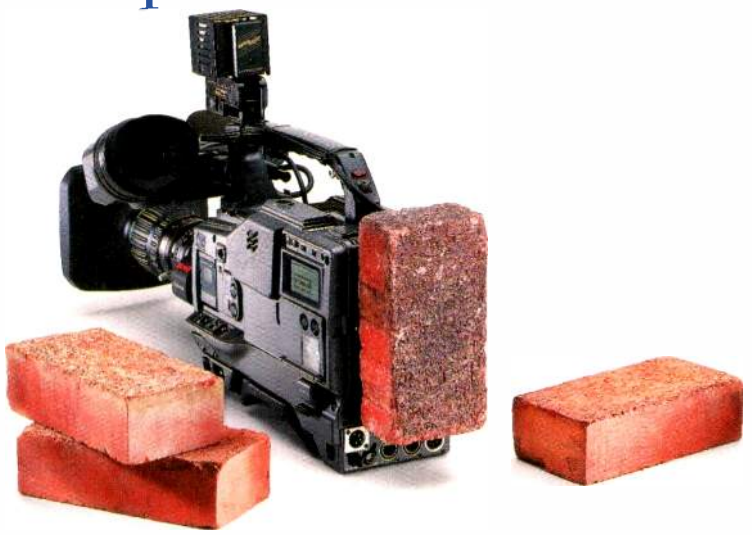

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Fujinon's
HDTV cine-style lenses

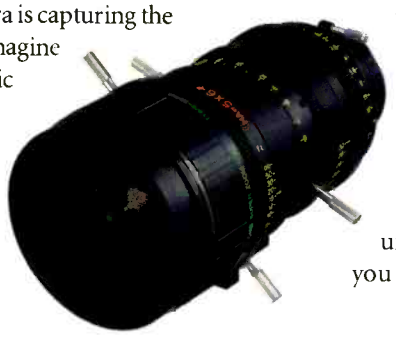
BY DENNY CLAIRMONT

Video-camera manufacturers have been trying to gain a foothold in the film industry for a decade, if not more. But it was not until the introduction of a 24p HDTV camera that they started seeing some success. The ATSC developed the 24p format to produce a video picture that resembles a film picture in many respects, starting with the number of frames per second.

Producers are making more movies and TV shows in HD, and equipment-rental companies are beginning to see an increase in demand for 24p equipment for production and testing. And there is growing interest among motion-picture producers about the purported benefits of digital video, which include lower production costs and lower film-to-process costs.

Until recently, a major hurdle in the acceptance of this format has been a dearth of HD video lenses that can mimic the functions, settings and quality of film lenses to which director-producers, cinematographers and camera assistants have grown accustomed. HD lens manufacturers had to address two issues in particular: "breathing" and "ramping."

Chances are that if you watch a documentary or news segment, you won't be disturbed by the breathing of ENG-style lenses. When shooting documentaries, especially nature programs, you want to be as close as possible to that tiger and cub. And if the camera zooms in, the audience is normally not disturbed by the awareness that a camera is capturing the wildlife action. But imagine you're doing a dramatic shot of a man sitting in a large plaza. Maybe he's in Paris at a sidewalk café and he's a spy, and he's watching someone off in the distance. The camera first focuses on him, and then it changes focus to the person he is watching. Over the years, film-style lenses have evolved to the point where the breathing is so minimal that you don't notice it. But, with ENG-style lenses, the effect is obvious and disruptive to the audience who, until then, felt like invisible observers.



Fujinon's HDTV Cine Style lenses, including the HAe5x6 SUPER Cine Style HDTV zoom lens shown here, provide the extra focus markings and gearing pitch that are common in the film industry.

> **HD lens manufacturers had to address two issues in particular: "breathing" and "ramping."**

Lens breathing

Breathing is an industry term that refers to a lens' tendency to make an image look bigger or smaller when its focal length is changed. In other words, when you change focus from something that is five feet away to something that is 20 feet away, the image size changes. This can have a disconcerting effect on the audience by making them aware of the camera's presence.

Lens ramping

The other issue using video cameras outfitted with ENG-style lenses involves "exposure ramping" – opening the iris or increasing the gain on light sensitivity to compensate for darker environments. Zoom lenses are particularly sensitive to this feature. When you use a zoom lens, particularly one that has a wide angle, everything appears to be distant. At a certain focal length, a certain amount of light comes through that lens and ends up on the film or the image sensor. With a zoom lens, the "speed" of that lens – its ability to capture light – can change as you zoom to telephoto. ENG-type lenses have an automatic exposure control that causes either the iris to open wider or the gain circuit of the camera's image sensors to increase their sensitivity.

But, when shooting drama, this is unacceptable. When you set up your scene, you don't want the camera making decisions for you. As a director or cinematographer, you might want it dark and scary on that stalker hiding behind some trees. You might also want to see a little bit of his outline. And when you zoom in, you don't want the shot to suddenly become bright and high key.

Markings, pitch

Film people also need a lens that has more markings for distances than ENG lenses. The man operating the video camera focuses by looking through the eyepiece at the image on the screen. That's not the way to shoot dramatic films. The cameraman is busy composing the picture. Though he's trying to watch the focus, that's not his only job. The man standing alongside the camera, the camera assistant, maintains focus. He needs to judge or measure the distance between the camera and the subject and correctly focus the lens using the engraved numbers on the lens. Documentary and ENG guys don't

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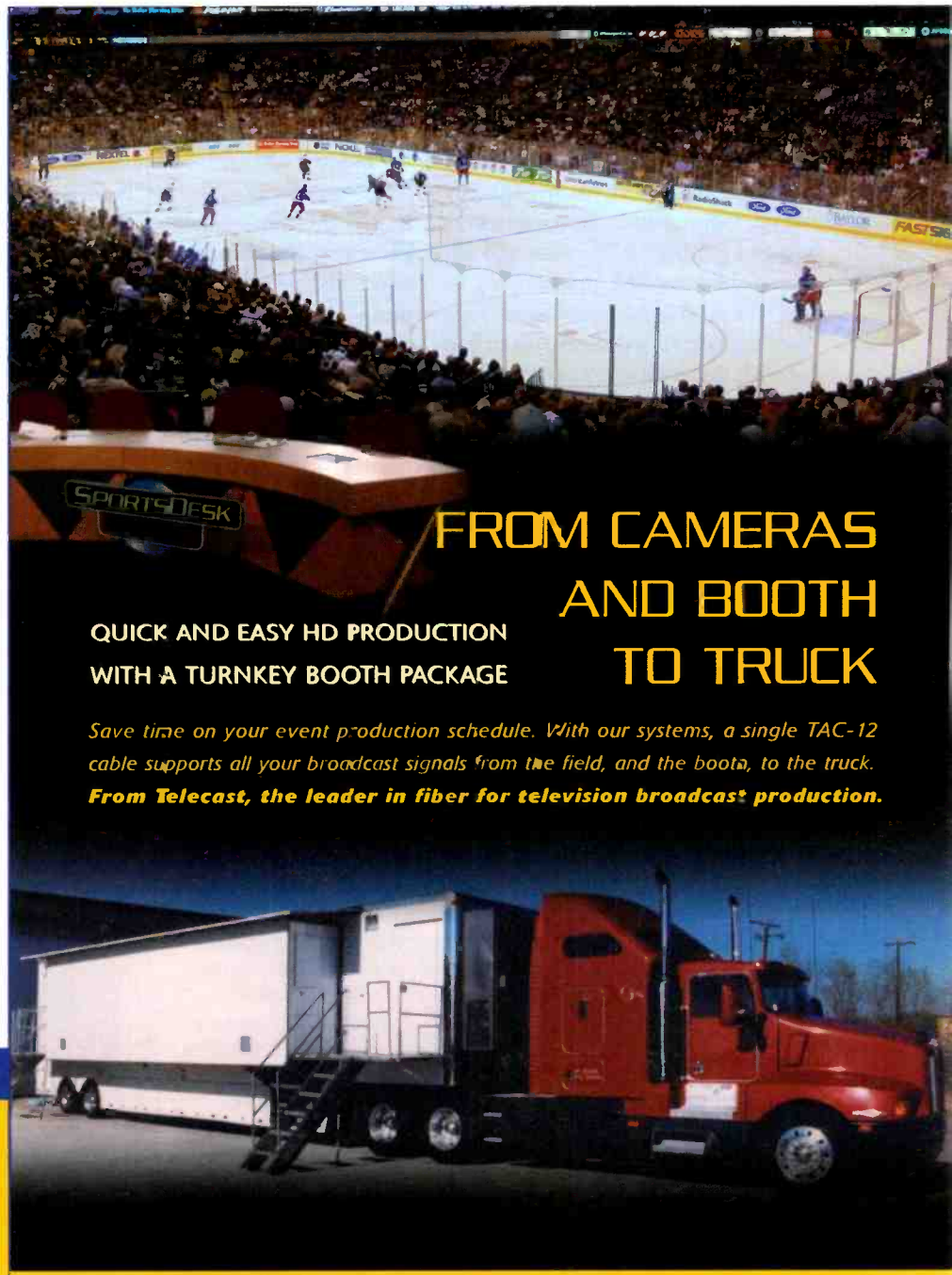

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work that way. They just reach up and re-focus in the middle of a scene. If you're watching a program in which a tiger is giving birth to cubs, a momentary lapse of focus doesn't bother you much. But, if you're watching a dramatic show, a momentary lapse of focus is disruptive because it reminds you that the camera is present.

Finally, most video lenses also have a different gear pitch than film-style lenses. Film producers need lenses that have the gears in the same place and the same pitch as film-style focusing devices.

First to market

To serve the digital cinematography market, Fujinon offers film-style markings and gearing on its lenses, and addresses the breathing and ramping issues. The process started a few years ago when Fujinon visited Clairmont to find out what the rental company would like to see in digital lenses and photography. Fujinon has now come back with lenses that meet the rental company's requirements for film-style lenses.

Recently, Clairmont purchased Fujinon HDTV Cine Style prime lenses and HDTV Cine Style zoom lenses, along with Sony HDEF900 HD cameras. The rental company bought three sets of eight HD Cine Style PRIME lenses and three HA10x5B-10 zoom lenses, which the film community refers to as the 5-50mm zoom lens.

These lenses provide the extra focus markings and gearing pitch that are common in the film industry. The focus ring turns much more than the 90 or 100 degrees you find on standard ENG-style lenses, which means that the increased number of focus markings are spread out in a more user-friendly way.

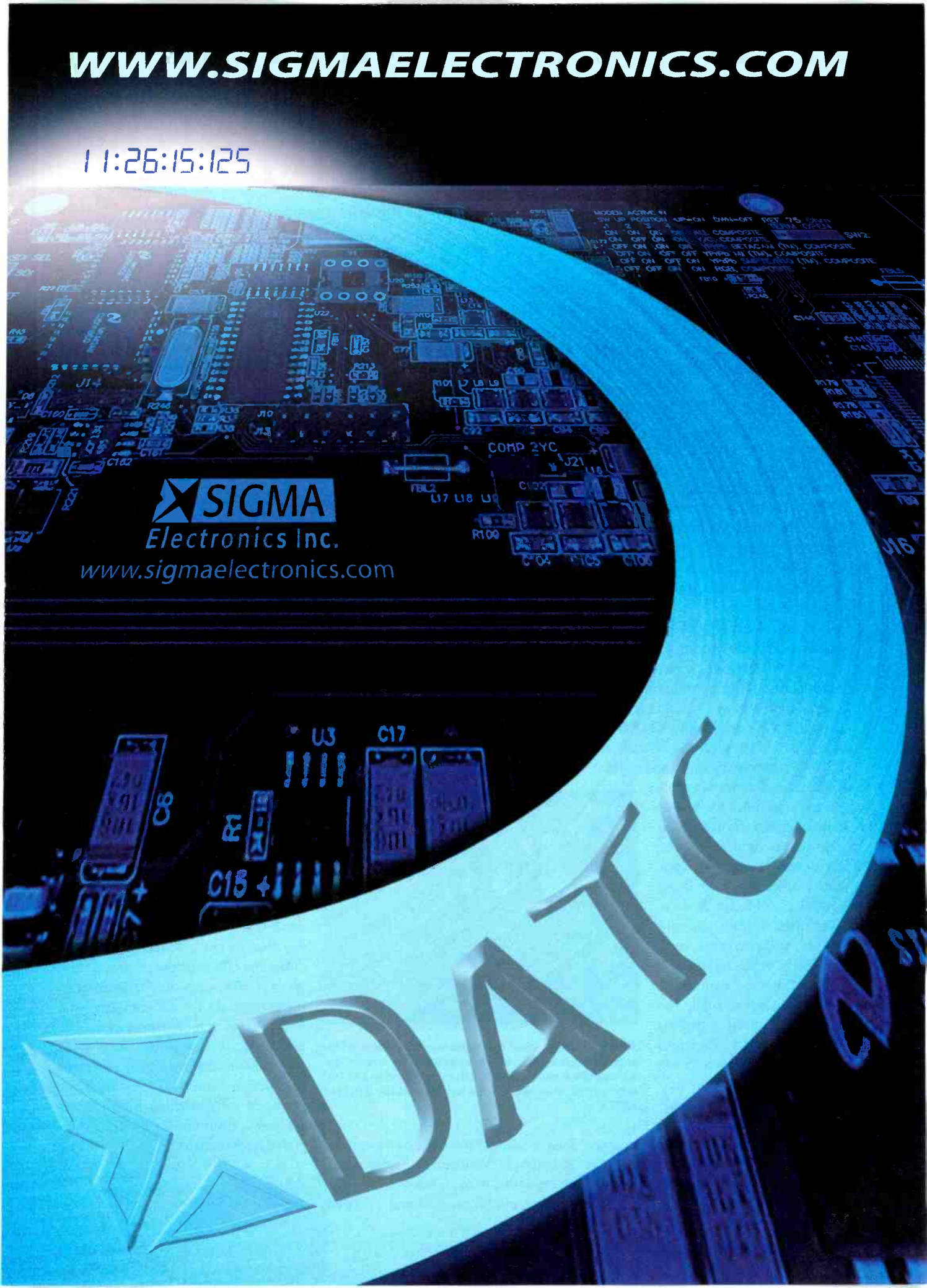
The gears on the lenses mate with the gears of the follow-focus controls because they have the same pitch (the spaces between the gear teeth have a 0.8 module pitch) to accept standard film lens accessories. Just as importantly, the lenses produce minimal breathing and ramping – two major issues film producers have had in the past with video lenses.

Unresolved issues

While Fujinon has stepped up to the plate in addressing the 24p lens questions, Clairmont still needs to resolve some issues to make 24p cameras right for people accustomed to working in film. Right now the rental company has Panasonic and Sony 24p HD cameras, and has borrowed Philips and Thomson equipment to examine and with which to experiment. All these cameras are built of thin die-cast magnesium, which is right for ENG and documentary people. They can throw these lightweight cameras on their shoulders and use them without getting tired. But the rental company feels that the cameras are not heavy-duty enough for its type of work. So the company is taking the whole front of the Sony camera and part of the top and bottom and remanufacturing it out of heavier-walled, strong high-grade aircraft aluminum. It has also changed the lens mount from aluminum to stainless steel. And, since the camera must be able to be easily mounted on a Steadi-Cam, the rental company has moved the camera's controls from the front of the camera to other positions on the camera.

Other issues persist. Right now, not many post facilities are doing 24p post-production. The 24p editing systems are expensive and entail a steep learning curve. But Clairmont feels that it has to get involved and help this new medium mature. The availability of Fujinon Cine Style lenses should help make digital cinematography a true alternative to shooting in film. BE

Denny Clairmont is president of Clairmont Camera.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KMEX-TV opts for Avid

BY LORENZO DELLA MONTAÑA

Los Angeles station KMEX-TV, part of the Univision Television Network, competes with three other Spanish-language stations and a number of English language outlets in the second-largest television market in the United States. In order to be successful in the face of this competition, its news operation has to be efficient.

Station management determined that a move to a new facility was needed to maintain its successful news operation, and turned to the broadcast news solutions team at Avid to help build an optimal nonlinear workflow system.

The project team began with existing systems. The newsroom was already using an Avid iNEWS newsroom computer system (NRCS), which had been upgraded to a newer version earlier in the year. In the new facility, KMEX-TV was able to supplement it with an iNEWS ControlAir automation system. To facilitate the move to completely nonlinear news production, the station also purchased an Avid Unity for News media network, four NewsCutter Effects editing systems, a Media Browse journalist video editing server system, and four AirSPACE video servers.

Use of the new equipment and software has made the news production workflow more efficient. Many times stories come in while the show is on the air. The new systems allow staff to quickly ingest and edit stories, and have them on the server ready to go at the director/producer's command.

Step one of this process begins with the ingest of material by the Media Browse. The system's Capture Manager records multiple feeds onto one of two video servers. The capture software simultaneously encodes a low-resolution version for directors or producers to use to quickly select appropriate clips, make rough cuts or frame-accurately edit entire simple sequences. Material can then be finished on the higher-resolution NewsCutter editing systems or sent directly to the other two video servers for mirrored playback.

A move to a new facility was needed for the station to maintain its successful news operation.

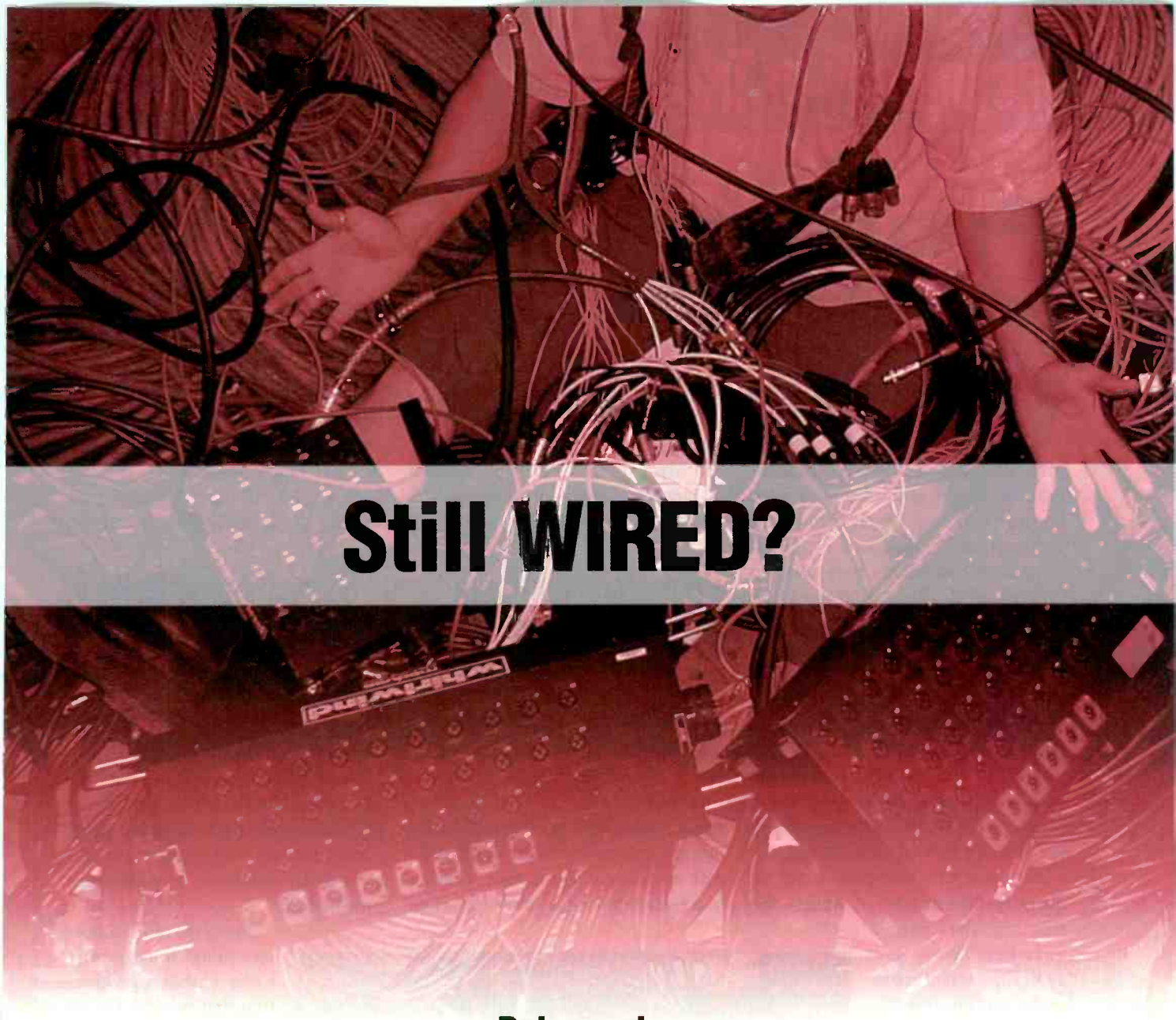
As material is being ingested into the video servers, the information is simultaneously sent to the shared storage system so the station's editors are able to access it while it is still being recorded. News editors on the network can share more than 100 hours of DV25 format footage using this system, or more than 50 hours of DV50 format, but this could be expanded to as much as 650 hours. Footage can be dragged and dropped from the Unity into the NewsCutter via the Unity MediaManager asset management system. Editing is conducted directly within the storage system, reducing the transfer of bandwidth-intensive, high-resolution files across the facility's network.

KMEX-TV ugraded its newsroom system with integrated Avid news systems in order to streamline news production and maintain its competitive edge. Photo by Alexander Sibaja/UET.

Introducing four new Newscutter Effects nonlinear editing workstations within the iNEWS environment is a natural evolution. Journalists benefit from the ability to edit words with pictures and maintain tight association with their projects using the NRCS. In time-sensitive situations, editors can begin editing the script before they've received voice-over tracks. NewsCutter Effects, with its bank of real-time effects, allows finishing of high-resolution material to keep on-air and production quality high.

The addition of the automation system to the newsroom infrastructure allows for control of up to 32 on-air playback devices, such as character generators, video servers, still store devices and robotic tape systems from a single workstation. An added benefit is that any changes made to the rundown on either the NRCS or the control system are instantly synchronized, even while the show is on the air, allowing news staff to create a more timely and accurate newscast. The Avid systems work together to enable the KMEX-TV news production team to deliver an entire newscast – from video ingest to air playout – from within a single, integrated environment. BE

Lorenzo Della Montaña is an industry consultant based on the West Coast.



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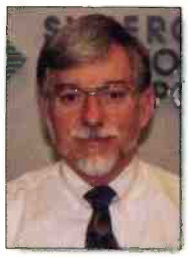
Production switchers

BY JOHN LUFF



When the production staff in a station is asked what they are most interested in, it is likely to be audio consoles and production switchers, for these two tools largely define their ability to excel in their jobs.

Production switchers have changed dramatically in the last 30 years, but strangely (or not so strangely, perhaps) much of the functionality is quite similar. The techniques for achieving functionality are quite different, however. Today, digital switchers predominate in our business. This article will refer to digital switchers without excluding the small number of analog production switchers still in the product lines of manufacturers.

The most obvious parameter to quantify is the number of inputs – the size of the panel. Switchers today are available with from eight to 80 inputs. Small switchers, often with integral digital effects and surprisingly large feature sets, can be purchased for modest amounts of money. A small ENG/EFP production truck might be equipped with such a switcher. They offer memory systems, canned effects, excellent keying, and even remote control by editors and other external devices via GPI/O contact closures and RS-422 control circuits. These small switchers can support two channels of digital effects, and often offer both analog and digital interfaces. They usually offer a single mix-effects system, though 1.5M/E switchers in this range are common.

In larger systems, clearly the number of inputs is likely to grow beyond 16, most often in blocks of 16 inputs. On many systems today the output choices are configurable, due to an internal structure that effectively utilizes an internal routing switcher. This allows any output connection to be configured with any output signal, thus allowing multiple outputs of any format needed without requiring an external distribution amplifier. This can be quite an effective technique for creating a system.

Other new features are also important. Some manufacturers offer aspect ratio conversion on all signals. This permits simultaneous production in both 4:3 (1.33:1) and 16:9 (1.78:1), assuming the internal structure allows an M/E to be effectively split into two separate paths, one in each aspect ratio. This setup provides important protection for future upgrade paths – for simultaneous production and an orderly switchover to widescreen production.

Production switchers have changed dramatically in the last 30 years, but . . . much of the functionality is quite similar.

The WRC production control room in Washington, DC, is built around a Grass Valley 4000 switcher, which allows up to 64 inputs for video and/or keying. Photo by Felix A. Peña, director of mechanical and computer services for CEI.

One of the most important things to remember today is that a production that might have required three M/Es in an analog switcher could very well be produced in a 2M/E digital switcher. Digital switchers generally have more keyers, and offer an "anything into anything" re-entry approach. This allows you to reconfigure the flow of a production easily, without being tied to a top-to-bottom flow in the architecture.

Finally, this year we have seen the introduction of fully featured digital production switchers that can support either high definition or standard definition on a

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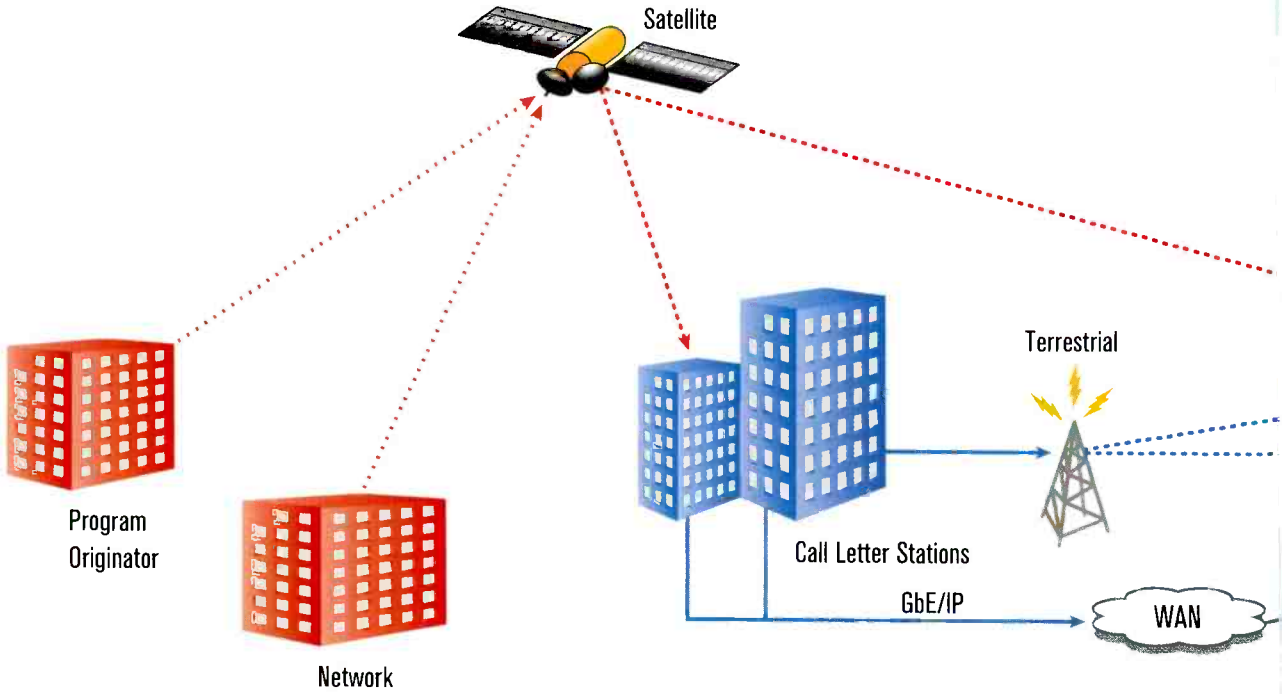

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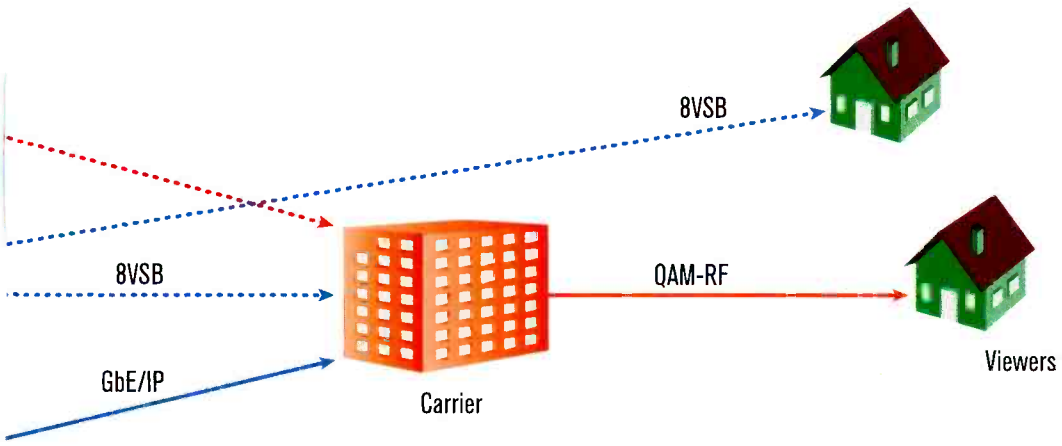

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switchable basis. As with aspect ratio issues, it is clearly valuable to many stations and production studios to have hardware that can adapt to a 525 shoot today and a 1080 shoot tomorrow. (Or 720p, and don't forget frame rates!) This allows a major capital investment without the fear of obsolescence. But what about simultaneous HD and SD production? Today that is possible in two ways. One is easy to envision. Simply use one panel to control two frames of electronics, one in HD and one in SD. If the production is well planned and the sources (all the sources) exist in both formats, this may yield superior native production in both formats.

A second approach is to do two versions of the production in HD, with graphics framed and composed for both aspect ratios and mixed in a single switcher using a second path through each M/E. This essentially requires that each M/E operate as two M/Es and output two distinctly different outputs – a 4:3 copy to be center cut for release and downconversion to SD, and a 16:9 version to be used in native form for the HDTV broadcast. In this case the SD broadcast is produced from the HD sources, and all of the HD broadcast is downconverted in a single operation. A benefit of this method is that SD pictures created from what might be viewed as oversampled images produce superior SD content with no practical compromises. If downconversion were not a well-known and high-quality process this might be problematical. However, the operational simplicity of having one set of electronics and one set of inputs involved in the broadcast is well worth looking into carefully. Several HD mobile units capable of operating in each of these two basic approaches are now on the road, and have been used for high-profile broadcasts quite successfully. **BE**

It is clearly valuable . . . to have hardware that can adapt to a 525 shoot today and a 1080 shoot tomorrow.

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

Send questions and comments to:
john_luff@primediabusiness.com

NEWS AUTOMATION SYSTEM

ParkerVision PVTV NEWS systems: Enable as few as one or two people to control a number of news production functions, including camera operation, graphics insertion, special effects, video server or tape machine operation, audio control and chroma keying; system is event-driven rather than time-driven to give the director control of the pace of the show; systems contain late-breaking news hotkeys to enable directors to manage last-minute events.

904-737-1367; www.PVTV.com

DIGITAL AD INSERTION SERVER

Sencore TSS3030: Offers up to 64 simultaneous channels, advanced Transport Stream processing functions and robust architecture for guaranteed on-air time; material can be stored under a variety of MPEG-2 formats and channels can be configured individually with bit rates from 3- to 100Mb/s to obtain the most effective bandwidth usage for each application; the TSS3030 is a combination of MPEG, DVB and ATSC interfaces, off-the-shelf computer components, and optimized, proprietary software.

800-SENCORE; www.sencore.com

RECORDER/SERVER

360 Systems' Image Server 2000: Able to play three independent video programs at once, each with four digital audio channels; a video input is also provided, and recordings may be made while two video programs are playing; supports most MPEG-2 broadcast standards for NTSC and PAL, and can operate in Main or 4:2:2 Profile; employs a pair of Gigabit Ethernet ports for high-speed transfer of program material at low cost.

818-991-0360; www.360systems.com

LENSES

Band Pro Film/Video Zeiss DigiPrime: Two new additions to the series (28mm and 70mm); optimized for HD and SD cameras equipped with 2/3-inch imagers; the 28mm offers a focal length that covers the field of view between the 20mm and 40mm DigiPrimes; the 70mm CF DigiPrime combines the two benefits of a longer focal length lens with close focusing capability; they both feature the convenience of 95mm front diameters.

818-841-9655; www.digiprimes.com

VIDEO SERVER

360 Systems' Image Server 7000: Can play up to six video programs at once, plus 24 audio channels; two independent video input channels are also available; the server has internal drives providing up to 2.5TB of storage, or 300 hours of broadcast-quality video; the drive's RAID configuration protects program material from loss, and hot-swap disks permit rapid drive placement; supports most MPEG-2 broadcast standards for NTSC and PAL, and can operate in Main or 4:2:2 Profile.

818-991-0360; www.360systems.com

MEDIA ASSET MANAGEMENT SYSTEM

Blue Order Media Workbench: Web-based system developed specifically for single-site or distributed workgroup-level applications; manages, processes and presents metadata and essence; format-independent and can handle most commonly used media and document types; the system holds selected assets (video, audio and stills) in electronic form, and makes them accessible to interested and trusted parties.

818-224-3930; www.blueorder.com

SERVER

Leitch VRnet: Transmission product that adds high definition to the list of available formats stored and managed in the VRnet server platform; the new server is designed to operate at the MPEG-2 Main Profile at high level to ensure the highest video quality, including a high-performance ASI module with transport stream processing and multiplexing capabilities; enables a mix of HD and SD programming; two new modules for the VRnet have also been introduced: the VRTX222 and VRIMX222 bi-directional codecs.

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New Products

SCAN CONVERTER

Magni MCP-601: First in a new line called MagniCoder Premier; the MCP-601 can seamlessly integrate digital DVI and XGA content with an SDI 601 or analog signal; this 1RU product offers several keying and effects capabilities that are typically available on more expensive devices; designed to convert the emerging, high-resolution computer DVI/XGA standard content, allowing it to be overlaid in real time onto an incoming SDI 601 or analog signal.

503-615-1900; www.magnisystems.com

VIDEO EDITING SOLUTION

Canopus DVRaptor RT2 and DVRaptor RT2 Power Tools: Combines Canopus' DV codec along with real-time DV and analog out in Adobe Premiere; cost-effective, professional-quality DV capture, editing and DVD authoring solution; fully scalable; includes ExEdit nonlinear editing software; DVRaptor RT2 Power Tools bring the latest in Canopus effects technology to Adobe Premiere; delivers six video filters and eight 3DRT transitions, including the new 3-D picture-in-picture transition.

408-954-4500; www.canopus.com

MASTER CONTROL SOLUTION

Doyle Technology: Multichannel solution designed to address requirements for the management of ATSC datastreams; presents a solution that bridges the gap between traditional broadcast business and operations and new models of generating revenue in the DTV environment; combines Doyle's system integration with technology innovations from NVision and Sundance Digital.

425-687-1007; www.doyletech.com

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Camplex CP-601: Remote control camera system delivers component or composite camera video signals; program audio; intercom; genlock or full-bandwidth return video; Aux video or IFB; interfaces with a variety of professional industrial cameras and utilizes a single coaxial cable (or triaxial if the user prefers) to deliver all signals and camera power; features a two-channel "stand-alone" intercom system.

620-342-7743; www.camplex.com

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Snell & Wilcox SwitchPack: Three SD and two HD compact switchers designed for live broadcast and post-production environments where space is at a premium; comprises a 1U SD mainframe and/or a 1U HD mainframe and a common control panel; the SwitchPack 16 features 16 inputs and five keyers, all of which are directly accessed from the control panel.

212-481-1830; www.snellwilcox.com

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+61 3 9682 4770; www.blackmagic-design.com

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Tandberg Television E5740 DSNG: High-performance, versatile and compact DSNG system; combines low bit-rate encoding performance previously only available in high-end system encoders with a versatile QPSK modulator (upgradeable to 8PSK and 16QAM) in a compact solution; range of features and options available; also offers a version with an L-Band output that includes support for mixing in a communications channel at L-Band.

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866-695-4569; www.bird-technologies.com

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650-855-0400; www.euphonix.com

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Leitch shared storage technology: Storage architecture built on modular servers like the VR445 shown above provides integration of ingestion, packaging and transmission functions; scalable VR-445 servers act as Fibre Channel hosts for storage array modules, each holding up to 60 hours of MPEG-compliant video and audio; servers support multiple compression formats to facility system upgrades; MOS protocol enables browse viewing and rundown playback.

516-594-3372; www.leitch.com

SOFTWARE

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800-869-3504; www.discreet.com

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408-260-1000; www.snellwilcox.com

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Managing the difficult

BY PAUL MCGOLDRICK

Anybody who has been a manager for any length of time has had a "difficult" employee. Fortunately in my career I can say that just about every such difficult person is somebody that I inherited from a previous regime. There was a lady, for example, who always seemed to be up to something – other than work. One time she was slyly watching the soaps on a TV hidden under her desk; another time she was taking orders on the telephone for her part-time janitorial supply business. She was always hiding something. It was like dealing with a child who thinks that its parents are blind and stupid.

I've even had employees who have responded to "Why do you think you are still working here?" with "Because you like me?" Or the employee I suspended after we found he had placed unauthorized advertising: Before he left the building we had a conversation to make sure there was "nothing else" out there. He said there wasn't – and then 20 minutes later, a dealer called to find out why he was supposed to keep quiet about some co-op advertising. The suspension turned into a termination.

I believe that quite a few difficult employees have just learned a behavior that helps them survive. It is a bit like the way most of us behaved when we were bullied on the school playground. You do something that makes you less vulnerable – less visible. We don't want to resolve the problem, we want it to go away. Or we go away.

Many managers allow these people to actually kidnap the work environment. But the first time you give in to what is often an unreasonable demand, you are hooked for the next time. As the advice columnists preach, "You allow yourself to be taken advantage of." When the employee's behavior was allowed by the previous manager it is very difficult to turn it around because the employee expects things to continue as they were. Seeing grown adults pout does not create a very happy workplace. But, at the same time, it is a great deal more profitable to be able to retain an employee than go through the costs of replacement and training.

My father was a born manager. He coaxed every positive thing possible out of his public sector employees, and they loved him for it. He pioneered the fight against dress codes that included hats for men. He persuaded very senior government employees to force disabled access in the workplace decades before it became a cause celebré. And one thing that he told me was that you have to visit your staff every day that you can. That paid handsomely for me and I adopted it 100 percent after I watched one of my own managers do exactly the same.

He would visit the labs and greet everybody by name and talk, on occasion, about the employee's family, dogs, whatever. He never criticized anything that he saw wrong, but as soon as he was back in his office on the top floor my telephone would ring. "Jones is leaving scope probes on the floor – they're expensive" or "Smith seemed to be on the telephone yet again when I went through." He followed chain-of-command rules to the letter.

What's really important when dealing with unacceptable behavior is to go for the act, not the person. Go after behavior that you personally know about – not after rumors that have come to you from elsewhere. Have any discussion either alone or, if a chaperone is required or desirable, with a nonconfrontational member of the HR department. Time things right, keep eye contact, keep calm. Most of the time when you can keep the conversation to one about "us" as opposed to "them" things will get better. If a manager allows higher management to be perceived as the problem, then the behavior will never change.

What's really important when dealing with unacceptable behavior is to go for the act, not the person.

We often know little about our employees' home life (and should be dissuaded from asking by the amount of litigation in the world out there today), and if the problem is there, then little can usually be done about the workplace behavior.

The types of problem people I have seen include: the jealous, the meddler, the "perhaps" person, the friendly-to-your-face person, the perfectionist, the bully, the avoider, the never-can-do person, and the complainer.

Have I really seen all these? You bet. Have you had other experiences you'd like to share with fellow readers? **BE**

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

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

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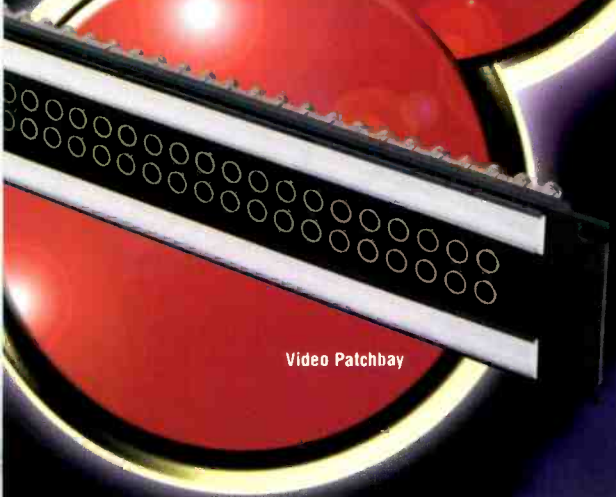

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