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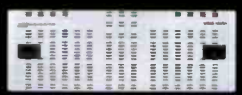

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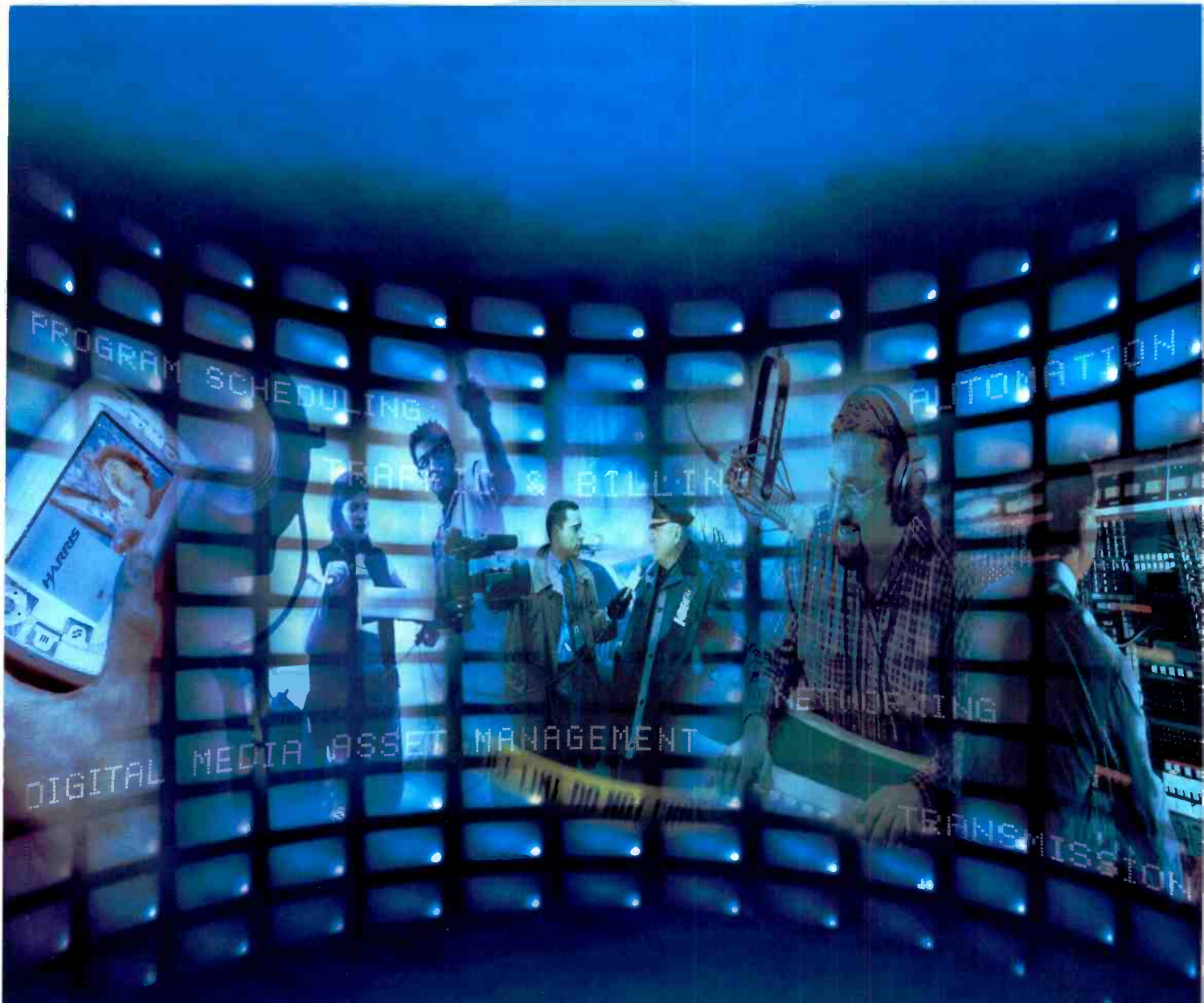

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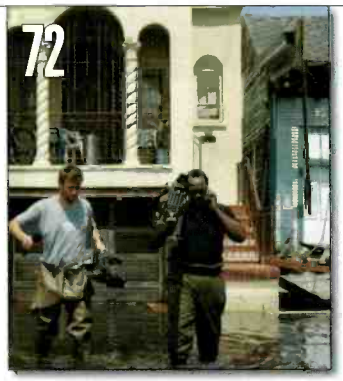
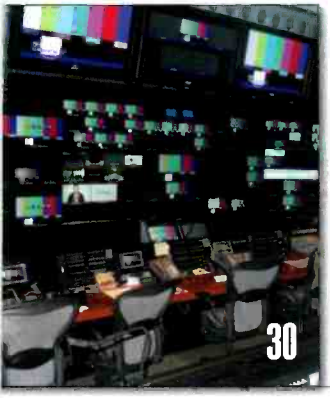


ON THE COVER:

CNN cameraman Scott McWhinnie (left) and correspondent Jeff Koinange (right) in the still flooded streets of New Orleans nearly two weeks after Hurricane Katrina struck. Photo courtesy Radhika Chalasani, Getty Images for CNN.



BEYOND THE HEADLINES

DIGITAL HANDBOOK

(Continued on page 8)

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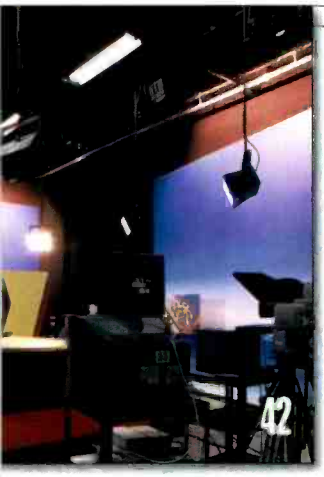

New Products & Reviews

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Freezeframe

You've heard of recommendation H.264 with regard to MPEG-4. What does recommendation H.262 compare to?

Readers submitting winning entries will be entered into a drawing for *Broadcast Engineering* T-shirts. Enter by e-mail. Title your entry "Freezeframe-December" in the subject field and send it to: editor@primediabusiness.com.

Correct answers received by Feb. 1, 2006, are eligible to win.

Question courtesy Tektronix 2005 Desktop calendar

August Freezeframe

Q. Find the error in the block diagram of a representative VSB terrestrial broadcast transmitter.

A. The Reed-Solomon encoder and Trellis encoder blocks have been swapped between each other. The Reed-Solomon Encoder should be before the Trellis encoder in a correct block diagram of a VSB transmitter.

Winners:

Bill Miller
Gregory Chambers
Chuck Condie
Tim Costley
William C. Miller

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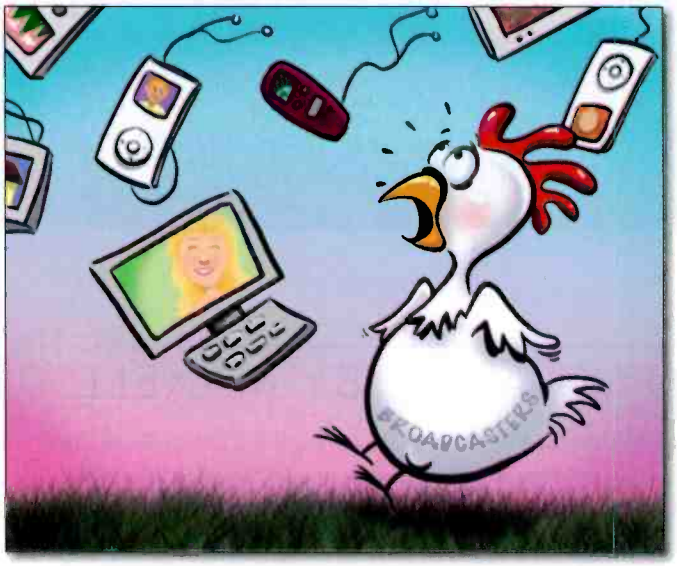
The sky is falling

On Nov. 4, Disney released its animated movie "Chicken Little." You recall the original story: Chicken Little is walking through the woods, oblivious to the world, when she is suddenly hit on the head with an acorn. She immediately believes the sky is falling. Well, in late October, Walt's broadcast division dropped a couple of programming acorns on the heads of its TV affiliates.



ABC announced that it would provide commercial-free versions of "Desperate Housewives," "Lost" and "Night Stalker" for download and play on the Apple iPod for $1.99. The shows are available to viewers the day after they air on prime-time TV.

You could almost hear the collective gasp from station managers. And if that wasn't enough to cause ABC affiliates to duck and run, The Disney Channel also announced that installments of "That's So Raven" and "The Suite Life of Zack & Cody" would also be available for download at the same price.

CBS was right behind with the announcement that it would join forces with the dark side (also known as Comcast Cable) to make "Law & Order: Special Victims Unit," "NCIS" and "CSI" available for replay mere hours after the premier broadcasts to Comcast customers on a VOD basis. The cost? Just 99 cents a show.

Not to be left out, NBC announced it would provide selected programs commercial-free through a new DirecTV service called DVR Plus. Again, the shows will be available for 99 cents just hours after they first air in prime time.

All this has caused many network affiliate managers to run around like our friend Chicken Little, crying, "The sky is falling! The sky is falling!" But this shouldn't come as a surprise to station management. The networks have hinted for years that they'd like to get rid of affiliates as soon as they find a way to reach the same eyeballs. All these new delivery schemes are merely a toe-in-the-water experiment for networks.

Comcast is looking skyward too. The cable giant is scrambling to build super headends, connecting 45 key cities over 19,000mi of fiber. The cost? A cool $100 million. Once the cable company adds what we broadcasters like to call centralcast features, it will have virtually unlimited ability to store and forward video around the country for VOD and portable applications.

But cable had better watch her head, too. As the telcos begin serving up IPTV with high-speed Internet, telephone and VOD, cable is no longer the only game on dry land.

There's a chink in cable companies' and telcos' armor though. Until these relative newcomers can create content, they'll literally have nothing but reruns.

While broadcasters shouldn't panic, it is no time to be complacent either. Broadcasters should immediately begin building archives of what broadcasters do best: local programming. Stations should leverage that exclusive content into every delivery channel possible.

Broadcasters who fail to seek and seize new opportunities could suffer the same fate as our friend Chicken Little. Don't forget: She was willingly lead to Foxy Loxy's den and never heard from again. BE

Brad Dick

editorial director

HDV to HD-SDI made simple

Miranda's award-winning **HD-Bridge DEC** offers high quality HDV to HD-SDI interfacing. With integral 1080i/720p cross conversion, it can really simplify signal processing when you're working across multiple HD formats. It's ideal for lossless HD-SDI editing of HDV files, with rapid batch capture using RS422 VTR control. HDV editing workflow is also improved with its Graticule markers and multiple monitoring outputs, including analog HD, digital/analog audio, and time code. And naturally, HD-Bridge DEC is also perfect for on-air playout of HDV using an HD-SDI infrastructure. So for smarter HDV interfacing, contact Miranda.

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HDTV: MAKING IT HAPPEN

Camera resolution

Dear editor:

For years, all camera manufacturers quoted horizontal lines of resolution in their specs. It was through this measurement that you had a ballpark idea of the resolution of a broadcast camera.

By reading the horizontal lines of resolution, you could tell if a camera had great resolution or not. The finer the lines and the closer the lines were together, the greater the resolution. When the lines became fuzzy or blurred together, that was the horizontal resolving limit of the camera.

Now none of the manufacturers list horizontal lines of resolution in their spec sheets. Therefore, an old guy like me can't tell which camera has the best resolution.

How do you discern the resolving power of new video cameras?

JIM MITCHELL

Response from Larry Thorpe, national marketing executive, Canon Broadcast & Communications Division:

The perceived picture sharpness performance of an HD lens-camera imaging system entails a complex assimilation of the total spatial resolution portrayed on the HD display. Television camera specifications do not do justice to the realities of their picture sharpness capabilities.

Historically, camera manufacturers quoted horizontal lines of resolution as the prime measurement of the performance of their cameras. These numbers referred to the limiting resolution or the horizontal resolving power of the lens-camera system. It was an attempt to simplify a complex performance assessment to a singular number. Regrettably, this became an industry yardstick — a competitive horsepower number (in that bigger was allegedly better).

This has always been a flawed approach to the assessment of a lens-camera's true performance with respect to picture sharpness. The horizontal limiting resolution specification has no bearing on what actually stimulates the television viewer.

Fortunately, today's camera spec sheets do quote an additional horizontal number — usually called modulation depth — in their spec sheets. This is a more important number than the limiting resolution specification. The significance of this percentage number is that it provides a spot reading of the modulation transfer function (MTF) of the HD lens-camera system at one specific spatial frequency.

MTF is a plot of the contrast behavior of image detail of increasing spatial frequency, and it directly relates to perceived picture sharpness. The shape of the plotted MTF curve across the frequency band of the system is what realistically describes the performance of a given lens-camera system (perceived picture sharpness being a function of the square of the area under that curve). The overall MTF information is the only true assessment of the practical resolution performance.

For a contemporary 1080-line HD camera, a typical spec might read: "Depth of modulation: 45 percent or more horizontally (at 800 TV lines at picture center, or 27.5MHz, with typical lens)." Given that the 30MHz bandwidth (defined by a prescribed digital filter) of the 1080-line HD standard is equivalent to 872 TVL/ph, the quoted specification is telling us that the MTF curve near the extremity of the system bandwidth (at a spatial frequency of 800 TVL/ph — equivalent to 27.5MHz in the electronic frequency domain) is reproducing 45 percent of the contrast at low frequencies. Thus, it is a useful indicator of how well the horizontal MTF is holding up across the useful HD band. But, it by no means tells the full story. In comparing lens-camera

systems, there is no substitute for actually measuring the depth of modulation at 200, 400, 600 and 800 TVL/ph and evaluating the MTF profile.

In addition, the above specification is confined to the picture center because the camera manufacturer understandably does not wish to engage in specifying the resolution behavior of the associated HD lens. Unlike the camera, all HD lenses have a variable resolution from picture center to extremities, which is compounded by further alterations over the focal range, with object distance from the lens and with aperture setting. No lens manufacturer publishes such specifications. Given the expense of HD lenses, it is recommended that they be carefully evaluated at different settings of the zoom and the iris.

Curiously, no manufacturers presently specify the vertical resolution for their HDTV cameras, though they continue to quote a limiting vertical resolution number for their respective SDTV cameras. BE

Test Your Knowledge!

See the Freezeframe question of the month on page 8 and enter to win a *Broadcast Engineering* T-shirt.

Send answers to bdick@primediabusiness.com

An IT Bill of Rights.

A Guide for Broadcasters To No-Compromise, File-based Server/Storage Systems

As the acceptance accelerates for IT-based technologies such as video servers, nonlinear editing systems, centralized storage, and more, broadcasters and video professionals must have options that give them the confidence to commit to moving wholesale to approaches that avoid many obstacles that today block their ability to truly improve their workflows.

Certain, Inalienable Rights.
As a leading provider of premium-quality content, you have certain, inalienable RIGHTS to a server and storage approach that lets you improve quality, reduce costs, increase flexibility, enhance workflows, and deliver better technologies to improve your overall business.

Taken together, these rights enable you to incorporate the latest enterprise server and storage technologies for a powerful yet simple, cost-effective solution that integrates easily into high-performance, networked IP environments—without compromising quality and other issues key to broadcasters and production professionals.

An IT Bill of Rights

1. The right to low-entry pricing and high performance—that remains low for large systems.
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Robbing
Peter to pay Paul

BY CRAIG BIRKMAIER

For the past few months, this column has explored the changing landscape of digital television — a landscape that seems to be changing before our very eyes at an accelerating speed.

Next month, we will try to sort out what is happening in Washington with respect to a hard date for the transition from analog NTSC to digital ATSC. Congress is currently trying to iron out the differences between bills passed in the House and Senate to bring NTSC broadcasts to an end in March 2009, immediately after the conclusion of March Madness (the men's NCAA Basketball Tournament).

This would not be the first hard date that broadcasters have been threatened with. The question is whether it will be any more real than the other deadlines set by the FCC and Congress, which were then rendered meaningless by subsequent legislation.

At the same time, Congress is talking about receiver subsidies for viewers still reliant on NTSC broadcasts for their TV fix (the roughly 15 percent of U.S households that watch TV without the aid of cable or satellite). And the NAB is working with several vendors to develop a reference platform for low-cost set-top boxes that would deliver DTV content to generations of legacy NTSC displays. Wrapped up in all of this is the political wrangling about multicast must carry, which some broadcasters view as a way to generate new revenue streams from their investments in the DTV transition.

Wrapped up in all of this is the political wrangling about multicast must carry, which some broadcasters view as a way to generate new revenue streams.

Why HDTV?

Just to refresh your memory, let's look back — nearly two decades — and remember why broadcasters went to the FCC in 1987 and asked the commission for additional spectrum to deliver what was then perceived as an important new capability — HDTV. The stated purpose was to allow the over-the-air broadcast service to remain competitive in the face of increasing competition from multichannel subscriptions services. But the real reason was to stall a move by the land mobile telephone industry to share the spectrum used by television broadcasters.

At the time, it was believed that it would take two 6MHz channels to deliver HDTV. So broadcasters asked the FCC to consider giving them the extra spectrum to develop a service that would augment the existing NTSC broadcasts to produce an HDTV-quality viewing experience.

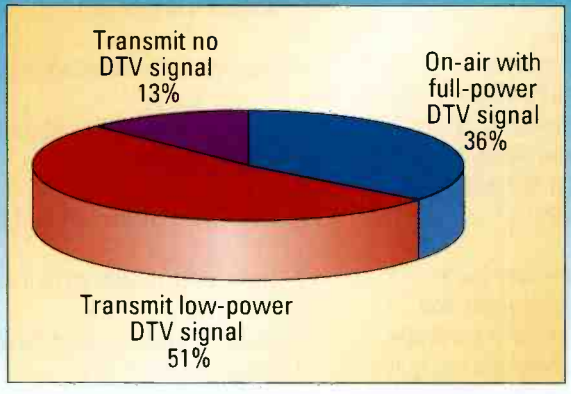
The plan worked initially, but it backfired when General Instruments demonstrated the ability to deliver HDTV in a single 6MHz channel using the same digital compression technology that the company was developing to enable the direct broadcast satellite industry to compete with cable. By 1991, the FCC changed the game, telling broadcasters that they would be loaned a second channel for digital HDTV broadcasts. Then, at the end of the DTV transition, the analog NTSC channels would be recovered.

For the next four years, the focus

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

Commercial DTV broadcast stations

Only 36 percent are on-air with full-power DTV signals



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(selected Phillies, Orioles, and Sixers games)

NBA TV
(NBA, WNBA, and original programming)

WGN Chicago
(Cubs, Sox, Bulls home games)

YES Network
(Yankees games)

was on developing a new digital broadcast service that would deliver a single HDTV channel to replace the single NTSC channel assigned to broadcasters. Multicasting was off the table, as it was perceived in Congress as an expansion of the broadcast franchise.

But at the last moment in 1995, when it was clear that Congress would authorize the transition plan, the ability to deliver multiple channels of standard-definition television was added to the ATSC standard. And when the FCC established the rules for this service, it added a provision allowing broadcasters to offer paid services alongside the one required channel that must be delivered in the free and clear. The price to play is just 5 percent of the revenues generated by these new services.

Broadcasters began to look at the DTV transition in a different light. Perhaps there was an opportunity here to generate new revenue streams via their DTV broadcasts.

The cost of prime time

What is a set of eyeballs worth? According to executives at CBS, the network generates an average of 36 cents in revenue for each viewer who watches its prime-time programming. This money covers the cost to the network for the content, operating costs and profits.

What is a set of eyeballs worth? [CBS] generates an average of 36 cents in revenue for each viewer who watches its prime-time programming.

Local broadcasters generate additional revenues from the ads they insert into prime-time programming — an additional revenue stream that the networks would love to control. Current ownership caps prevent the networks from owning sufficient stations to reach more than 40 percent of U.S. homes. It now appears that the networks have found the bypass technology they have been looking for and, with it, the ability to generate more revenue from the programming they control.

Last month, this column explored the realities of hardware and software video encoding and how operational

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Introducing the world's highest quality video card with amazing Dual Link HDTV 4:4:4 SDI for 10/12 bit RGB workflow. DeckLink HD Pro instantly switches between HD and standard definition. Now you can afford the best quality HDTV card available, even if most of your work is in standard definition. DeckLink HD Pro does both!

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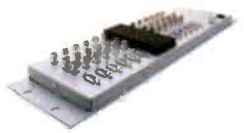

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HDLink

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RRP $695

DeckLink HD

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DeckLink Extreme

This amazing video card features 10 and 8 bit SD-SDI, HD-SDI down conversion, analog composite and component I/O, balanced analog audio I/O, DV, JPEG, internal keyer, genlock and so much more. Now available with PCI-Express.

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Blackmagicdesign

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constraints can influence the delivered quality of broadcast content. That column also noted the ability for consumers to download video content and consume it via portable media players (PVRs).

Even before that column was published, Apple announced that it had sold 1 million music videos and TV shows from ABC during the first 20 days after the service was launched. The networks took notice.

CBS and NBC both jumped on the download bandwagon, announcing deals, with Comcast and DirecTV respectively, to make some of their prime-time shows available for viewing via VOD services immediately after the networks broadcast the shows.

Comcast will allow viewers to watch CBS shows (with commercials that cannot be skipped) for 99 cents. DirecTV will push some NBC shows to DirecTV receivers with integrated PVRs so they can be viewed without commercials for 99 cents.

The networks all contend that these services will expand the audience for their shows rather than cannibalizing the over-the-air audience. But network affiliates are not convinced. Many see this as another way for the networks to generate new revenue streams at the affiliates' expense. And some are asking why they cannot offer download services too.

The real-time dilemma

The problems DTV broadcasters face in generating new revenue streams (such as bandwidth constraints) are not difficult to understand, but they may be difficult to overcome.

Multicasts come with their own set of problems. The 19.3Mb/s payload that can be delivered via an ATSC channel is barely adequate to deliver one high-quality HDTV program using MPEG-2 compression. As more prime-time programming is being produced and delivered using HD formats, less room is left for multicasts.

In Las Vegas — one of the markets where USDTV offers a 20-channel broadcast subscription service — some viewers are complaining about the quality of the free-to-air DTV broadcasts. If a station gives 6Mb/s to USDTV, it only has 13.3Mb/s left for itself.

The problems DTV broadcasters face in generating new revenue streams are not difficult to understand, but they may be difficult to overcome.

Likewise, if stations get into the multicast business, something has to give. And that something is likely to be the quality of the programs that are delivered.

Broadcast competitors are beginning their own transition to such next-generation video compression technologies as H.264, which can deliver the same level of quality with about half the bits now required.

In November, DirecTV began delivering local HD broadcasts in four markets, with plans to serve 36 markets by early 2006. New set-top boxes that can decode both MPEG-2 and H.264 are required to receive these channels. And, as was the case with first-generation set-top boxes, the cost is being subsidized by subscriber fees.

Broadcasters currently have no way to collect subscriber fees, and their platform is constrained to the use of MPEG-2 compression. Only a small percentage of U.S. homes have ATSC-capable receivers. But Congress and the NAB are hoping to deploy millions of receivers over the next few years in anticipation of the 2009 shutdown of NTSC services.

These boxes will be bare bones, converting HD broadcast to NTSC. They will not support H.264. They will not have integrated PVRs. In short, the ability of broadcasters to compete will be constrained.

There is an alternative, though it is not clear that the broadcast networks will let their affiliates compete in the paid video download business. There is a huge amount of capacity during the overnight hours to download content to PVR-equipped receivers.

Collecting the fees for this content is a bit more complex, but can be managed with a number of technologies, including networked transactions and smart cards — the same smart cards used in DBS system (and now in cable-ready DTV receivers).

Unfortunately, it now appears that the networks are robbing Peter (their affiliates) to pay Paul (themselves). BE

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

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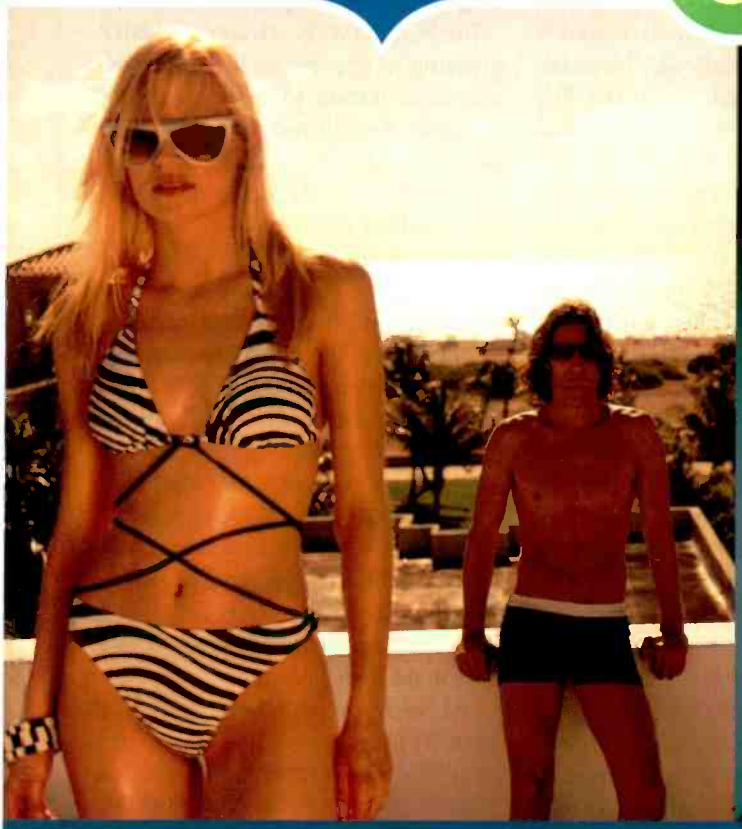

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BEYOND THE HEADLINES

FCC active on the DTV front

BY HARRY C. MARTIN

While much attention has been paid in recent weeks to Congressional efforts to set a firm date for the DTV transition, the FCC has been busy with its own initiatives aimed at keeping the DTV clock moving.

Channel election deadlines

The commission released the results from the first round of channel elections and set Oct. 31, 2005, as the deadline for the second-round elections. (The second-round deadline was extended from Oct. 24 to Oct. 31 at the request of the AFCCE to accommodate some last-minute channel accommodations.) Licensees who did not participate in the first round — either because they lacked an in-core channel or because their proposed channel caused impermissible interference with other channel elections — were required to make a selection by Oct. 31 or wait for the third round of elections, which is expected to take place in early 2006.

LPTV, TV translator filings

The commission released a public notice that allows LPTV and TV translator licensees to immediately file applications to convert their in-core analog facilities to digital facilities. Class A LPTV licensees have filed such applications for some time.

For these three groups, there is obviously a downside to digital-only operation. In filing an application to convert to digital operations on its current channel, they will give up their right to file for a companion channel in the future.

The FCC previously adopted rules that will permit LPTV, TV translator and Class A stations to select an available digital channel to operate in conjunction with their analog facility once the DTV channel election process is almost completed. A filing window for companion channels might be opened in early 2006.

For this reason and because the DTV hard conversion date is still three years off, only a handful of licensees have converted. But filing now will result in the issuance of a construction permit, perhaps at a new site that will be good for three years. Such a permit, even if it is not immediately implemented, would lock in the station's right to a digital in-core channel.

Digital-only request

The FCC recently released an order granting a request by a full-power television station to cease operating its analog facility and to operate only as a digital station on its digital channel. A television station in Riverdale, NY, received two out-of-core channels. It sought authorization to turn off its analog facility and agreed to broadcast only in the digital mode.

While it was the only television station licensed to Riverdale, the commission reasoned that any adverse impact on the viewing public would be minimal because the area had more than 92 percent cable penetration. Moreover, the licensee agreed to provide cable systems the equipment necessary to downconvert the digital signal to analog for carriage of the station on their systems.

The licensee mentioned the support given by the company planning to use the 700MHz spectrum being vacated when the analog station is turned off. The commission agreed that these factors weighed in support of the request and granted authorization to terminate its analog service.

The second round of channel assignments should conclude by the end of the year. At that point, the FCC may open a window for filing of companion DTV channel requests by LPTV, TV translator and Class A licensees. This, coupled with adoption of a hard transition date in 2009, will launch us into a new DTV year in which TV licensees will need to be even more vigilant. BE

Harry C. Martin is the immediate-past president of the Federal Communications Bar Association and a member of Fletcher, Heald and Hildreth.

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

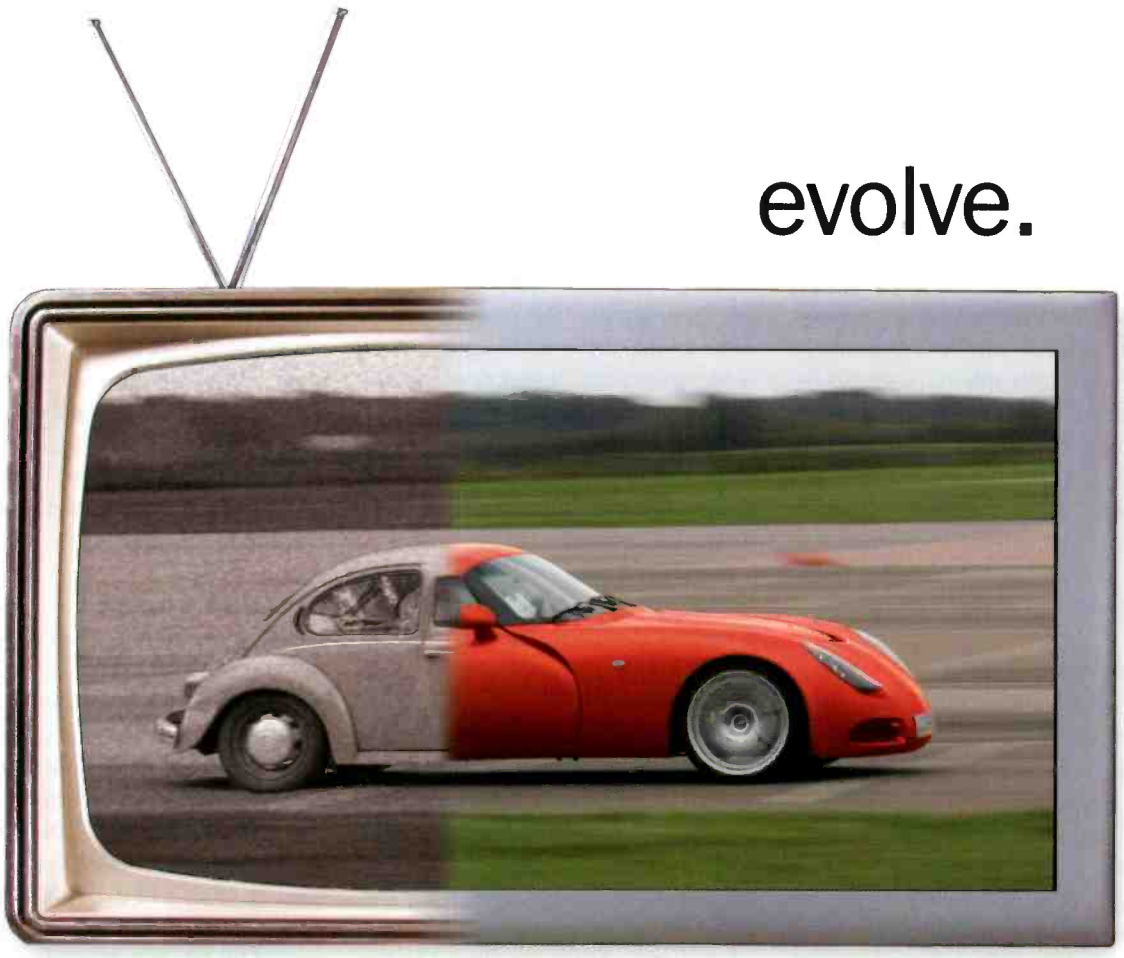
Dateline

Feb. 1, 2006, is the date by which TV, TV translator, LPTV and Class A TV stations in the following states must file their 2006 license renewal applications: Arkansas, Louisiana and Mississippi. TV stations in those states must also file biennial ownership reports and EEO program reports on Feb. 1 with their renewals.

Feb. 1 is the date that TV stations in Indiana, Kentucky and Tennessee must begin their pre-filing renewal announcements in anticipation of filing their renewals on April 1.

Feb. 1 is the deadline for TV stations in the following states to place their EEO public file reports in their public files and post them on their Web sites: Arkansas, Kansas, Louisiana, Mississippi, Nebraska, New Jersey, New York and Oklahoma.

The start date for on-air labeling of core educational and informational programming with the logo "E/I" was stated in last month's column as Sept. 19, 2006. The correct date is Sept. 19, 2005.



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Interfacing
with common carriers

BY MICHAEL ROBIN

The common carriers play an important role in the delivery of TV programs to private homes. The original analog monochrome TV transmission concept was remarkably simple: essentially, a camera and microphone, a studio-to-transmitter link (STL), and a visual and aural transmitter. The processing, distribution and transmission of analog video signals is characterized by less than ideal performance in terms of linear distortions, nonlinear distortions and noise.

The analog world

The use of less than ideal distribution equipment affects the shape of video signals. In an analog world, there is a direct relationship between the waveshape and the picture quality. The resulting picture impairments can be judged subjectively by observing the picture quality on a picture monitor.

In the early 1950s, national and international bodies developed subjective picture-quality grading criteria, resulting in minimum acceptable performance figures. Maintaining local and intercity network equipment to meet these figures resulted in satisfactory performance for carrying standard monochrome TV signals but was unsatisfactory for carrying compatible color signals. The introduction of color in the 1950s resulted, therefore, in tightening the tolerances of the performance figures and the introduction of new performance indicative parameters. These parameters quantify the chrominance-to-luminance and luminance-to-chrominance interaction.

The overall performance of a distribution system can be predicted with a certain degree of accuracy by applying a formula developed by CCIR for predicting the performance of international video signal distribution networks. Objective equipment performance measurements use standardized test waveforms tailored to contain frequency domain components best suited for measuring specific types of impairments.

Early approaches involved a television test signal generator at the origination point (MCR) and video test equipment at the destination. This required station shutoff and a long time of tests.

Later approaches involved transmission of vertical interval test signals (VITS) inserted on several blanked horizontal lines in the vertical blanking interval. This allows the performance tests to be carried out at any convenient time without requiring transmission shutoff. Recent test equipment, such as the Tektronix VM700, carries the testing automatically and generates a performance test results printout referenced to specifications.

The DS3 concept

In the transition from analog to digital systems, there were likely to exist some types of hybrid systems. Early approaches digitizing the signal distribution resulted in the introduction of the DS3 digital distribution network operating at 45Mb/s. Essentially, the NTSC composite video signal is sampled at 4Fsc, and a DPCM compression process is applied to reduce the overall bit rate to nominally 45Mb/s.

This concept made its appearance on the market before MPEG-2. In those days, it was generally agreed that the normal approach to digitization and compression would be the adoption of a subcarrier-related digital sampling strategy. The system consists of an encoder that digitizes and compresses one composite NTSC video channel and, typically, four audio channels. The inputs are NTSC analog video with typical analog video signal performance specifications and analog audio with typical analog audio performance specifications. The system also has a decoder that decompresses and converts one NTSC composite video signal and four analog audio signals to analog.

The performance specifications are typical of analog video and audio systems, and one could ignore that this is a digital compression/decompression

FRAME GRAB A look at tomorrow's technology

Global forecasts by region

By 2010, Asia will surpass North America in VOD/NVOD households

VOD/NVOD households	2005	2010
Asia Pacific	18 million	125 million
North America	63 million	113 million
Europe	39 million	98 million
Latin America	6 million	13 million
Total	**126 million**	**349 million**

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system. The DS3 concept has enjoyed an enormous success. Even today it is generally less costly to install and use than some MPEG-2 systems.

The MPEG-2 world

MPEG-2 revolutionized the broadcasting world. Using the MPEG-2 video compression system, a 270Mb/s signal can be reduced to 4Mb/s bit rate without visible picture-quality reduction. A contemporary MPEG-2 encoder is typically 1RU and accepts analog composite NTSC and 270Mb/s SDI. The typical NTSC internal (or external) manufacturer-provided decoder uses sophisticated comb filters for luminance and chrominance separation. Earlier encoders were quite bulky and used relatively inexpensive comb filters. The user may choose MPEG-2 4:2:2 or 4:2:0, between 1.5Mb/s and 50Mb/s bit rate and the I-B-P sequence.

The contemporary MPEG-2 decoder is typically 1RU, has SDI 270Mb/s and analog composite NTSC outputs. Some decoders have color-black reference inputs, which allow the NTSC output to be timed and phased to studio reference. The video performance specifications of MPEG-2 systems are analog NTSC and, without exception, no reference is made to compression/decompression-related picture impairments. The advertised data are, therefore, useless. All manufacturers ignore the fact that the picture quality changes dynamically depending on the data rate, the picture complexity and the encoding algorithm used. So, buyers have no available data expressing the picture quality in comparison to that of a number of competing systems.

A significant problem confronts the user of large systems that are made up of a concatenation of encoders/decoders (codecs). Overall system performance is unpredictable. For instance, codec A followed by codec B may not produce the same set of impairments as codec B followed by codec A. Additionally, the use of statistical multiplexing adds a time-varying aspect to the data rate available for the compressed signal, i.e., creating a time-varying quality factor as pictures have to be subjected to greater compression to fit in the allocated bit rate.

How do you handle it?

Picture quality is of concern to all people in the broadcast chain. To achieve it, the system design group must use a combination of subjective and objective approaches in specifying and selecting equipment.

Whenever possible, measure equipment performance against an industry standard using a picture quality analysis (PQA) system. System commissioning teams should specify the required picture-quality levels, and these should be followed through production and post-production and to final transmission. Using the selected equipment, an experimental system should be set up in a test lab, and its overall performance, from input of the encoder to the output of the decoder, should be measured using a PQA test system.

I have used a Tektronix PQA system, which presents the measurements results in a single numerical quantity called picture-quality rating. It also presents peak signal to noise ratio values. Several test sequences are available on a CD-ROM. Select a sequence with a lot of detail and one with a lot of movement. Stick to them for all present and future tests to ensure uniformity. Pending an agreed upon set of performance test results, generate your own and keep them for future reference. To maintain low final impairment, the highest standards have to be maintained throughout.

The problems reviewed in this article deal with SD systems. To my knowledge, there is no PQA test equipment designed specifically for HDTV. BE

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

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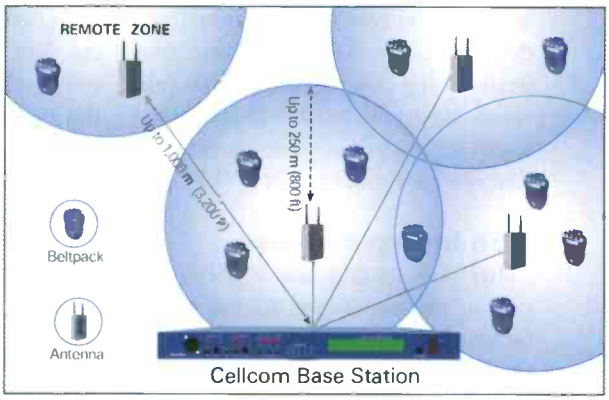

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Virtual private networks

BY BRAD GILMER

Virtual private networks (VPNs) have become a critical part of nearly every broadcast operation. Using VPNs and establishing policies for them can be an important part of your overall networking strategy.

As the name implies, a VPN allows a computer to appear to be connected to a local network, even though the computer may be hundreds or thousands of miles away. In this article, we will consider the case of a reporter hundreds of miles from the station who needs to log into the local newsroom computer to file a story. Before looking at VPNs, let's analyze an example that does not make use of a VPN.

With VPNs, network engineers have a better solution that provides a high degree of security while actually improving the end-user experience.

Web browser access

One way to give the reporter access to the newsroom system would be to allow the reporter to log in to the system using a Web browser. The reporter connects the laptop to the Internet, enters the URL of the newsroom system into a Web browser and is presented with a login dialog box. Once the reporter logs into the system, she is able to file her story as if she were sitting at a desk in the local station. While this would work just fine, there are a few critical issues with this implementation, all of which revolve around security.

Using a Web interface to connect to a newsroom system is not a problem in and of itself. The question is whether the designer of that system has taken adequate safeguards to ensure that the system is not vulnerable to an attack. By having the Web interface exposed on the Internet, hackers will try to break into the system.

Network engineers design strong security systems specifically to deter attackers from reaching critical internal systems. As Figure 1 shows, most stations employ firewalls and other devices at the Internet ingress point. These devices are specifically designed and updated to foil attackers. But all network engineers face tough challenges when implementing such systems.

On one hand, network engineers would like to protect the inside systems from attack. But they struggle with the security implications of allowing outside connections through the firewall technology they have worked so hard to create. If they have to provide remote access for other systems as well, then the network designers ultimately end up having to trust that a number of different vendors have taken adequate safeguards to be sure that their systems will not be compromised by an attacker.

The privacy of a VPN

In the past, there were few practical solutions. You built the best firewall you could, and then you exposed the absolute minimum inside equipment to the outside world. But with VPNs, network engineers have a better solution that provides a high degree of security while actually improving the end-user experience.

As mentioned earlier, the VPN creates a private network of computers, even though some or all of those computers are thousands of miles away running on different physical networks. The net effect of this is that once connected to the VPN, the reporter's laptop sitting in a hotel room acts just as if it were plugged into the newsroom network back at the station.

The communications between the laptop and the station can use encryption, making it difficult for an attacker to listen in. And because the VPN connection forces all Internet traffic destined for the laptop to pass through the corporate firewall, the laptop is protected by the same technology on the road as at home.

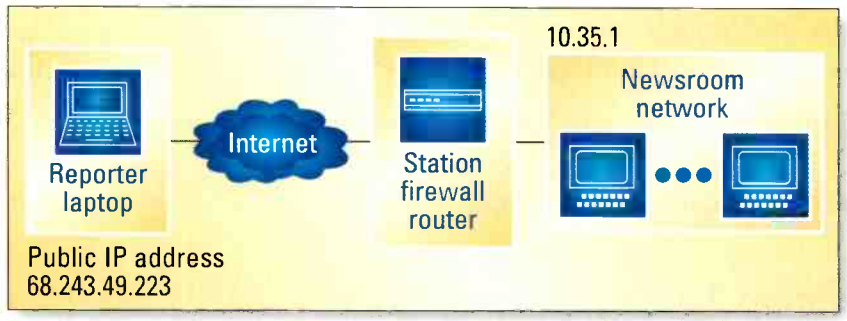

Figure 1. The station firewall can be configured to allow Web access for the newsroom network, but this is a security hazard.

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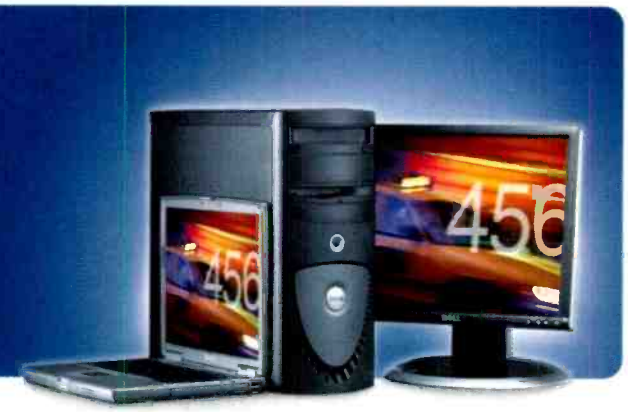

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VPN in action

Let's take a look at how this might work. In Figure 2, a station has configured its newsroom system to run on a separate network from the rest of the building, and the network design does not allow any traffic to pass from the firewall to the newsroom system. In this scenario, the newsroom system login screen is not accessible to the outside world — the firewall blocks all access.

At the start of the VPN session, the reporter's laptop is connected to the Internet. The laptop has been assigned a public IP address of 68.243.49.223 by the hotel's ISP. At this point, the reporter can access the Internet, run a Web browser and perform other functions, but the reporter cannot access the newsroom system. The firewall at the station prevents him or her from seeing the inside network on which the newsroom system is located.

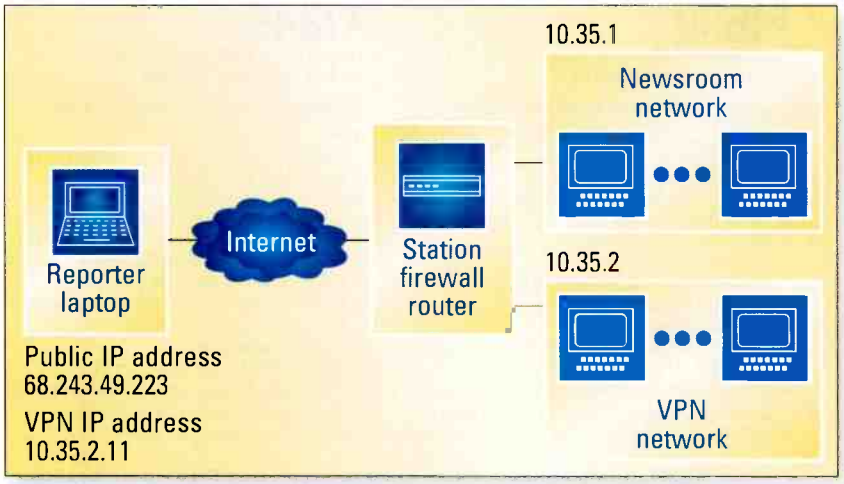

Figure 2. Once connected to the VPN, the laptop is assigned an IP address from the UPN address pool. All traffic across the Internet is encrypted.

When the reporter starts the VPN client and begins the VPN login process, several important steps occur. (Note: This is a simplified description.)

First, the VPN client verifies that the VPN-capable router is available at the station. Second, the VPN client asks the reporter to log in, preventing unauthorized access of the VPN if the laptop is stolen.

Third, the VPN client and router communicate, verifying the login data is correct and then applying any policies for the VPN link that have been established by the network engineer. Finally, the VPN client reports that it is connected to the VPN.

When the process is complete, several changes have taken place on the reporter's laptop. First, all communications over the VPN are now encrypted, and the only communications between the laptop and the outside world occur over the VPN back to the station. The laptop can no longer communicate directly with other computers on the Internet without those communications first going over the VPN back to the station and then through the station's firewall out to the Internet. This helps to protect the laptop from attack by applying the same security policies to the laptop as have been established for other computers within the station.

Second, the laptop has been assigned a new IP address within the station's VPN pool. In other words, the laptop now thinks it is attached to a network behind the station's firewall. In this example, the network address assigned to the laptop is 10.35.2.11.

As Figure 2 shows, the station has two separate networks. The newsroom network is 10.35.1, and the VPN network is 10.35.2. Computers connected to the networks are given addresses between 0 and 255. So the main newsroom computer's IP address might be 10.35.1.0. At this point, the laptop is connected to the VPN, and it thinks it is inside the firewall on the 10.35.2 network.

Because of the way IP works, the laptop still cannot see the newsroom system, which is on a separate network (10.35.1). Earlier, I mentioned that during the VPN login process, security policies were applied to the connection. Parts of these policies establish which IP addresses get assigned to VPN clients and which routes are established between various networks.

In this case, when the laptop connects to the VPN, a predefined route is established between the 10.35.2 network and the 10.35.1 network. This means the router automatically knows about both networks and effectively connects the two networks so traffic can flow back and forth between the VPN network and the newsroom network.

Now the reporter enters the internal (non-public) URL of the newsroom system in her Web browser. She is presented with the login screen, and she is ready to go.

Caveats

A few notes are in order. First, for those of you who are more advanced at networking, it is more efficient to use sub-netting rather than to use three completely separate networks. Also, DHCP would need to be configured to assign the correct group of IP addresses to the VPN clients so they can access the newsroom system.

Second, this is but one of many ways to configure access to newsroom systems. If your newsroom vendor uses some other secure access technology, this is perfectly fine. I selected the newsroom system as an example that would be familiar with many readers.

Finally, I will write about IP addressing schemes in next month's introduction to networking article, so you might want to reread this column once you have read January's column in order to understand how sub-netting might be a better way to go. BE

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

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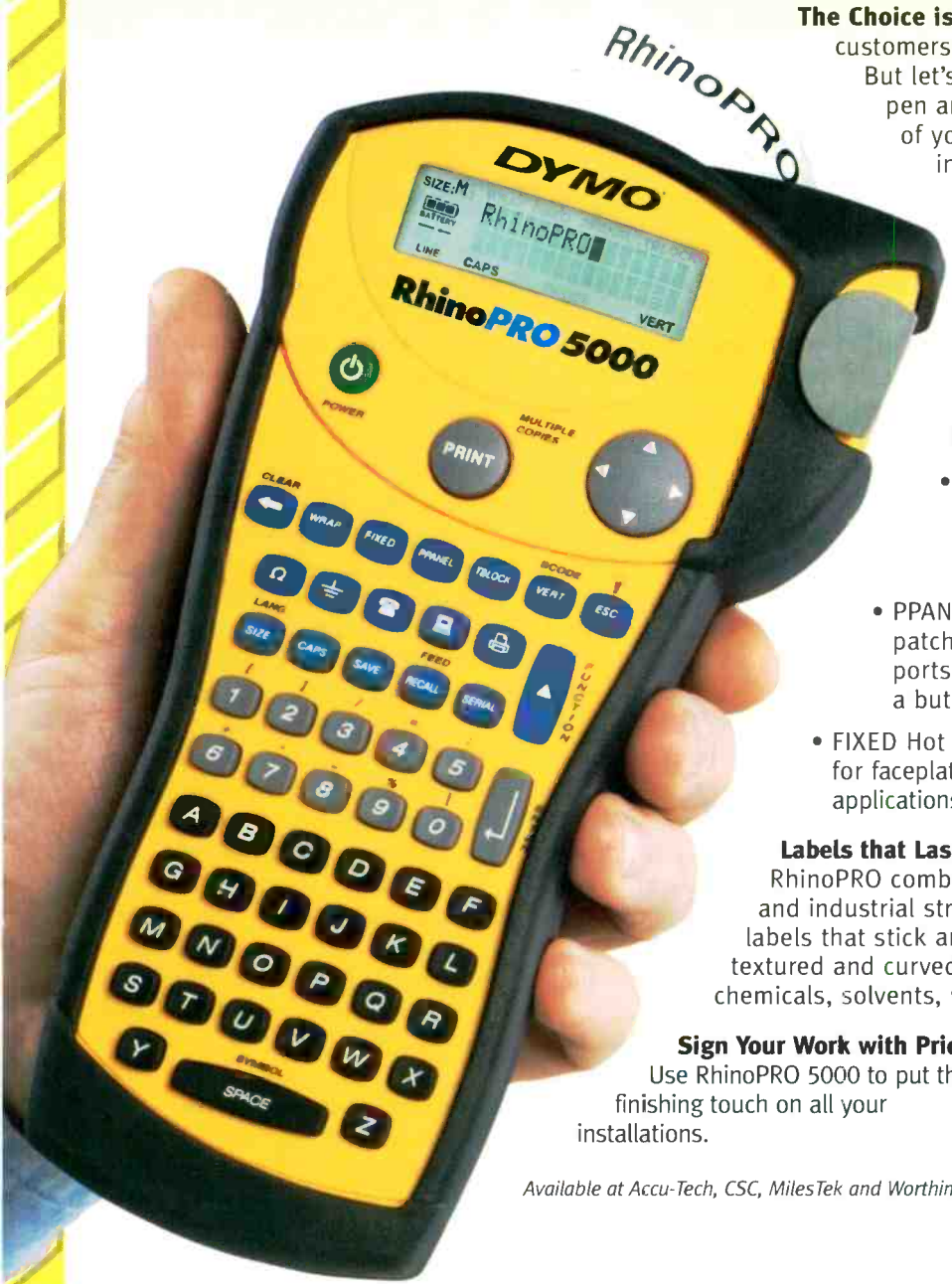

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Establishing an audio reference and timing system

BY JIM STARZYNSKI

Two of the most critical jobs a broadcaster needs to tackle when transitioning from analog to digital technology are understanding and establishing a reference and timing system for digital audio. This audio reference is necessary as a foundation for clean digital sound, whether for a simple system or a complete plant.

Delivering high-quality sound on a daily basis requires attention to details for both producing audio and timing it to the rest of the equipment in the video environment. Locking the proper reference to a stable source and establishing proper distribution of this signal will help eliminate the artifacts, which may materialize as pops, clicks or mutes, plaguing an improperly designed system. In addition, an engineer should become familiar with devices that are available to maintain clean audio during switching and what to do when a source has no external reference capability.

Let's investigate the practices necessary for clean audio that require the attention of today's broadcast engineer. For our purposes here, the digital audio referred to is the pulse code modulation (PCM) type usually transported as discrete AES3 audio pairs or embedded in a serial-digital audio-video bit stream.

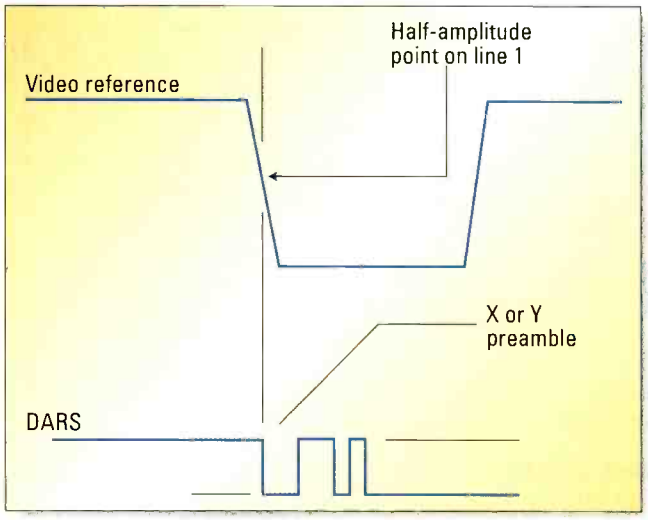

Figure 1. The X or Y preamble of DARS aligned to the half-amplitude point of the leading edge of the sync pulse of the TV signal. For NTSC's 29.97, this happens on the fourth line of every fifth frame. (AES11-2003)

Start at the beginning: Time

Contemporary broadcast reference designs use the Global Positioning System (GPS) as the origin of plant timing. Familiar GPS navigation accuracy is based on acquisition of a precise timing signal established by the atomic clocks in the 24 active GPS satellites orbiting the earth. These signals remotely reference a quartz clock in all GPS receivers. With the satellite signal acquired, a land-based receiver can easily and inexpensively create a clock as accurate as the satellite's atomic one.

Not intended for navigation but for its timing accuracy, a GPS-capable signal pulse generator and master clock outputs several precise reference signals. These include color black, tri-level sync, digital audio reference signal (DARS), longitudinal time code and even a 10MHz clock as a timing source for an external signal generator.

However fascinating, the GPS element of this benchmark system is optional. The most important — and essential — practice for all installations is timing audio and video to a common, stable source.

The most important — and essential — practice for all installations is timing audio and video to a common, stable source.

As described, a broadcast signal generator creates a color black video reference signal (in this example at GPS accuracy) and may also supply a synchronous, video standard, 48kHz DARS that is in time with the video reference. (More on DARS later.)

SMPTE 272M states "audio is clock synchronous with video when the sampling rate of the audio is such that the number of audio samples occurring within an integer number of video frames is itself a constant integer." For 29.97, it's 8008/5. This means that exactly 8008 samples of audio will fit in five synchronous frames of video at NTSC's 29.97 frame rate. (See Figure 1.) Once synchronized using DARS, the digital audio and video should stay properly timed and aligned.

Synchronous equipment relies on aligned audio and video frame boundaries for proper operation. When all of this works, switching and processing can occur with minimal audible artifacts.

Clocking requirements

Whether it is the familiar color black video signal, DARS or the less used Word Clock, one of these signals will usually fulfill most clocking requirements. However, be prepared to provide one of these three signals as a slave to the primary reference you've

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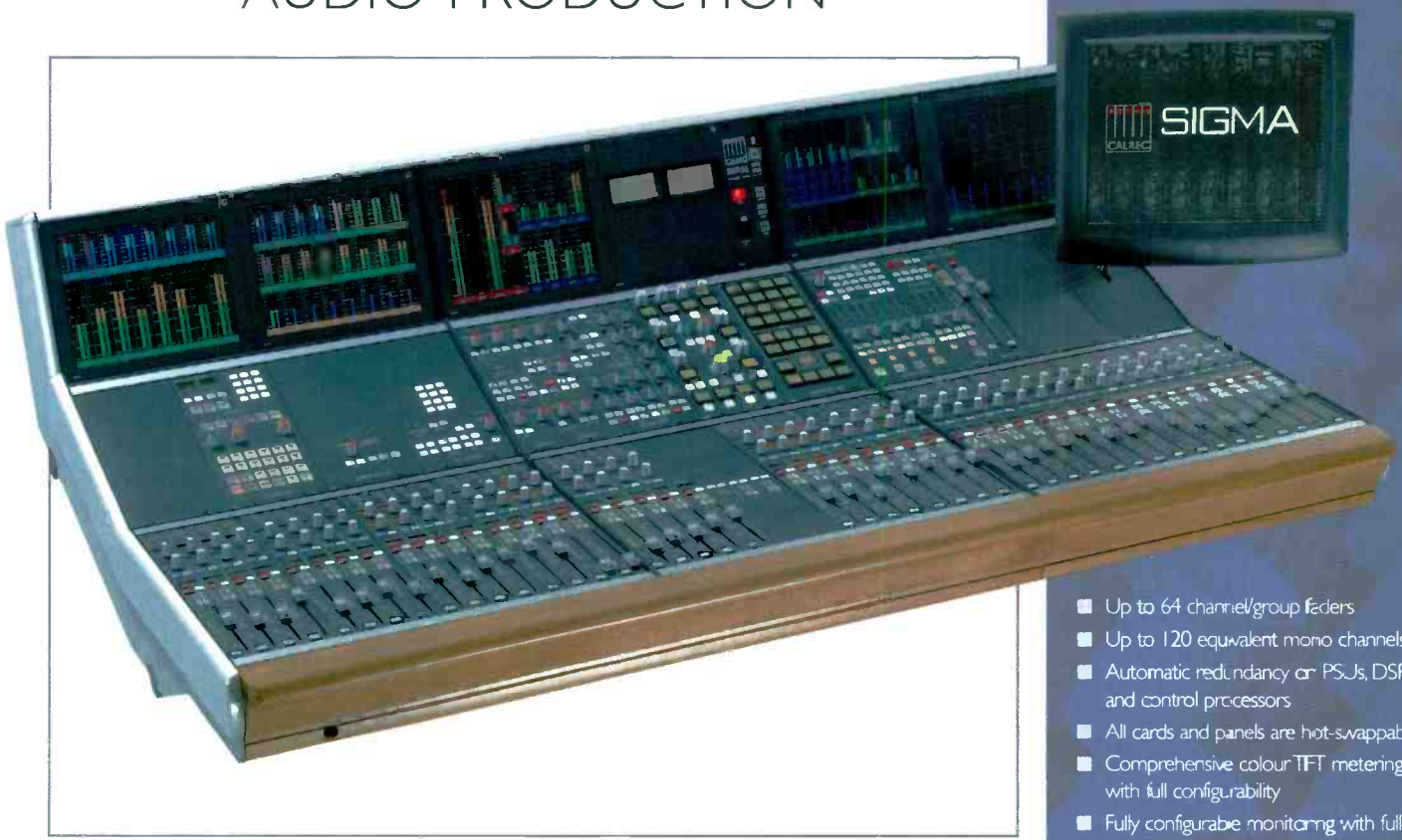

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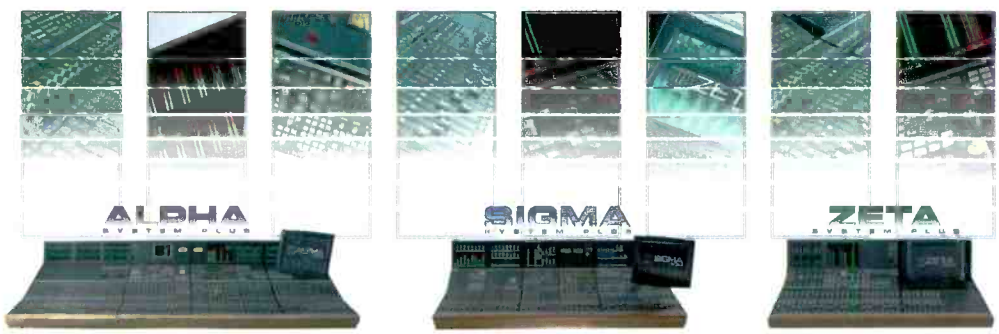

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chosen. (An example is a digital audio mixing console using Word Clock that can't accept DARS or color black.)

• *Color black.* Color black (black and burst) is frequently used to reference TV audio equipment because of its common availability and established video clock accuracy in the broadcast plant.

• *DARS.* A DARS AES11-2003 signal is an AES3-formatted audio signal capable of being referenced, locked and distributed at the precise audio frame rate. It may contain only the preamble portion of the signal without active audio and, if so, is often referred to as AES silence or AES black. It is usually distributed on coax to the appropriate audio device.

• *Word Clock.* As mentioned in AES11-2003, Word Clock is a square wave at the sampling frequency basic rate. This signal is not standardized, may be looped and is commonly carried on coaxial cable. Word Clock is infrequently used to reference broadcast and audio recording equipment; however, it is required frequently enough that it's important to understand how and when to use it.

The same timing rules apply whether the audio is distributed as discrete AES pairs or is embedded.

Careful distribution

Regardless of the type of timing signal required, the proper reference must be available and properly connected. A series of cable runs and DAs should be thought out and implemented. Cable lengths should be observed so long distances don't induce timing errors. Reclocking DAs should be used when cable lengths mandate them.

Discrete digital audio is frequently transported on 75Ω coaxial cable. When embedding audio per SMPTE 259M and 272M for SD, and SMPTE 292M and 299M for HD, the audio is also distributed on coax. Sixteen channels can be multiplexed in a single stream on a single cable with video and data. However, the same timing rules apply whether the audio is distributed as discrete AES pairs or is embedded. Synchronization must be maintained for clean signal routing and processing.

Using V-fade

Unfortunately, synchronizing the audio may not always be enough to ensure clean switches between sources. Even if the audio and video frames are

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The new NBC Universal Studio 8H production control room in New York City's Rockefeller Center is equipped with the latest HD video and digital audio technology. These systems get their timing reference from redundant master signal pulse generators locked to GPS receivers that are fed from dual antennas atop NBC Headquarters. Photo by Jim Starzynski.

aligned and a switch happens exactly between audio samples, the transition may occur at extreme opposite polarities of each signal. Switching at this point may cause a sharp transient that yields an audible click in the sound.

One solution is to use a process known as a V-fade. V-fade is a function of an audio router or switcher that fades down the old source and fades up the new one around the switch point. It reduces the chance for extremes in polarity and cures the problem.

Sample rate conversion

Sometimes supplying a timing reference to all the digital audio gear installed in the video plant isn't possible. Not every audio source component is designed to work in a video environment. For instance, CD players work at 44.1kHz and need to properly interface to the 48kHz audio gear used in most video facilities. When the numbers don't match up, the sample rate conversion (SRC) solves the problem.

Think of SRCs as the audio equivalent of a video standards converter or frame sync.

As the out of snyc source is processed at the input of an SRC-capable mixer, DVTR or frame sync, the SRC realigns this incoming digital audio and times it to the reference of the receiving device. The formerly random source is now properly timed to the rest of the system.

SRCs in distribution gear can also clean up some artifacts left over from the digital audio switching process. Think of SRCs as the audio equivalent of a video standards converter or frame sync.

Implementing synchronization

Establishing plant reference, managing its distribution and applying the techniques necessary to solve specific problems are important procedures that need to be performed by the video engineer working in a digital audio world. The standards and practices explained here, along with the many other digital audio references that are available, are a good start to a working understanding of how clean digital sound is produced, distributed and maintained in a modern broadcast facility. BE

Jim Starzynski is principal engineer in advanced technology for NBC-Universal.

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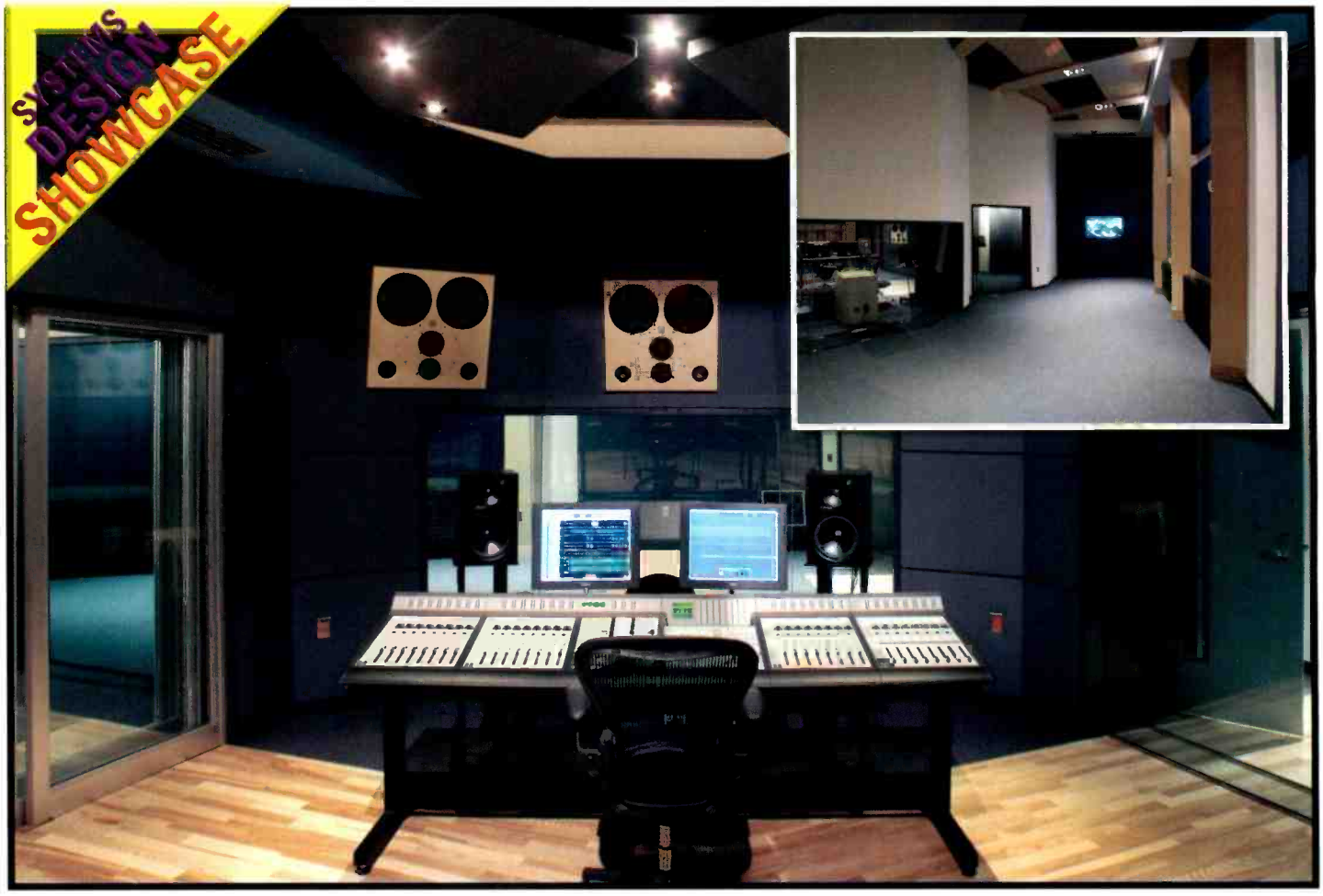

StarCity Recording Company BLASTS OFF

BY SUSAN ANDERSON

When audio professionals Jeff Glixman, Carl Cadden-James and Lily Salinas were looking for a location to launch StarCity Recording Company — their recording and post-production facility — they didn't have to look far. They opened their facility in an 18,000sq-ft studio previously occupied by Angel Mountain Productions, a studio where Glixman and Cadden-James had both done previous work.

When they heard about the studio's availability, they were thrilled. After all, the facility was already complete, and they knew from experience that the sound it provided was out of this world.

The studio's location was another bonus. The trio wanted to provide a laid-back and creative environment where artists could thrive. They wanted to avoid the pressure, fast pace and high costs associated with big cities. Based in Bethlehem, PA, the facility achieves those goals. It's an hour's drive from New York City and Philadelphia, offering artists there an alternative for their high-res audio and video projects.

Prepare for launch

Before opening its doors, however, there was work to be done. Angel Mountain Productions was more corporately driven and therefore had an institutional feel — not the vibe the trio was going for. To provide the transition from a clinical atmosphere to a creative one, they brought in Martin Pilchner, principal of Pilchner Schoustal

Above: Designed for audio and post-production work, Control Room B is equipped with a large-format Digidesign ProControl and a large selection of outboard gear. Inset photo: Live Room B provides an ideal space for sound effects using the facility's six Foley pits.

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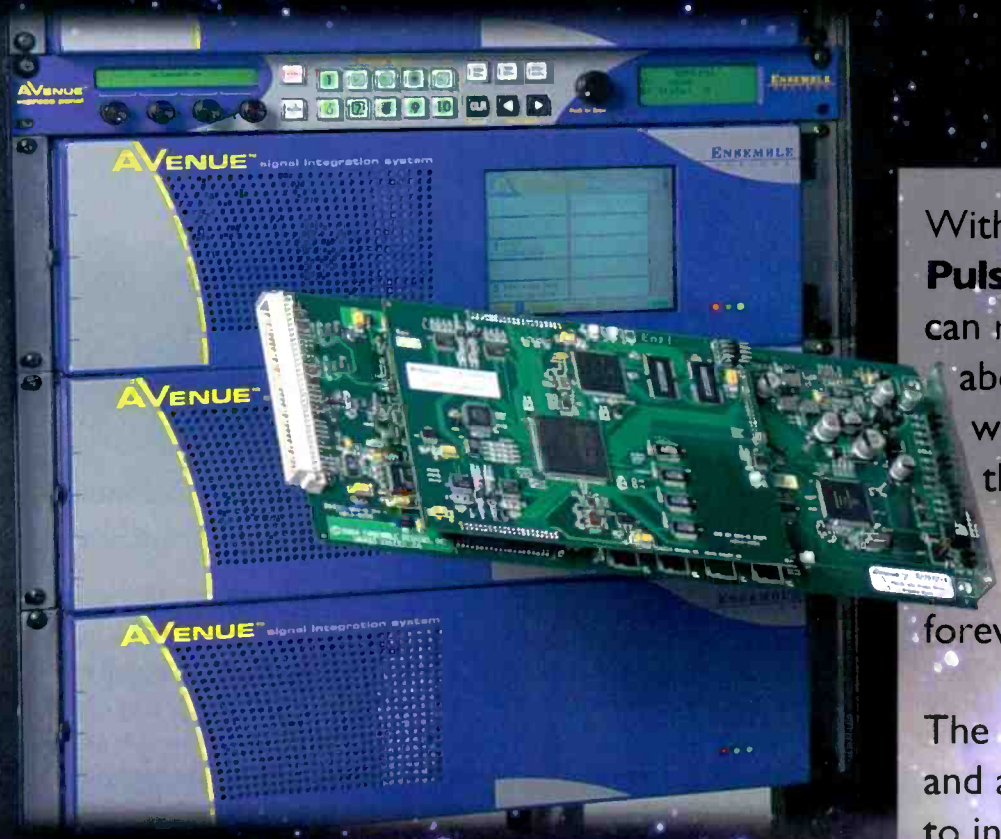

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A Digidesign Control|24 console resides in the C Room, which is ideal for smaller productions. As with all of StarCity's rooms, surround monitoring is by Quested.

International. Pilchner spearheaded the design of Angel Mountain Productions, so he was familiar with the facility. Changes include new paint schemes, carpeting and décor to create an artistic feel. Likewise, a new client lounge is being added, as well as a mastering suite and a second entrance to the facility.

Orchestrating the systems integration design and implementation is Cadden-James, a 5.1 specialist with experience in both mix and audio post-production.

Mission control

The facility houses three control rooms, which contain Stewart automatic drop-down MicroPerf screens with projectors providing lock-to-picture images. In addition, all three suites are designed and built to accommodate 5.1 surround production. The spaces are tied together by a Studio Network Solutions storage network with 1.5TB of storage.

Measuring 25ft x 28ft, Control Room A is the largest of the control rooms. It houses an SSL XL 9000 K console with 72 channels; a Studer A827 Gold Edition 2in, 24-track analog tape recorder; five soffited Quested 412s; and a range of vintage and modern outboard gear.

Adjacent to Control Room A is Live Room A, which measures 30ft x 39ft. Ideal for large ensemble recording and

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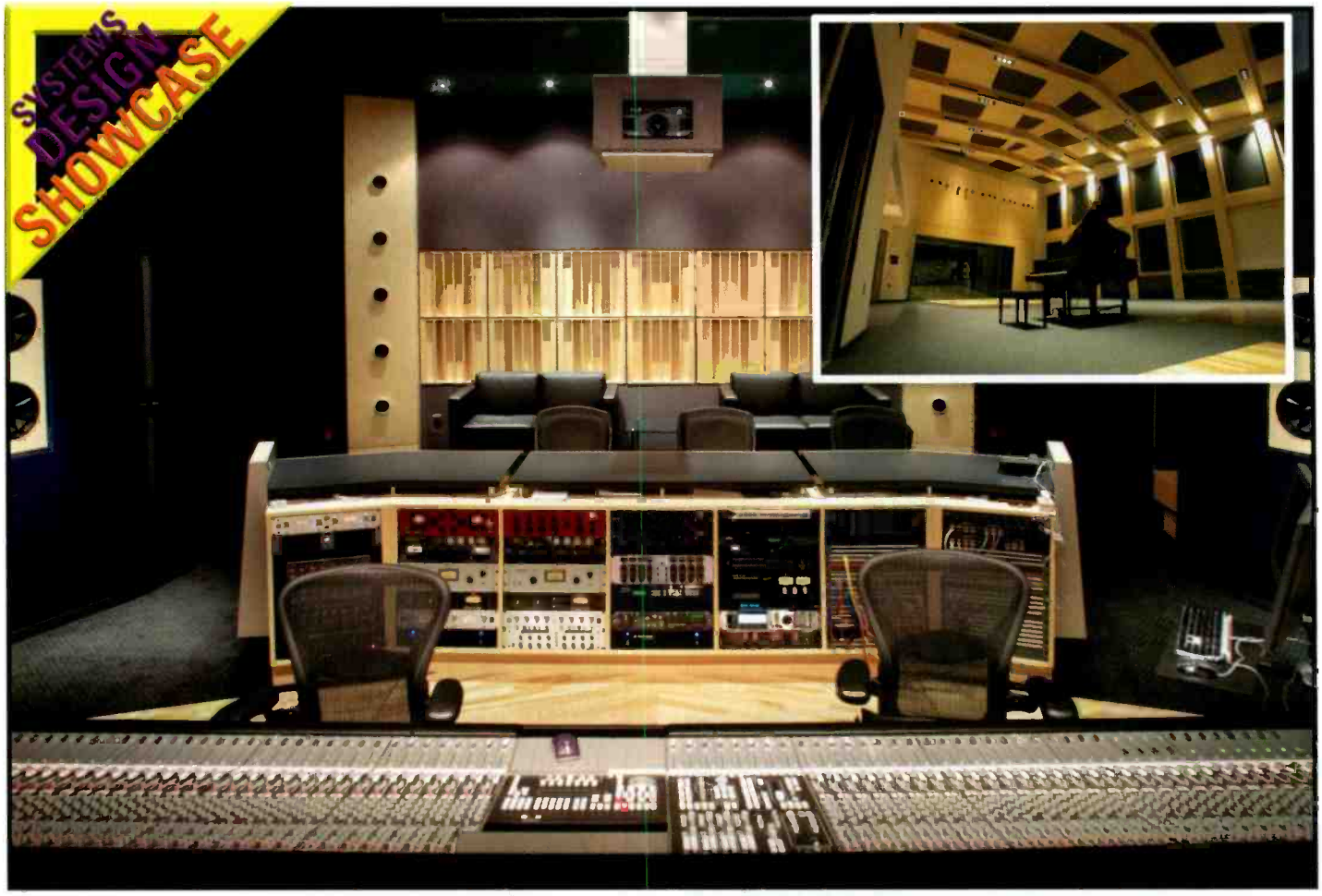

StarCity's largest control room is Control Room A. It houses an SSL XL 9000 K, a Studer A827, and a broad collection of vintage and modern outboard gear. Inset photo: Live Room A can accommodate a 40-piece orchestra and is equipped with three isolation booths.

film scoring, the room can accommodate a 40-piece orchestra. It features a Yamaha C7, 22ft-high ceilings and three isolation booths.

Control Room B measures 17ft x 23ft and is designed as an audio post room for film and television work. A 32-fader Digidesign ProControl adorns the room. Other features include five soffit-mounted Quested 212s, Dolby encoding, and a large selection of outboard gear.

Like Control Room A, Control Room B has a studio proper — Live Room B. The 13ft x 35ft room lends itself for cutting bass, drums or any other instrument that artists desire. It is equipped with plasma monitors and six Foley pits, making the room ideal for sound effects and ADR.

At 16ft x 20ft, Control Room C is designed for smaller productions. It houses a Digidesign Control|24 console and two isolation booths, each measuring 9ft x 9ft. The room also employs a Pro Tools|HD 3 with numerous plug-ins and five soffit-mounted Quested 212s.

In addition to the control rooms and live rooms, the facility boasts a 30ft x 40ft THX-specified mix theater. It contains 30 seats and was specifically built for 5.1 productions. StarCity's partners removed the existing film console and most likely will replace it with an AMS Neve DFC or Digidesign surface solution. The mix theater features a 6.1 Dolby Digital EX and an 11ft x 20ft projection screen, as well as a large video projector and facilities for two rock-and-roll 35mm projectors.

Mission accomplished

Business at StarCity has been taking off since the facility unofficially opened its doors four months ago. Among its growing list of clients is Ace Entertainment, which has turned to the facility for recording and mixing projects on the BET Jazz Channel's "Studio Jams" series. On the series, a diverse group of musicians perform together in Live Room A. Cadden-James then mixes the tracks on the XL 9000 K.

Cadden-James says that he and his partners have been so busy servicing their existing client base and revamping the facility that they haven't had time to actively solicit new business. Therefore, he's amazed at the amount of business seeking out StarCity. It must be in the stars. BE

Susan Anderson is managing editor of Broadcast Engineering *and* Broadcast Engineering World *magazines.*

Design team

Martin Pilchner, Pilchner Schoustal International
Carl Cadden-James, systems integration
Denis DeCamillo, Q Cables

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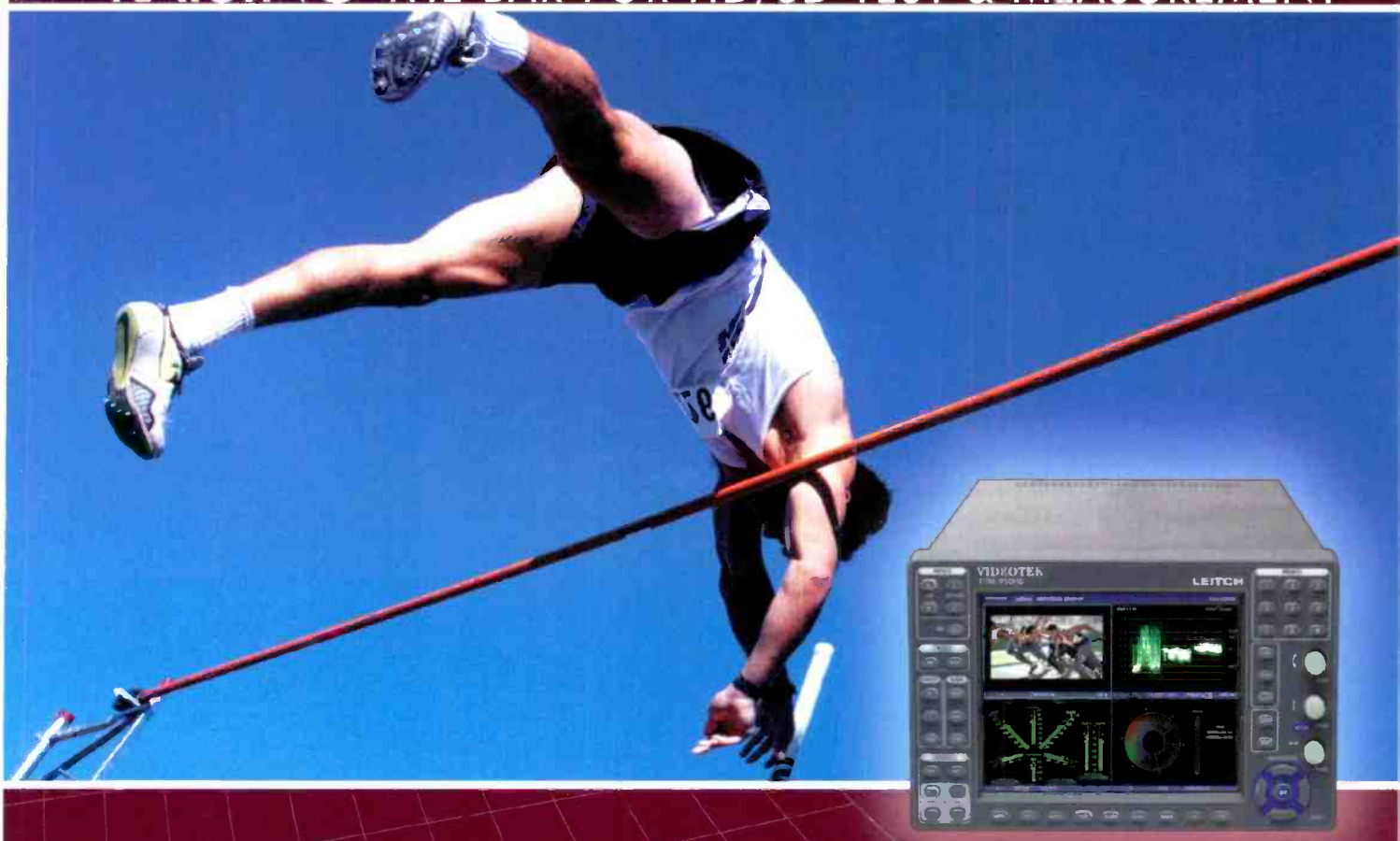

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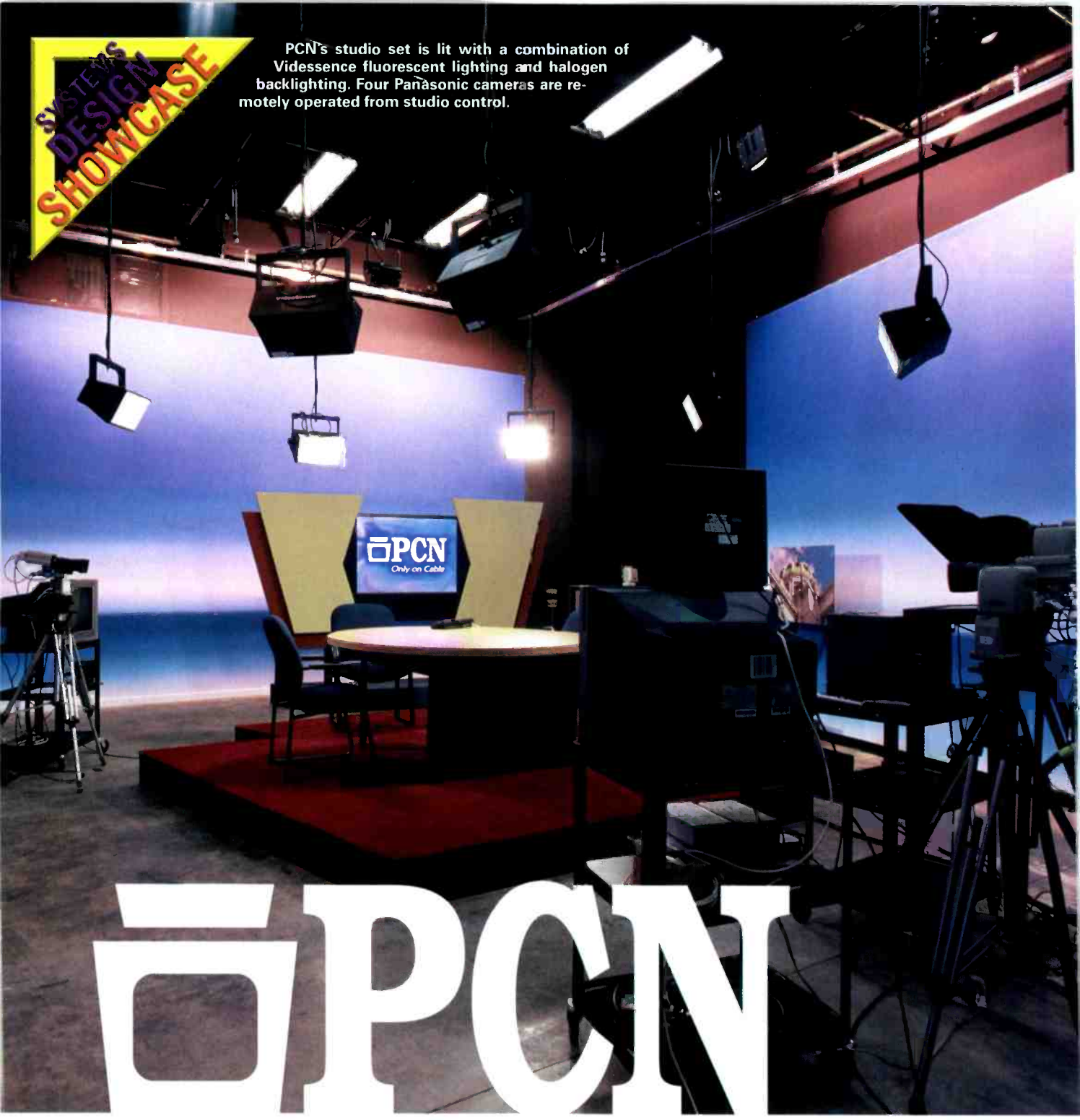

PCN's studio set is lit with a combination of Videssence fluorescent lighting and halogen backlighting. Four Panasonic cameras are remotely operated from studio control.

PCN DESIGNS NEW DIGITAL FACILITY

BY DEBRA KOHR SHEPPARD

After 10 years serving as the home of the state's public affairs network, Pennsylvania Cable Network's (PCN) original two-story building had long outlived its usefulness. As the staff grew and equipment needs increased, the four analog production rooms had taken on multiple functions and had become crowded, making it difficult to produce and air the network's unedited live and taped coverage of Pennsylvania state government activities. An upgrade and improvement of on-air quality and appearance became a priority.

PCN decided to expand its headquarters in Camp Hill, PA, from 5500sq ft to more than 21,000sq ft. The task to design a new digital facility became an internal project.

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SYSTEMS DESIGN SHOWCASE

Master control is a one-person operation and monitored by staff nearly around the clock. All taped and live coverage pass through master control prior to the Uplink. Operators use the Chyron Duet for PCN's intensive lower-third graphic supering. When necessary, the digital Yamaha audio board to the left of the operator allows for EQ and level control.

Designing the new facility

A schedule that included everything from hanging cable to installing equipment and training staff was planned to appropriately correspond with the construction timeline. The challenge was to remain flexible and alter the network's timeline to accommodate construction delays.

This venture required putting up with drilling and hammering for months while continuing to run a television network and handle normal tasks, such as equipment repairs and maintaining a quality air signal.

The new floor plan more than tripled the number of technical rooms. It was designed with efficiency in mind — improving workflow for the staff and room layout.

Due to the nature of the network's master control, that room was given critical attention. Two rooms were formed out of the old master control. The tape room became a spacious quality-control station, where the operations staff checks levels of incoming feeds and decks. With computers and decks now absent from the new master control, a significant reduction in equipment noise allows the operator better concentration. A curved console provides a more conducive work environment, and a comfortable producer's desk serves as another Chyron station.

Design strategy

Cost of equipment and satellite transmission was a significant factor in the decision to implement SD vs. HD. The plan was to design an SDI facility using Leitch and Grass Valley conversion gear to integrate the analog sources.

Using a combination of both digital and analog audio proved to be more cost-effective. For example, continuing to use the current studio microphones and purchasing the Wheatstone SP-8 analog audio mixer kept the cost down, while still meeting all of studio control's needs. It was also decided that the network select discreet unbalanced digital audio. The flexibility of routing audio separately from video was important. The unbalanced audio was chosen because it could be integrated using the same coax and BNC connectors as the video. Color-coded cables were used to distinguish between the audio and video signals.

The equipment at the core

The demand for a mid-sized router that could switch audio, video and control signals was essential to the design. The Grass Valley Concerto

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routing switcher was chosen for this purpose. The system consists of one frame configured for 64x64 serial digital routing and one frame configured for 32x32 digital audio, 32x32 analog audio and 32-port RS-422 data routing. The entire system, including remote panels, is configured and controlled using the Grass Valley Encore control system.

Quality control is the most important function in operations. The staff adjusts levels of all sources, including satellite, microwave and fiber feeds. The challenge was to find a quick and easy way for operations to adjust these incoming analog sources within a digital platform. The solution was Grass Valley's Newton control panel and its Kameleon modular conversion products. The Newton panel, designed to be part of the quality control station, can be configured to adjust any combination of audio and video characteristics that are available on the Kameleon cards.

As the network's studio productions became more complicated, the Grass Valley 110 production switcher was no longer adequate. The team researched several options and decided on the Grass Valley Zodiak for its versatility and features.

The switcher's flexibility offers many options in mapping buttons and saving multiple effects without tying up the mix effects banks. For example, when trying to accomplish an effect with multiple boxes, the Zodiak required one ME, while a competitor's switcher required the entire switcher.

This proved to be especially beneficial during the network's election night coverage. The continuous five-hour program was less stressful due to the switcher's ability to not only save an ME with the correct DVE but also recall the correct still. To accomplish this with a simple button push resulted in an efficient and seamless production.

The Zodiak's built-in machine controller has several options. Tapes can be cued and rolled using the touch screen panel or by programming the master E-MEM. This is useful because PCN often uses one clip tape with multiple segments. The network uses a more freeform style when it comes to its productions, and the switcher's quick reaction and versatility meets these needs.

On-air appearance

To improve the on-air appearance and functionality in master control, two major upgrades were needed — an advanced CG system and a digital switcher. The network's master control switcher is used similar to many production switchers. Operators spend much of their time supering live and taped events and then transitioning

Frank Graybill, WNET, New York

Frank Graybill is Choosey...

"We needed 8vsb Analyzers for both WNET DT New York and WLIW DT Plainview, NY. I made a list of parameters that we needed to analyze and priced equipment. I thought we'd have to spend $30,000 or more, then we discovered the 8vsb Analyzer from Modulation Sciences for under $10,000."

When WNET Needed 8vsb Analyzers, Frank Picked MSI

The **msi 4400** has many *standard* features the expensive boxes lack–like full remote control via the Internet, alarm and trend logging, automatic email generation and tap weight comparison over time, and most importantly, a commitment of support for the lifetime of the unit.

All the features we need come standard with the box.

- Eye Pattern & Constellation Displays
- 8 External Alarm Channels
- Signal Quality Metering
- SNR, MER, or EVM Readout with 20 minute History
- Tap Weight Equalizer – Display, Zero, Freeze & Compare
- Trend & Alarm Data Logs – with Negative Time History
- Bit Error Rates – Raw, pre-RS, & post-RS
- E-mail notification of Alarms
- Fully Web Enabled for Remote Operation
- DVB/ASI and SMPTE 310M TS Outputs

msi modulation sciences inc.

The **msi 4400** delivers accurate real-time data from an antenna at our WNET studios in Manhattan, while at WLIW it takes its signal directly from the transmitter. Our engineers have full access and control of both units from their desks and through remote network connections.

12A World's Fair Dr. Somerset, NJ 08873 • (800) 826-2603 Toll Free • (732) 302-3090
E-mail: sales@modsci.com • Web: www.modsci.com

to various sources dedicated to switcher inputs. Graphics must be recalled quickly, and the switcher must be logical and intuitive.

The team chose the Chyron Duet LE character generator and the Grass Valley M-2100 master control switcher. The Duet's two channels are assigned to separate keyers on the M-2100: one channel/keyer for lower-third name and topic graphics and the other for crawls promoting upcoming programs using the animation and effects generator built into the Duet.

Another plus is that graphics can be typed in the Duet's "preview" without altering the two channels on the air. Graphics created in Adobe Photoshop can easily be imported into the Duet for lower-third templates or full-screen stills.

In studio control, the director/TD operates the Grass Valley Zodiak with a Chyron Duet and Panasonic remote camera control unit on either side. Behind the console is the audio booth and a producer's station, which includes the call screener and teleprompter crew positions.

Design team

Cenyx
High Construction
Lerro Corporation
PCN
- Debra Kohr Sheppard, VP of operations
- John Fox, chief engineer
- Mark Kendall, engineer

Premier Productions
RF Central
Systems Wireless

The network's four Duets and three PCs running Chyron's Lyric software are networked together. The multiple Duets can serve as a backup to each other or, if need be, one Duet's drive can be simultaneously accessed to super programs in four rooms while still maintaining each Duet's two-channel capabilities.

In addition to the M-2100's keying options, the audio/video breakaway is an important feature. Operators can use the audio follow video option or quickly breakaway from either signal to another source. This provides the flexibility needed in the network's master control.

Monitoring

Another design consideration was how to monitor the various signals in master control and studio control. The team selected the Barco Hydra Compact and Overview DLP display system instead of traditional CRT monitors.

This multi-image display requires less maintenance and less power and produces less heat than racks of CRT monitors. The display system has more inputs than any of the other manufacturers that were evaluated. The system allows for greater flexibility in sources displayed. The monitor wall layout can be changed quickly with the use of GPIs.

SDI/analog signals are monitored at the quality-control station in the tape room and adjusted using various TBCs. Sony DVCAM tape is the format used both in the field and in the technical rooms. DSR1800s and DSR1500s are used to play and record feeds and for VHS/DVD duplication purposes.

Making a connection

PCN did not have an extensive intercom system until the Drake PICO was purchased. It is a 32-port digital matrix in a 1RU frame configurable from either the front panel or computer interface through a serial port. To continue using some existing RTS equipment, the optional four-channel, two-wire interface was also purchased.

Any of the 32 ports can be configured for use as an intercom panel port, a four-wire telephone interface port or a two-wire audio I/O port. With this arrangement, multiple audio sources can easily be routed to the PICO and assigned to intercom or IFB channels. Multiple configurations or maps can be saved and the intercom setup switched based on the event being covered.

Testing 1-2-3

Videotek's VSG-204D serial digital sync generator is used for producing the reference and test signals needed throughout the facility. A second VSG-204D and a Videotek VSX-11D multiformat sync changeover unit were installed to create a fully redundant reference system. Up to 11 sources from the primary and backup generators can be connected to the VSX-11D. When a loss of signal is detected on any of the primary inputs, a transfer to the backup occurs.

Backup power

In order to satisfy both the distribution of power and a backup power plan, the network upgraded a 20 KVA

Leibert UPS to 30 KVA and purchased a new 50 KVA Leibert UPS. The smaller UPS and existing 60kW generator supply backup power to the uplink and such critical areas as master control. The larger UPS provides backup power for the remaining equipment. This UPS can supply power for up to 30 minutes at full load, allowing for a graceful change to alternative programming in the event of an extended power failure.

Move-in day

The design team carefully scheduled the transition into the new building room by room. Studio control, one linear edit suite and graphics were the first rooms to be functional. The staff practiced in the new master control until the cutover day. The old master control was disassembled and equipment was reallocated into the new building. The relocation was completed with ease.

PCN now offers a professional and inviting atmosphere for guests and the staff. The staff enjoys the spacious environment. The new digital equipment improved the on-air appearance. BE

Debra Kohr Sheppard is vice president of operations for PCN in Camp Hill, PA.

Three workstations provide areas for Leightronix automation, Leitch video server programming and a networked PC that serves several purposes — a Chyron typing location, VHS tape labeling and a Primera Bravo DVD duplicator, which serves as a backup to the two Rimage systems.

Technology at work

Barco
- Overview mDG50-DL 50in DLP
- Overview cDR67-DL 67in DLP
- Hydra Compact

BUF Technology VTC-4000
Chyron Duet LE CGs
Drake PICO digital matrix intercom
Grass Valley
- Concerto multiformat routing
- Encore router control system
- Kameleon KAM-AV A/D
- M-2100 MC switcher
- Newton modular control
- Zodiak 2.5 M/E switcher

Leader LV-5100D/LV-5100D
Leightronix
- Net-164 video system switcher
- TCD/IP video system controller

Leitch
- DPS-475 TBCs/converters
- Genesis amps/converters
- Logomotion logo generator
- VR-440 video server

Panasonic pan/tilt robotic system
PanoramaDTV video monitors
Rimage 2000i and 1500
S-A Power Vu Plus encoders
Sony DVCAM VCRs
Videotek
- VSG-204D sync generator
- VSX-11D sync changeover unit

Videssence studio lighting
Wheatstone SP-8 console
Wohler AMP2-DA audio monitor
Yamaha 01V digital mixing console

Winter **2006** PRODUCT GUIDE

Marshall Electronics

BROADCAST MULTIMEDIA DIVISION

NAB booth# SU4355

MegaPixel Resolution

V-R72P-2HDSDI
Price: $2999.00

Expanding Our New Line of TFT-MegaPixel™ High Definition Monitors

Many of our new products feature TFT-Megapixel™ displays that provide greatly improved images compared to similar CRT and LCD products. This new product line features the highest pixel density available for 10.4-inch to 3.5-inch displays in one, two, three, and four screen configurations. Unlike many other LCD monitor manufacturers who simply package OEM open frame monitor sets, Marshall Electronics has developed these products with newly developed proprietary technology that delivers a totally digital image process onto each screen with greater than twice the resolution of our competition. Significant improvements have also been achieved in brightness, contrast ratio, and viewing angles. Configurations are available with HDSDI, SDI, DVI, Component HD/SD, and composite video inputs. All models feature screens calibrated to SMPTE/IBU standards for color gamut and color temperature.

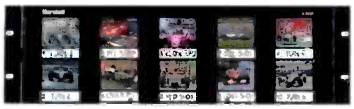
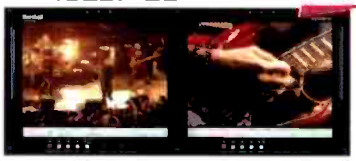
1.44 TFT-MegaPixel™

NEW LINE

Inputs	8.4" 800 x RGB x 600		10.4" 800 x RGB x 600	
	 Dual 8.4"	 Stand Alone 8.4"	 Dual 10.4"	 Stand Alone 10.4"
VGA	V-R82DP-VGA $1799.00 (January, 2006)	V-R84DP-VGA $999.00 (January, 2006)	V-R102DP-VGA $1999.00 (January, 2006)	V-R104DP-VGA $1199.00 (January, 2006)
Composite 1, Composite 2	V-R82DP-2C $1999.00 (in stock)	V-R84DP-2C $1399.00 (in stock)	V-R102DP-2C $2499.00 (in stock)	V-R104DP-2C $1599.00 (in stock)
SDI 1, SDI 2	V-R82DP-2SDI $2999.00 (January, 2006)	V-R84DP-2SDI $1799.00 (January, 2006)	V-R102DP-2SDI $3399.00 (January, 2006)	V-R104DP-2SDI $1999.00 (January, 2006)
HDSDI/SDI	V-R82DP-HDSDI $3399.00 (February, 2006)	V-R84DP-HDSDI $2099.00 (February, 2006)	V-R102DP-HDSDI $3699.00 (February, 2006)	V-R104DP-HDSDI $2299.00 (February, 2006)
YPrPb, DVI, XGA, S-Video, Composite	V-R82DP-HDA $3099.00 (March, 2006)	V-R84DP-HDA $1999.00 (March, 2006)	V-R102DP-HDA $3399.00 (March, 2006)	V-R104DP-HDA $2199.00 (March, 2006)
SDI, YPrPb, DVI, XGA, S-Video, Composite	V-R82DP-SD $3699.00 (March, 2006)	V-R84DP-SD $2199.00 (March, 2006)	V-R102DP-SD $3999.00 (March, 2006)	V-R104DP-SD $2399.00 (March, 2006)
HDSDI/SDI, YPrPb, DVI, XGA, S-Video, Composite	V-R82DP-HD $4299.00 (April, 2006)	V-R84DP-HD $2499.00 (April, 2006)	V-R102DP-HD $4599.00 (April, 2006)	V-R104DP-HD $2699.00 (April, 2006)

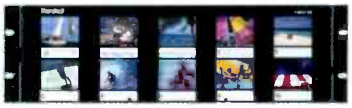
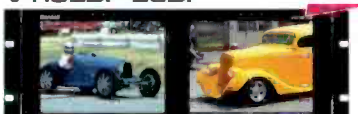
LCD Racks

Composite

	Display	# of Displays	Rack Spaces (Rack Depth)	Resolution (Backlight in cd/m² luminance)	Inputs-Video per Display (Total) S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	Inputs-Audio SDI Embedded	AES/EBU	Balanced XLR	Unbalanced RCA	Tally	Features	Price
V-R18P 	1.8"	8	1 D(11")	480 x 234 (250)		1 (8)										N	• ONLY tiltable rack mount on the market with 8 monitors in 1U space! • High resolution LCD panels • Active loop through • NTSC/PAL auto recognition	$2299.00
V-R25P 	2.5"	10	3 D(2.65")	480 x 234 (250)		1 (10)										N	• ONLY rack mount on the market with 10 monitors in 3U space! • High resolution LCD panels • Active loop through • NTSC/PAL auto recognition • Blue screen when signal not present	$3299.00
V-R43P 	4"	3	2 D(1.9")	480 x 234 (300)		2 (6)										Y	• Ultra compact - Only 2U high • Active loop through • NTSC/PAL auto recognition • Low price	$1299.00
V-R44P 	4"	4	2 D(1.9")	480 x 234 (300)		1 (4)										Y	• Ultra compact - Only 2U high • Active loop through • NTSC/PAL auto recognition • Low price	$1699.00
V-R53P 	5"	3	3 D(2.5")	960 x 234 (350)		2 (6)				1 (3)						Y	• High resolution LCD panels • Each display has extra VGA input • Built-in Color Bar Generator • Active loop through • NTSC/PAL auto recognition	$2249.00
V-R563P 	5.6"	3	3 D(2.5")	960 x 234 (350)		2 (6)										Y	• High resolution LCD panels • Built-in Color Bar Generator • Blue screen when signal not present	$1799.00
V-R63P 	5.8" wide	3	3 D(2.5")	1200 x 234 (350)		2 (6)										Y	• Wide Screen Hi Res panels with 16:9 to 4:3 ratio switch • Blue screen when signal not present • Input config stored in memory, when unit is off • NTSC/PAL configuration switch • Active loop through; Bar Generator	$3099.00
V-R682P 	6.8"	2	3 D(2.65")	1152 x 234 (300)		2 (4)										N	• High Resolution 6.8" LCD Panel • Bright 300 cd/m² luminance • NTSC/PAL auto recognition • Active loop through feature • Built-in Color Bar Generator	$1495.00
V-R72DP-2C NEW 	7" wide	2	3 D(2.5")	800 x 480 x RGB (380) 1.2 TFT MEGAPIXEL		2 (4)										Y	• 1.2 TFT-Megapixel 7-inch wide screen • 800 x RGB x 480 Dots with 1.2 million pixels • 100% digital processing • Bright 380 cd/m² luminance • 400:1 ratio of contrast between black and white • 4:3 and 16:9 screen aspect ratios • Built in Color Bars	$1999.00
V-R72DP NEW 	7" wide	2	3 D(2.5")	800 x 480 x RGB (380) 1.2 TFT MEGAPIXEL		2 (6)										Y	• 1.2 TFT-Megapixel 7-inch wide screen • 800 x RGB x 480 Dots with 1.2 million pixels • 100% digital processing • Bright 380 cd/m² luminance • 400:1 ratio of contrast between black and white • Any of the 6 inputs can be routed to each screen • Each screen can sequence through all active inputs	$2995.00
V-R82DP-2C NEW 	8.4"	2	4 D(1.5")	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL		2 (4)										Y	• 1.44 million TFT-MegaPixel / 8.4 inch screens • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • Composite displayed as 10-bit digital • On Screen Display (OSD) and Blue "Gun"	$1999.00
V-R102DP-2C NEW 	10.4"	2	5 D(1.5")	800 x 600 x RGB (600) 1.44 TFT MEGAPIXEL		2 (4)										Y	• Large 10.4- inch screens /1.44 TFT-MegaPixel • More screen in less space than 9-inch CRT • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • Composite displayed as 10-bit digital • On Screen Display (OSD) and Blue "Gun"	$2499.00
V-R151P 	15.1"	1	6 D(2.25")	1024 x 768 x RGB (250)	1	1				1					2	Y	• Compact - only 6U for 15" LCD • Hi Res LCD panel • Built-in 125 channel cable ready TV tuner (NTSC only) • Built-in speakers • NTSC/PAL configuration switch	$2199.00

LCD Racks

SDI

	Display	# of Displays	Rack Spaces (Rack Depth)	Resolution (Backlight in cd/m² luminance)	Inputs-Video per Display (Total) S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	Inputs-Audio SDI Embedded	AES/EBU	Balanced XLR	Unbalanced RCA	Tally	Features	Price
V-R18P-SDI 	1.8"	8	1 D(11")	480 x 234 (250)				1 (8)								N	• ONLY tiltable rack mount on the market with 8 SDI monitors in 1U space! • High resolution LCD panels • Active reclocked loop through • NTSC/PAL auto recognition	$3599.00
V-R25P-SDI 	2.5"	10	3 D(2.65")	480 x 234 (250)				1 (10)								N	• ONLY rack mount on the market with 10 SDI monitors in 3U space! • High resolution LCD panels • Active reclocked loop through • NTSC/PAL auto recognition	$4599.00
V-R44P-SDI 	4"	4	2 D(1.9")	480 x 234 x RGB (300)				1 (4)								Y	• High resolution LCD panels • 4 SDI inputs, each with loop through • Blue screen when signal not present • Each channel has Hi-Res SDI to Composite Video converter • NTSC/PAL configuration switch	$2299.00
V-R44DP-SDI COMING SOON 	3.5"	4	2 D(1.9")	640 x 480 (250) 1 TFT MEGAPIXEL				1 (4)								Y	• Four 3.5-inch Advanced Definition 4:3 screens • 100% digital processing • Widest quad screen viewing radius available - 130° • Brightest quad screen available - 380(cd/m²) • 4:3, 16:9, and 4:3 of 16:9 DTV aspect ratios • On Screen Display (OSD) and Blue "Gun"	$2999.00
V-R53P-SDI 	5"	3	3 D(2.5")	960 x 234 (350)		1 (3)		1 (3)		1 (3)						Y	• High resolution LCD panels • Active loop through for composite and SDI inputs • Built-in Color bar generator • Blue screen when signal not present • Each SDI channel has Hi-Res 10-bit SDI to Composite Video converter • NTSC/PAL auto recognition	$3399.00
V-R563P-SDI 	5.6"	3	3 D(2.5")	960 x 234 (350)		1 (3)		1 (3)								Y	• High resolution LCD panels • Built-in Color Bar Generator • Each channel has Hi-Res 10-bit SDI to Composite Video converter	$2799.00
V-R63P-SDI 	5.8" wide	3	3 D(2.5")	1200 x 234 (300)		1 (3)		1 (3)								Y	• Wide Screen Hi Res panels with 16:9 to 4:3 ratio switch • Each ch. has 10-bit D/A converter • Blue screen when signal not present • Input config. stored in memory, when unit is off • NTSC/PAL configuration switch • Active loop through; Bar Generator	$3699.00
V-R72P-2SD NEW 	7" wide	2	3 D(2.5")	800 x 480 x RGB (380 1.2 TFT MEGAPIXEL	1 (2)	1 (2)	1 (2)	1 (2)								Y	•1.2 TFT-Megapixel 7-inch wide screen with 800 x 480 x RGB Dots • 100% digital processing • Bright 380 cd/m² luminance • 400:1 ratio of contrast between black and white • 4:3 and 16:9 screen aspect ratios • Standard multiformat inputs • Built in Color Bars	$2899.00
V-R82DP-2SDI NEW 	8.4"	2	4 D(1.5")	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL				2 (4)								Y	• 1.44 million TFT-MegaPixel / 8.4 inch screens • 100% digital processing • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • On Screen Display (OSD) and Blue "Gun"	$2999.00
V-R82DP-SD NEW 	8.4"	2	4 D(1.5")	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL	1 (2)	1 (2)	1 (2)	1 (2)		1 (2)	1 (2)					Y	• 1.44 million TFT-MegaPixel / 8.4 inch screens • SDI plus all HD/SD analog signals • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • On Screen Display (OSD) and Blue "Gun"	$3699.00
V-R102DP-2SDI COMING SOON 	10.4"	2	5 D(1.5")	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL				2 (4)								Y	• Large 10.4- inch screens /1.44 TFT-MegaPixel • 100% digital processing • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • On Screen Display (OSD) and Blue "Gun"	$3399.00
V-R102DP-SD COMING SOON 	10.4"	2	5 D(1.5")	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL	1 (2)	1 (2)	1 (2)	1 (2)		1 (2)	1 (2)					Y	• Large 10.4- inch screens /1.44 TFT-MegaPixel • SDI plus all HD/SD analog formats/frame rates • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • On Screen Display (OSD) and Blue "Gun"	$3999.00

LCD Racks
SDI

V-R171P-SDI

V-R191P-SDI

Display	# of Displays	Rack Spaces (Rack Depth)	Resolution (Backlight in cd/m² luminance)	Inputs-Video per Display (Total) S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	Inputs-Audio SDI Embedded	AES/EBU	Balanced XLR	Unbalanced RCA	Tally	Features	Price
17" wide	1	6 D(2.5")	1280 x 768 x RGB (450)	1	1		1		1						Y	• High Resolution wide screen 1280 x 768 Dots with 2.95 million pixels • CRT style viewing radius - 170° in any direction provides superior visibility • Bright 450 cd/m² luminance produces enhanced image quality • 500:1 contrast ratio • 4:3 and 16:9 screen aspect ratios • Built-in Color Bars • Easy to see three color tally indicators	$3499.00
19"	1	8 D(2.5")	1280 x 1024 x RGB (300)	1	1		1		1						Y	• High Resolution LCD panel,1280 x 1024 pixels, 1,310,720 total • CRT style viewing radius - 170° in any direction provides superior visibility • 500:1 contrast ratio, 4:3 and 16:9 screen aspect ratios for DTV operations • Standard multiformat inputs: composite, Y/C and SDI with active loop through. plus VGA/XVGA input with automatic scaling • SDI input with standard 10-bit composite output is provided using 12-bit Digital to Analog processing • Three color tally indicators	$3995.00

LCD Racks
High Definition

V-R44P-HDSDI NEW

V-R653P-HDSDI NEW

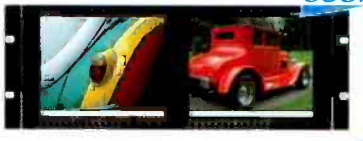
V-R72P-2HDA NEW

V-R72P-2HDSDI NEW

V-R72P-2HD NEW

V-R72P-AFHD NEW

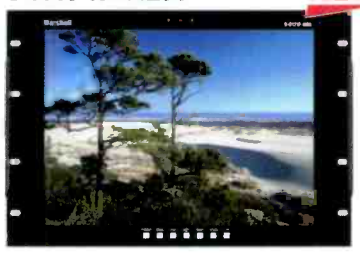
V-R82DP-HDA COMING SOON



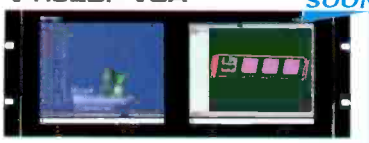
V-R82DP-HDSDI COMING SOON

Display	# of Displays	Rack Spaces (Rack Depth)	Resolution (Backlight in cd/m² luminance)	Inputs-Video per Display (Total) S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	Inputs-Audio SDI Embedded	AES/EBU	Balanced XLR	Unbalanced RCA	Tally	Features	Price
3.5"	4	2 D(1.5")	640 x 480 x RGB (250) 1 TFT MEGAPIXEL					1 (4)							Y	• Four 3.5-inch Advanced Definition 4:3 screens • Bright 300 cd/m² luminance • 350:1 ratio of contrast between black and white • 4:3 and 16:9 screen aspect ratios for DTV applications • Works with all SMPTE/ITU SDI/HDSDI production formats and frame rates	$3999.00
6.5" wide	3	3 D(2.5")	800 x 480 x RGB (500) 1.2 TFT MEGAPIXEL					1 (3)							Y	• 3 High Resolution 6.5-inch 1.2 TFT-MegaPixel wide screens • 100% digital processing • Bright 300 cd/m² luminance • 500:1 ratio of contrast between black and white • 4:3 and 16:9 screen aspect ratios • Works with all SMPTE/ITU SDI/HDSDI production formats and frame rates	$3999.00
7" wide	2	3 D(2.5")	800 x 480 x RGB (380) 1.2 TFT MEGAPIXEL	1 (2)	1 (2)	1 (2)				1 (2)					Y	• 2 High Resolution 7-inch 1.2 TFT-MegaPixel wide screens • Analog Signals converted to 10 bit digital • Bright 380 cd/m² luminance • 400:1 ratio of contrast between black and white • 4:3 and 16:9 screen aspect ratios • Works with all SMPTE/ITU SDI/HDSDI production formats and frame rates	$2899.00
7" wide	2	3 D(1.5")	800 x 480 x RGB (380) 1.2 TFT MEGAPIXEL					1 (2)							Y	• 2 High Resolution 7-inch 1.2 TFT-MegaPixel wide screens • 100% digital processing • Bright 380 cd/m² luminance • 400:1 ratio of contrast between black and white • 4:3 and 16:9 screen aspect ratios • Works with all SMPTE/ITU SDI/HDSDI production formats and frame rates	$2999.00
7" wide	2	3 D(2.5")	800 x 480 x RGB (380) 1.2 TFT MEGAPIXEL	1 (2)	1 (2)	1 (2)		1 (2)							Y	• 2 High Resolution 7-inch 1.2 TFT-MegaPixel wide screens • 100% digital processing • Bright 380 cd/m² luminance • 400:1 ratio of contrast between black and white • 4:3 and 16:9 screen aspect ratios • Works with all production formats and frame rates	$3999.00
7" wide	2	3 D(2.5")	800 x 480 x RGB (380) 1.2 TFT MEGAPIXEL	1 (2)	1 (2)			1 (2)							Y	• 2 High Resolution 7-inch 1.2 TFT-MegaPixel wide screens • 100% digital processing • Bright 380 cd/m² luminance • 400:1 ratio of contrast between black and white • 4:3 and 16:9 screen aspect ratios • Blue Gun for color adjustment • 6 Frame Marker Overlays with Center Mark	$4499.00
8.4"	2	4 D(1.65")	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL	1 (2)	1 (2)	1 (2)			1 (2)	1 (2)					Y	• 1.44 million TFT-MegaPixel / 8.4 inch screens • Accepts all analog HD/SD formats/frame rates • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • On Screen Display (OSD) and Blue "Gun"	$3099.00
8.4"	2	4 D(1.65")	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL					1 (2)							Y	• 1.44 million TFT-MegaPixel / 8.4 inch screens • 100% digital processing of HDSDI/SDI • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • On Screen Display (OSD) and Blue "Gun"	$3399.00

LCD Racks
High Definition

Display	# of Displays	Rack Spaces (Rack Depth)	Resolution (Backlight in cd/m² luminance)	Inputs-Video per Display (Total) S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	Inputs-Audio SDI Embedded	AES/EBU	Balanced XLR	Unbalanced RCA	Tally	Features	Price
V-R82DP-HD COMING SOON																	
	8.4"	2	4 D(1.5")	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL	1 (2)	1 (2)	1 (2)		1 (2)	1 (2)	1 (2)					Y	• 1.44 million TFT-MegaPixel / 8.4 inch screens • Accepts all HD/SD formats/frame rates • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • On Screen Display (OSD) and Blue "Gun"	$4299.00
V-R842P-AFHD NEW																	
	8.4"	2	4 D(2.16")	1024 x 768 x RGB (400) 2.4 TFT MEGAPIXEL	1 (2)	1 (2)	1 (2)		1 (2)	1 (2)	1 (2)					Y	• High Definition Resolution 8.4-inch 2.4 TFT-MegaPixel screen • Analog Signals converted to 10 bit digital • Bright 400 cd/m² luminance • 400:1 ratio of contrast between black and white • Build-In Color Bar Generator • Standard Multiformat Inputs • Blue Gun for color adjustment • Zoom function Build-in Color Bars 6 Frame Marker Overlays with Center Mark	$5999.00
V-R102DP-HDA COMING SOON																	
	10.4"	2	5 D(1.5")	800 x 600 x RGB (600) 1.44 TFT MEGAPIXEL	1 (2)	1 (2)	1 (2)			1 (2)	1 (2)					Y	• Large 10.4- inch screens /1.44 TFT-MegaPixel • Accepts all analog HD/SD formats/frame rates • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • On Screen Display (OSD) and Blue "Gun"	$3399.00
V-R102DP-HDSDI COMING SOON																	
	10.4"	2	5 D(1.5")	800 x 600 x RGB (600) 1.44 TFT MEGAPIXEL				1 (2)								Y	• Large 10.4- inch screens /1.44 TFT-MegaPixel • 100% digital processing of HDSDI/SDI • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • On Screen Display (OSD) and Blue "Gun"	$3699.00
V-R102DP-HD COMING SOON																	
	10.4"	2	5 D(1.5")	800 x 600 x RGB (600) 1.44 TFT MEGAPIXEL	1 (2)	1 (2)	1 (2)		1 (2)	1 (2)	1 (2)					Y	• Large 10.4- inch screens /1.44 TFT-MegaPixel • Accepts all HD/SD formats/frame rates • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • On Screen Display (OSD) and Blue "Gun"	$4599.00
V-R171P-HDA NEW																	
	17"	1	7 D(3")	1280 x 1024 x RGB (300)	1 (2)	1 (2)	1 (2)		1 (2)	1 (2)	1 (2)					Y	• SXGA 1280 x 1024 pixels, 16.7 million colors • Compact - fits in EIA standard rack 8U high • VESA 75 mount for wall, ceiling or desk top • 170° CRT style viewing angles • V-Mount battery adapter • Composite/Component/DVI/VGA inputs	$2995.00
V-R171P-HD																	
	17" wide	1	6 D(2.5")	1280 x 768 x RGB (450)	1	1	1		1	1						Y	• Rack mount and Desktop configurations • High Resolution wide screen 1280 x 768 Dots • Bright 450 cd/m² luminance • CRT style viewing radius - 170° in any direction • 500:1 contrast ratio • Pixel response less than 23 ms • 16:9 and 4:3 screen aspect ratios • Built-in Color Bar Generator • 6 Frame Marker Overlays with Center Mark	$4399.00
V-R231P-AFHD COMING SOON																	
	23" wide	1	6 D(2.5")	1920 x 1200 x RGB (250) NATIVE RESOLUTION 1920 x 1080 DISPLAY	1	1	1		1	1	1					Y	• Totally Digital WUGA 6.9 Megapixel 1920 x 1200 display • Native HD/SD screen formats (640, 720, 1080 vertical lines) in TFT Pixel-to-Pixel™ mode • CRT style viewing radius - 176° in any direction • Bright 250 cd/m² luminance • CRT style viewing radius - 170° in any direction • 500:1 contrast ratio • 16:9 and 4:3 screen aspect ratios • All analog signals internally converted to 24 bit component digital with 5 line adaptive filter • 6 Frame Marker Overlays with Center Mark	$5999.00

LCD Racks
DVI/VGA

	Display	# of Displays	Rack Spaces (Rack Depth)	Resolution (Backlight in cd/m² luminance)	Inputs-Video per Display (Total) S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	Inputs-Audio SDI Embedded	AES/EBU	Balanced XLR	Unbalanced RCA	Tally	Features	Price
V-R44P-DVI COMING SOON 	4"	4	2 D(1.9")	840 x 480 x RGB (300) 1 TFT MEGAPIXEL							1 (4)					Y	• Four 3.5-inch Advanced Definition 4:3 screens • 100% digital processing of DVI/VGA signals • Widest quad screen viewing radius available - 130° • Brightest quad screen available - 380(cd/m²) • 4:3, 16:9, and 4:3 of 16:9 DTV aspect ratios • On Screen Display (OSD) and Blue "Gun"	$3599.00
V-R82DP-VGA COMING SOON 	8.4"	2	5 D(1.5")	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL						1 (2)	1 (2)					Y	• For PC signals up to SXGA resolution (1280x1040) • 1.44 million TFT-MegaPixel / 8.4 inch screens • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • On Screen Display (OSD) and Blue "Gun"	$1799.00
V-R102DP-VGA COMING SOON 	10.4"	2	5 D(1.5")	800 x 600 x RGB (600) 1.44 TFT MEGAPIXEL						1 (2)	1 (2)					Y	• For PC signals up to SXGA resolution (1280x1040) • Large 10.4 inch High Res screens • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 600 (cd/m²) brightness modification • On Screen Display (OSD) and Blue "Gun"	$1999.00

LCD Racks
Quads

	Display	# of Displays	Rack Spaces (Rack Depth)	Resolution (Backlight in cd/m² luminance)	Inputs-Video per Display (Total) S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	Inputs-Audio SDI Embedded	AES/EBU	Balanced XLR	Unbalanced RCA	Tally	Features	Price
V-R151P-4 	15.1"	1	6 D(2.25")	1024 x 768 x RGB (250)	1	4				1						N	• Compact - only 6U for 15" LCD • Hi Res LCD panel • Built-in Quad Splitter with on screen display • Freeze-zoom function and PIP capability • Available in NTSC or PAL config. (V-R151P-4-PAL)	$2699.00
V-R154P 	15.1"	1	8 D(3.33")	1024 x 768 x RGB (250)	1	4				1				8		Y	• Hi Resolution LCD panel • Built-in 125 channel cable ready TV tuner (NTSC only) • Built-in speakers • Built-in Quad Splitter with on screen display • Freeze-zoom function and PIP capability • Built-in audio bar graph display • Headphone output • Available in NTSC or PAL config. (V-R154P-PAL)	$4995.00
V-RD151-4 	15.1"	1	1 D(22")	1024 x 768 x RGB (250)	1	4				1					2	N	• High Resolution 1024 x 768 pixels, 786,432 total • Bright 250 cd/m² luminance • 4 Video inputs with 75Ω termination and active loop through feature • Ultra-compact design fits in EIA standard rack 1U high • Built-in Quad Splitter/Sequential Switcher • Available in NTSC or PAL format • Key lock for secure transportation	$2699.00
V-R171P-4 	17"	1	8 D(2.5")	1280 x 1024 x RGB (250)	1	4				1						N	• High Resolution 17" LCD monitor • Best viewing angle in the Industry - 170° in any direction • Menu driven 4:3 or 16:9 ratio switch • Built-in Quad Splitter with on-screen display • Freeze-zoom function and PIP capability • With optional HDSDI to VGA converter can accept 1080i or 720p • Only 2.5" deep • Available in NTSC or PAL config. (V-R171P-4-PAL)	$3699.00

LCD Racks

Audio + Video

V-R81PA

V-R71PA-SDI

Display	# of Displays	Rack Spaces (Rack Depth)	Resolution (Backlight in cd/m² luminance)	Inputs-Video per Display (Total)						Inputs-Audio				Tally	Features	Price
				S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	SDI Embedded	AES/EBU	Balanced XLR	Unbalanced RCA			
7.9"	1	4 D(2.65")	1400 x 234 (350)	1	2								4		Y	• Built-in speakers / Headphone output • Ability to choose any audio input to any speaker independently • NTSC/PAL auto recognition • 4 channel bar graph display • Low cost	$1999.00
7" wide	1	3 D(2.65")	1440 x 234 (400)	1	1		1				4	2	4		N	• Wide Screen Hi Res panel with 16:9 to 4:3 ratio switch • Accepts all types of audio/video inputs • 4 channel high res bar graph display • NTSC/PAL auto detection • Active loop through; Bar Generator • Revolutionary Class D digital audio amplifier offers 5W per channel	$3299.00

LCD Racks

Pull-Out Drawers

V-RD151-4

V-RD151P

Display	# of Displays	Rack Spaces (Rack Depth)	Resolution (Backlight in cd/m² luminance)	Inputs-Video per Display (Total)						Inputs-Audio				Tally	Features	Price
				S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	SDI Embedded	AES/EBU	Balanced XLR	Unbalanced RCA			
15.1"	1	1 D(22")	1024 x 768 x RGB (250)	1	4				1					2	N	• High Resolution 1024 x 768 pixels, 786,432 total • Bright 250 cd/m² luminance • 4 Video Inputs with 75Ω termination and active loop through feature • Ultra-compact design fits in EIA standard rack 1U high • Built-in Quad Splitter/Sequential Switcher • Available in NTSC or PAL format • Key lock for secure transportation	$2699.00
15.1"	1	1 D(22")	1024 x 768 x RGB (250)	1	1				1					2	N	• High Resolution 1024 x 768 pixels, 786,432 total • Bright 250 cd/m² luminance • Video and S-Video inputs with 75Ω termination and active loop through feature • Ultra-compact design fits in EIA standard rack 1U high • Built-in Speakers • NTSC/PAL recognition • Key lock for secure transportation	$2199.00

Monitors

VGA

V-R84DP-VGA COMING SOON

V-R104DP-VGA COMING SOON

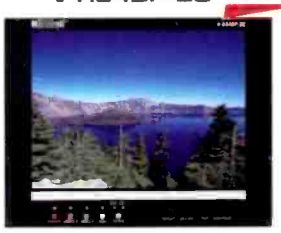
Display	Resolution (Backlight in cd/m² luminance)	Inputs								Dimentions	Tally	Features	Price
		S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	Audio				
8.4"	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL						1	1		3.62" x 3.32" x 0.95"	N	• Easy to View 8.4-inch screen • 800x600 Dots (1.44 million RGB pixels) • 100% digital processing • 5 Year /50,000 backlight life • 10 bit Analog to Digital conversion • Wide viewing angle - 130° • 500 (cd/m²) luminance • 500:1 contrast ratio • Response rates less than 25 ms • 4:3 and 16:9 screen aspect ratios • Direct access for all adjustments • Durable metal enclosure • Configurable ¼ 20 Mounting • Operates on 12 VDC	$999.00
10.4"	800 x 600 x RGB (600) 1.44 TFT MEGAPIXEL						1	1		3.62" x 3.32" x 0.95"	N	• Large 10.4-inch screen • 800x600 Dots (1.44 million RGB pixels) • 100% digital processing • 5 Year /50,000 backlight life • 10 bit Analog to Digital conversion • Wide viewing angle - 130° • 600 (cd/m²) luminance • 500:1 contrast ratio • Response rates less than 25 ms • Direct access for all adjustments • Durable metal enclosure • Configurable ¼ 20 Mounting • Operates on 12 VDC	$1199.00

Monitors
Composite

	Display	Resolution (Backlight in cd/m² luminance)	Inputs: S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	Audio	Dimentions	Tally	Features	Price
V-LCD3.5-PRO NEW 	3.5"	480 x 234 (250)		1							3.62" x 3.32" x 0.95"	N	• High resolution LCD Panel • Bright 250 cd/m² luminance • NTSC only • Miniature and lightweight package • Optional stand • Optional Power Supply (V-PS12-500) • Weighs only 0.32 lbs	$399.00
V-LCD4-PA 	4"	480 x 234 (210)		1							6" x 4.5" x 2.5"	N	•Plastic cabinet with 1/4" mount •Sound and brightness control •Built-in speaker and removable stand •Power supply and RCA to BNC adapter are included •Available in NTSC or PAL format •Weighs only 1.12 lbs	$299.00
V-LCD4-PRO-L 	4"	480 x 234 (250)		2							5.51" x 3.62" x 1.81"	N	• Heavy Duty compact metal cabinet with brushed aluminum finish has 1/4" mount for ease of installation • Switchable dual video BNC inputs • Color, tint, contrast and brightness control • Wide viewing angle • Active loop through feature • Weighs only 0.92 lbs	$399.00
V-LCD4-PRO-L-KIT 	4"	480 x 234 (250)		2							5.51" x 3.62" x 1.81"	N	**Kit includes:** • V-LCD4-PRO-L • Weather Proof Caring Case • High Capacity Battery • Charger • Can run up to 1 hour and 20 min on the battery	$474.00
V-LCD5.6-PRO 	5.6"	960 x 234 (250)		1						1	6.4" x 5.3" x 2.0"	N	• Plastic cabinet with 1/4" mount • Side mounted volume, color, contrast and brightness controls • Power supply and adapter cables included • Built-in speaker • Measures 6.4"W x 5.3"H x 2.0"D • Weighs only 1.14 lbs	$399.00
V-LCD5.6-PRO-KIT 	5.6"	960 x 234 (250)		1						1	6.4" x 5.3" x 2.0"	N	**Kit includes:** • LCD5.6-PRO • Padded Caring Case • High Capacity Battery • Charger • Cables • Can run up to 1 hour and 45 min on the battery	$429.00
V-ASL7000 NEW 	7" wide	1440 x 234 (200)		2						2	7.375" x 4.625" x 1.0"	N	• NTSC VHF/UHF/CATV (cable ready) 125 channel tuner built-in • 2 Composite NTSC plus 2 Mono Audio inputs • Composite NTSC output • Built-in FM Transmitter 87.5 to 89.5 MHz • Will work from 10V to 16V DC • Weight only 1.75 lbs	$549.00
V-ASL7070 NEW 	7" wide	1440 x 234 (200)		2						2	7" x 4.75" x 1.0"	N	• Low Cost Wide Screen Field Monitor • NTSC/PAL System Selectable • Mirror Mode • Headphone Jack with volume control • IR Audio for wireless headphone • On Screen Display (OSD) for adjustment functions	$499.00

Monitors

Composite

	Display	Resolution (Backlight in cd/m² luminance)	Inputs: S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	Audio	Dimentions	Tally	Features	Price
 V-R70DP NEW	7" wide	800 x 480 x RGB (380) 1.2 TFT MEGAPIXEL	1	2							7.60" x 5.16" x 2.16"	Y	• High Resolution 7-inch wide screen 800xRGBx480 Dots with 1.2 million pixels • Optical grade polycarbonate screen cover • Analog signals converted to 10 bit digital • Bright 380 cd/m² luminance • 400:1 ratio of contrast between black and white luminance • 4:3 and 16:9 screen aspect ratios • "V" Mount battery adapter included • Built in Color Bars • Blue Screen for color adjustment	$999.95
 V-LCD8-PRO	7.9"	1440 x 234 (350)	1	1							9.41" x 6.25" x 1.50"	N	• Plastic cabinet with 1/4" mount • Bright and vivid color picture • Slim, portable design • Low power consumption • Accepts composite and S-Video, each with active loop through • NTSC/PAL auto recognition • Power supply included • Weighs only 1.7 lbs	$949.00
 V-R84DP-2C NEW	8.4"	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL		2							9" x 6.875" x 2.50"	Y	• 1.44 million TFT-MegaPixel / 8.4 inch screens • Hyper Process plus Match Color Conversion • Optical grade polycarbonate screen cover • Rugged Enclosure with AR/Scratch Resistant screen • 500 (cd/m²) brightness modification • Includes V-Mount Battery Adapter / 4 Pin XLR Pwr • On Screen Display (OSD) and Blue "Gun"	$1399.00
 V-R104DP-2C NEW	10.4"	800 x 600 x RGB (600) 1.44 TFT MEGAPIXEL		2							10.25" x 8.5" x 2.50"	Y	• 1.44 million TFT-MegaPixel / 10.4 inch screens • Large 10.4 Screen Field Monitor • Optical grade polycarbonate screen cover • Hyper Process plus Match Color Conversion • Rugged Enclosure w AR/Scratch Resistant screen • Includes V-Mount Battery Adapter / 4 Pin XLR Pwr • On Screen Display (OSD) and Blue "Gun"	$1599.00

Monitors

Composite + VGA

	Display	Resolution (Backlight in cd/m² luminance)	Inputs: S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	Audio	Dimentions	Tally	Features	Price
V-LCD12.1-SVGA 	12.1"	800 x 600 x RGB (210)	1	1				1		1	11.50" x 8.75" x 1.25"	N	• Lightweight and portable • Remote control included • Built-in speakers • Optional VESA adapter available (VESA 75mm Adapter V-LCD-VA) • NTSC/PAL switchable • Optional Ceiling Mount ($75.00) • Optional Wall Mount ($75.00) • Low cost • Weighs only 3.25 lbs	$1199.00
V-LCD15 	15.1"	1024 x 768 x RGB (250)	1	1				1		1	15.37" x 12.19" x 2.10"	N	• High resolution LCD panel • Remote control included • Built-in speakers • Optional VESA adapter available (VESA 75mm Adapter V-LCD-VA) • NTSC/PAL switchable • Optional Ceiling Mount ($75.00) • Optional Wall Mount ($75.00) • Weighs only 9 lbs	$1499.00

Monitors

Composite + VGA

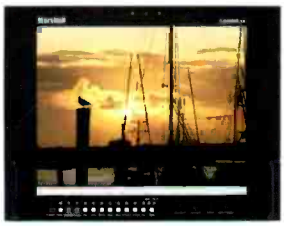
	Display	Resolution (Backlight in cd/m² luminance)	Inputs: S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	Audio	Dimentions	Tally	Features	Price
 V-LCD17	17.0"	1280 x 1024 x RGB (250)	1	1				1		1	16.96" x 14.29" x 2.16"	N	• Best viewing angle in the Industry - 170° in any direction • Software driven 16:9 to 4:3 switch • HD Ready: will accept 1080i or 720p with optional HD/SVGA converter • VESA 75mm mount compliant • NTSC/PAL switchable • Weighs only 12.95 lbs	$2569.00
 V-LCD20	20.1"	640 x 480 x RGB (450)	1	1				1		1	20.08" x 18.90" x 2.36"	N	• Ultra bright 450 cd/m² luminance • Highest contrast ratio 400:1 • Full function remote control • NTSC/PAL switchable • VESA 75mm mount compliant • Weighs only 17.95 lbs	$2799.00

Monitors

SDI

V-R70P-SD NEW 	7" wide	800 x 480 x RGB (380) 1.2 TFT MEGAPIXEL		1		2					7.60" x 5.16" x 2.16"	Y	• High Resolution 7-inch wide screen 800xRGBx480 Dots with 1.2 million pixels • Optical grade polycarbonate screen cover • 100% digital processing • Analog signals converted to 10 bit digital • Bright 380 cd/m² luminance • 400:1 ratio of contrast between black and white luminance • 4:3 and 16:9 screen aspect ratios • Includes V-Mount Battery Adapter / 4 Pin XLR Pwr • Built in Color Bars • Blue Screen for color adjustment	$1499.00
V-R84DP-2SDI NEW 	8.4"	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL				2					5" x 6.875" x 2.5"	Y	• 1.44 million TFT-MegaPixel / 8.4 inch screens • Optical grade polycarbonate screen cover • 100% digital processing • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • Includes V-Mount Battery Adapter / 4 Pin XLR Pwr • On Screen Display (OSD) and Blue "Gun"	$1799.00
V-R84DP-SD COMING SOON 	8.4"	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL	1	1	1	1		1		1	9" x 6.875" x 2.5"	Y	• 1.44 million TFT-MegaPixel / 8.4 inch screens • Optical grade polycarbonate screen cover • SDI plus all HD/SD analog signals • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • Includes V-Mount Battery Adapter / 4 Pin XLR Pwr • On Screen Display (OSD) and Blue "Gun"	$2199.00
V-R104DP-2SDI NEW 	10.4"	800 x 600 x RGB (600) 1.44 TFT MEGAPIXEL				2					10.25" x 8.5" x 2.5"	Y	• Large 10.4- inch screens / 1.44 TFT-MegaPixel • Optical grade polycarbonate screen cover • 100% digital processing • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • Includes V-Mount Battery Adapter / 4 Pin XLR Pwr • On Screen Display (OSD) and Blue "Gun"	$1999.00

Monitors
SDI

	Display	Resolution (Backlight in cd/m² luminance)	Inputs: S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	Audio	Dimentions	Tally	Features	Price
V-R104DP-SD 	10.4"	800 x 600 (600) 1.44 TFT MEGAPIXEL	1	1	1	1		1	1		10.25" x 8.5" x 2.5"	Y	• Large 10.4- inch screens / 1.44 TFT-MegaPixel • Optical grade polycarbonate screen cover • SDI plus all HD/SD analog formats/frame rates • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • Includes V-Mount Battery Adapter / 4 Pin XLR Pwr • On Screen Display (OSD) and Blue "Gun"	$2399.00

Monitors
TV Tuner

V-ASL7000 *NEW* 	7" wide	1440 x 234 (200)		2						2	7.375" x 4.625" x 1.0"	N	• NTSC VHF/UHF/CATV (cable ready) 125 channel tuner built-in • 2 Composite NTSC plus 2 Mono Audio inputs • Composite NTSC output • Built-in FM Transmitter 87.5 to 89.5 MHz • Will work from 10V to 16V DC • Weight only 1.75 lbs	$549.00
V-LCD-12-TV 	12.1"	800 x 600 x RGB (210)	1	1				1		1	11.50" x 8.75" x 1.25"	N	• Lightweight and portable • Remote control included • Built-in speakers • Optional VESA adapter available (VESA 75mm Adapter V-LCD-VA) • NTSC/PAL switchable • Optional Ceiling Mount ($75.00) • Optional Wall Mount ($75.00) • Low cost • Weighs only 3.25 lbs	$959.00
V-LCD15-TV 	15.1"	1024 x 768 x RGB (250)	1	1				1		1	15.37" x 12.19" x 2.50"	N	• High resolution LCD panel • Remote control included • Built-in speakers • Optional VESA adapter available (VESA 75mm Adapter V-LCD-VA) • NTSC/PAL switchable • Optional Ceiling Mount ($75.00) • Optional Wall Mount ($75.00) • Weighs only 9 lbs	$1059.00
V-LCD17-TV 	17.0"	1280 x 1024 x RGB (250)	1	1				1		1	16.96" x 14.29" x 2.16"	N	• Best viewing angle in the Industry - 170° in any direction • Software driven 16:9 to 4:3 switch • HD Ready: will accept 1080i or 720p with optional HD/SVGA converter • VESA 75mm mount compliant • NTSC/PAL switchable • Optional Ceiling Mount ($75.00) • Optional Wall Mount ($75.00) • Weighs only 12.95 lbs	$2059.00
V-LCD20 	20.1"	640 x 480 x RGB (450)	1	1				1		1	20.08" x 16.90" x 2.36"	N	• Ultra bright 450 cd/m² luminance • Highest contrast ratio 400:1 • Full function remote control • NTSC/PAL switchable • VESA 75mm mount compliant • Weighs only 17.95 lbs	$2799.00

High Definition

Display	Resolution (Backlight in cd/m² luminance)	Inputs: S-Video	Composite	Component HD/SD	SDI	HDSDI/SDI	VGA	DVI	Audio	Dimentions	Tally	Features	Price
V-R65P-HD 													
6.5"	800 x 480 x RGB (380) 1.2 TFT MEGAPIXEL		1	1		1	1			7.25" x 4.6" x 2.4"	Y	• High resolution 6.5" wide screen LCD Panel with 1.2 million pixels • Bright 380 cd/m² luminance • Optical grade polycarbonate screen cover • 16:9 and 4:3 screen aspect ratios for DTV app. • Standard multiformat inputs	$3799.00
V-R70P-HDA NEW 													
7"	800 x 480 x RGB (380) 1.2 TFT MEGAPIXEL		1	1						7.60" x 5.16" x 2.16"	Y	• High Resolution 7-inch wide screen 800xRGBx480 Dots with 1.2 million pixels • Optical grade polycarbonate screen cover • 100% digital processing • Analog signals converted to 10 bit digital • "V" Mount battery adapter included • Bright 380 cd/m² luminance • 4:3 and 16:9 screen aspect ratios	$1599.00
V-R70P-HDSDI NEW 													
7"	800 x 480 x RGB (380) 1.2 TFT MEGAPIXEL					1				7.60" x 5.16" x 2.16"	Y	• "V" Mount battery adapter included • High Resolution 7-inch wide screen 800xRGBx480 Dots with 1.2 million pixels • Optical grade polycarbonate screen cover • 100% digital processing • Analog signals converted to 10 bit digital • Bright 380 cd/m² luminance	$1999.00
V-R84DP-HDA COMING SOON 													
8.4"	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL	1	1	1			1	1		9" x 6.875" x 2.5"	Y	• 1.44 million TFT-MegaPixel/8.4 inch screens • Optical grade polycarbonate screen cover • Accepts all analog HD/SD formats/frame rates • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • Includes V-Mount Battery Adapter / 4 Pin XLR Pwr • On Screen Display (OSD) and Blue "Gun"	$1999.00
V-R84DP-HDSDI COMING SOON 													
8.4"	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL					1				9" x 6.875" x 2.5"	Y	• 1.44 million TFT-MegaPixel/8.4 inch screens • Optical grade polycarbonate screen cover • 100% digital processing of HDSDI/SDI • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • Includes V-Mount Battery Adapter / 4 Pin XLR Pwr • On Screen Display (OSD) and Blue "Gun"	$2099.00
V-R84DP-HD COMING SOON 													
8.4"	800 x 600 x RGB (500) 1.44 TFT MEGAPIXEL	1	1	1		1	1	1		9" x 6.875" x 2.5"	Y	• 1.44 million TFT-MegaPixel/8.4 inch screens • Optical grade polycarbonate screen cover • Accepts all HD/SD formats/frame rates • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • Includes V-Mount Battery Adapter / 4 Pin XLR Pwr • On Screen Display (OSD) and Blue "Gun"	$2499.00
V-R841P-AFHD COMING SOON 													
8.4"	1024 x 768 x RGB (380) 2.4 TFT MEGAPIXEL	1	1	1		1	1	1		9" x 6.9" x 2.8"	Y	• High Definition 8.4-inch 2.4 MegaPixel screen • "V" Mount battery adapter included • Optical grade polycarbonate screen cover • Bright 400 cd/m² luminance • 400:1 ratio of contrast between black and white luminance • Blue Gun for color adjustment • Zoom function • 4:3 and 16:9 screen aspect ratios • 6 Frame Marker Overlays with Center Mark • Built- in Color Bars	$3899.00
V-R104DP-HDA COMING SOON 													
10.4"	800 x 600 x RGB (600) 1.44 TFT MEGAPIXEL	1	1	1			1	1		10.25" x 8.5" x 2.5"	Y	• 1.44 million TFT-MegaPixel/10.4 inch screens • Optical grade polycarbonate screen cover • Accepts all analog HD/SD formats/frame rates • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • Includes V-Mount Battery Adapter / 4 Pin XLR Pwr • On Screen Display (OSD) and Blue "Gun"	$2199.00
V-R104DP-HDSDI COMING SOON 													
10.4"	800 x 600 x RGB (600) 1.44 TFT MEGAPIXEL					1				10.25" x 8.5" x 2.5"	Y	• 1.44 million TFT-MegaPixel/10.4 inch screens • Optical grade polycarbonate screen cover • 100% digital processing of HDSDI/SDI • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • Includes V-Mount Battery Adapter / 4 Pin XLR Pwr • On Screen Display (OSD) and Blue "Gun"	$2299.00
V-R104DP-HD COMING SOON 													
10.4"	800 x 600 x RGB (600) 1.44 TFT MEGAPIXEL	1	1	1		1	1	1		10.25" x 8.5" x 2.5"	Y	• 1.44 million TFT-MegaPixel/10.4 inch screens • Optical grade polycarbonate screen cover • Accepts all HD/SD formats/frame rates • Hyper Process plus Match Color Conversion • 50,000 hour backlight half life • 500 (cd/m²) brightness modification • Includes V-Mount Battery Adapter / 4 Pin XLR Pwr • On Screen Display (OSD) and Blue "Gun"	$2699.00

6.5" and 7" Stand Alone Monitor Kits

A range of pre-packaged kits for 6.5" and 7.0" stand alone monitors are available. Each kit includes options that make these monitors even more portable. Every kit is provided at a discounted package price and no substitution of components is allowed. All of the kits include components required for portable operation and include a durable carry case, analog component breakout cable, A.C. stand alone power supply and cleaning wipes. A variety of kits are available with batteries, charger, sun hood, plus Anton Bauer Gold and four pin D.C. power adapter cables. Tough, rugged and lightweight, the carry case provides the safest transportable environment for your monitor. Each case is manufactured with a proprietary HPX™ high performance resin, and features secure Press & Pull latches, automatic pressure relief valve and a durable soft-grip handle. This is the most comfortable, toughest case available. Airtight, watertight, dent & shatter-resistant, our carry case is made to defy the elements.

Part Number	Including	Description	Q-ty	Price
V-R65P-HD-K1	V-R65P-HD RGB-5HD15-6 V-CC1 V-PS12-3.3 V-HWP-K	6.5" HD monitor Analog Video Break-Out Cable Carrying Case A.C. Power Supply Cleaning Wipe	1 1 1 1 10	3899.00
V-R65P-HD-K2	V-R65P-HD-K1 V-PAC-D V-PAC-XLR V-H700P	Anton Bauer Gold Power Adapter 4 pin XLR Power Adapter Viewing Hood	1 1 1 1	3999.00
V-R65P-HD-K3	V-R65P-HD-K2 V-R65-BA IDX-E50S	see above V Mount Battery Adapter Battery	1 1	4399.00
V-R65P-HD-K4	V-R65P-HD-K2 IDX-VL-2Plus	see above 2 Channel Sequential Charger	1 1	4999.00
V-R70-K1	V-CC7 V-PS12-3.3 V-HWP-K	Carrying Case A.C. Power Supply Cleaning Wipe	1 1 10	249.95*
V-R70-K2	V-R70-K1 V-PAC-D V-PAC-XLR V-H700P	see above Anton Bauer Gold Power Adapter 4 pin XLR Power Adapter Viewing Hood	1 1 1 1	449.95*
V-R70-K3	V-R70-K2 IDX-E50S	see above Battery	1 1	649.95*
V-R70-K4	V-R70-K3 IDX-VL-2Plus	see above 2 Channel Sequential Charger	1 1	1185.00*

** Only when purchase with 7" LCD monitor*

Accessories for Stand Alone / Video Assist Monitors

V-H7M
Sun Hood for 7" monitors.
Use for viewing in bright lighting or outdoors.
Price: $99.95

V-H900
Sun Hood for 8.4" monitors.
Use for viewing in bright lighting or outdoors.
Price: $129.00

COMING SOON

V-H10M
Sun Hood for 10.4" monitors.
Use for viewing in bright lighting or outdoors.
Price: TBD

V-ABA-01
V-Mount to Anton Bauer Adapter.
Use to power Marshall Electronics monitors that have V-Mount plate with Anton Bauer Gold Mount battery.
Price: $199.00

V-DV-PWR1
Use the DV-Power pack with Marshall Electronics line of Stand Alone monitors. This product is the perfect solution for users of DV and HDV Camcorders.
Price: $299.00

V-R65-BA
Mount for IDX Batteries.
Attaches to V-R65P-HD monitor.
Price: $150.00

V-CC1, V-CC7
Airtight, watertight, dent & shatter-resistant, carry case for V-R65P-HD.
Price: $199.00

V-LCD-MT-01
Camera Hot Shoe Mount.
Attaches monitor to camera.
Price: $24.95

V-LCD4-ST
Stand. Use for table top mount.
Price: $39.95

V-PAC-D
Power Adapter Cable. Use with Anton Bauer D-type connection.
Price: $60.00

V-PAC-XLR
Power Adapter Cable.Use with 4 Pin XLR connections.
Price: $60.00

RGB-5HD15-X
Component input cable.
HD-15 to BNC breakout cable
(X = Length in feet: 6, 10, 15, 20)
Price: $34.95 to $68.50
(See Page 16 for pricing details)

V-HWP-K
Package of 10 non-toxic, anti-static, alcohol and ammonia free cleaning wipes for LCD displays.
Price: $9.95

Distribution Amplifieres

	In	Out	Features	Price
MD-0114 	1 Composite	4 Composite	• Use in short cable run and desktop/ multimedia applications • Self terminating 75Ω BNC input • 75Ω BNC outputs (4) • Power indicator on front panel • All connections in rear of module • Install in rack or use on the desktop	$89.95
MD-0114-EQ 	1 Composite	4 Composite	• Convenient front panel adjustments of gain and high frequency equalization • Adjustments to compensate for cable runs up to 1000' • Self terminating 75Ω BNC input • 75Ω BNC outputs (4) • All connections in rear of module • Install in rack or use on the desktop	$159.95
BD-0114 	1 Composite	4 Composite	• Signal Bandwidth up to 300Mhz • Use 3 modules for Y-Pr-Pb applications • Self terminating 75Ω BNC input • 75Ω BNC outputs (4) • All connections in rear of module • Install in rack or use on the desktop	$179.95
MD-0512 	1 Component 1 RGBHV	2 Component	• Signal Bandwidth up to 350Mhz • Multiple applications • HD-15 Input Connection self terminating 75Ω • 2 HD-15 Output Connections • All connections in rear of module • Install in wall or use on the desktop	$159.95
MD-0514 	1 Component 1 RGBHV	4 Component	• Signal Bandwidth up to 350Mhz • Multiple applications • HD-15 Input Connection self terminating 75Ω • 4 HD-15 Output Connections • All connections in rear of module • Install in rack or use on the desktop	$179.95
BD-0314 	1 SDI	4 SDI	• Use for distribution of SDI signals 143Mbs to 540Mbs • Self terminating 75Ω BNC SDI input • 4 reclocked and equalized BNC SDI Outputs • Power indicator on front panel • All connections in rear of module • Install in rack or use on the desktop • Can also be used as a signal repeater • Includes power supply	$299.00
BD-0914-D 	1 HDSDI/SDI	4 HDSDI/SDI	• Use for distribution of HDSDI or SDI signals 143Mb/s to 1.5Gb/s • Self terminating 75Ω BNC SDI input with adaptive equalization • 4 buffered and reclocked BNC HDSDI or SDI Outputs • Power indicator on front panel • All connections in rear of module	$699.00

Price: $95.00

V-CRM2

Single RU Conversion and D/A Module Bracket

Single RU (1.75" tall) Conversion and Distribution 2 Module Bracket. Two Marshall Electronics 7.75" wide or one 7.75" plus one 4.75" wide conversion or distribution modules can be securely installed into a standard EIA 19" rack with the V-CRM2 mounting bracket. Every V-CRM2 includes one blank panel and one 4.75" adapter for a clean cosmetic appearance.

Price: $95.00

V-CRM3

Single RU Conversion and D/A Module Bracket

Single RU (1.75" tall) Conversion and Distribution 3 Module Bracket. Up to three Marshall Electronics 4.75" wide conversion or distribution modules can be securely installed into a standard EIA 19" rack with the V-CRM3 mounting bracket. Every V-CRM3 includes two blank panels for a clean cosmetic appearance.

Converters

	In	Out	Features	Price
MC-0201-4 NEW 	4 S-Video	4 Composite	• Compact design can be installed on the tabletop, wall mounted or placed into a standard 19" EIA rack using the optional V-CRM2 rack kit • Full bandwidth conversion of S-Video (Y/C) chrominance and luminance components to composite video • Four channels of conversion in each MC-0201-4. This is a perfect fit for use of S-Video signals with the Marshall Electronics 4 screen monitor set model V-R44P • Low Power consumption less than 10 watt • Operates from 6 Volt DC • S-Video signal loops out for use with downstream equipment like switcher, vision mixer, or VCR	$189.95
C-0301-08 	1 SDI	1 SDI 1 S-Video 2 Composite	• Converts component serial digital signal to analog composite and Y/C • Active loop through for SDI signal with reclocking • Simultaneous outputs for 2 video and 1Y/C (S-video) • PAL/NTSC auto detection with led indicator • Pedestal on/off selection for NTSC signals • 10 bit processing with two-times over sampling • Supports closed captioning • Includes color bar generator	$289.00
C-0301-10 	1 SDI	1 SDI 1 S-Video 2 Composite	• Converts component serial digital signal to analog composite and Y/C • Active loop through for SDI signal with re-clocking • Simultaneous outputs for 2 composite video and 1 Y/C (S-video) • PAL/NTSC auto detection with led indicator • Pedestal on/off selection for NTSC signals • 10-bit digital encoding with 4x over sampling • Supports closed captioning • Includes Color Bar Generator and Power Supply	$379.00
C-0103-08 	1 Composite 1 S-Video	1 SDI	• Converts Composite Video or Y/C to Digital Component (SDI) • Illuminated power and input signal indicators • Adaptive filtering removes NTSC interlace artifacts • 2x over sampling for true color reproduction • 10 Bit analog to digital conversion • 8-bit qauntization of output signal • Supports closed captioning	$495.00
C-0103-10 NEW 	1 Composite 1 S-Video 1 Component	1 SDI	• Converts Component, Composite Video or Y/C to Digital Component (SDI) • Illuminated power and input signal indicators • NTSC or PAL operation with automatic detection • Adaptive filtering removes NTSC interlace artifacts • 2 x over sampling for true color reproduction • 12 Bit analog to digital conversion • 10-bit qauntization of output signal • Supports closed captioning	$575.00
C-0909-AD COMING SOON 	1 Component or 1 S-Video or 1 Composite	2 HDSDI/SDI	• Converts Analog High Definition (SMPTE-260/274/296M) to Digital (HDSDI) • Converts XVGA, SXGA and WXGA to Digital (HDSDI SMPTE-292M) • Converts Analog Composite (PAL/NTSC) to Digital (SDI SMPTE-259M) • Converts Y/C (S-Video) to Digital (SDI) • End to end 10bit processing • 2x over sampling of Composite and Y/C signals • Adaptive comb filter for noise reduction on composite and Y/C signals	$1995.00
C-0909-DA NEW 	1 HDSDI or 1 SDI	1 HDSDI/SDI 1 Component or 1 SDI 1 Component	• Converts HDSDI to Analog High Definition RGBHV or Y-Pr-Pb • Converts HDSDI to XVGA, SXGA and WXGA • Converts SDI to Analog Composite (PAL/NTSC) • Converts SDI to Y/C (S-Video) • Converts SDI to Analog Component RGB/Y, R-Y, B-Y/YUV • Converts SDI to VGA • PAL/NTSC auto detection with led indicator • Active loop through for SDI signal with re-clocking • Automatic detection range of 142Mb/s to 1.485Gb/s • Automatic Compensation of SDI input for cable length up to 1000' • 10-bit processing with 4x over sampling	$999.00
C-0105 NEW 	1 Composite 1 S-Video 1 VGA	1 VGA	• NTSC or PAL operation with automatic detection • Illuminated power and input signal indicators • Converts Composite Video or Y/C (Svideo) to VGA (RGBHV) for display on projectors or data screens • Transforms interlaced 525/625 images to Progressive Scan • Adaptive filtering removes NTSC interlace artifacts • 2x over sampling for true color reproduction. VGA output processed as 4:4:4/RGB • Automatically scales NTSC input to 640x480 RGB Pixel screen format • Automatically scales 525 input to 768x576 RGB Pixel screen format • Automatic Gamma correction. Automatic color space conversion • Seamless switching between VGA and composite or Y/C inputs	$249.00

Accessories

V-R70-2M Price: $95.00

Rack mount adapter kit for all V-R70P and V-R70DP models.
The V-R70-2M can be used to mount any of our 7-inch portables into a standard 19-inch EIA rack. Two monitors can be installed or a single monitor with a blank insert that is included.

V-R84-1M / V-R104-1M Price: $99.00

Rack mount adapter kit for all V-R84DP/V-R104DP models.
A single V-R84DP/V-R104DP model with 8.4/10.4 Inch screen can be installed into a standard 19-inch EIA rack with this kit.

V-CB1

Price: $19.95

Converters and D/A Base Holder for desktop use
For desktop applications like editing and graphics, use the V-CB1 stand to reduce the footprint of the conversion or distribution module. The V-CB1 stand provides a sturdy base with a secure attachement to the module while reducing the desk space to under 4 square inches.

RGB-5HD15-X

RGB-5HD15-6	6ft	$34.95
RGB-5HD15-10	10ft	$39.95
RGB-5HD15-15	15ft	$59.95
RGB-5HD15-25	25ft	$68.50

BNC Breakout Cables
Our RGB-HD-15-X cables are available in 6, 10, 15 and 25 foot lengths and are used to transform individual signals, such as RGBHV from BNC connections to a Female DB/HD-15 connector.

V-BG-P-MS

Price: $249.00

V-BG-PCB-MS

Price: $199.00

Color Bar Generator NTSC/PAL (Handheld and PCB)
Use the V-BG-P-MS portable color bar generator in the field or on the desctop. This dual model runs on a standart 9VDC battery ot on optional external power supply, and is used to generate a full field color bar test pattern as a composite video signal for PAL or NTSC Systems.

Power Supplies

V-PS12-3.3A | V-PS12-500 / V-PS12-1000 | V-PS6-1.2A

Part No	Description	Price
V-PS12-500	12VDC (500mA) regulated power supply w/coax plug	$16.00
V-PS12-1000	12VDC (1A) regulated power supply w/coax plug	$24.95
V-PS12-3.3	12VDC (3.3A) w/coax plug	$79.95
V-PS12-5V-1	12VDC (5A) P/S w/twist lock connector	$89.95
V-PS6-1.2A	6V (1.2A) P/S w/twist lock connector	$39.95

COMING SOON

AV-840 / AV-1040

Pedestal Microphone with 8.4/10.4-inch TFT-MegaPixel Monitor

- **Desktop or recess install**
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- **Microphone PTT/PTM/On/Off**
- **Remote control RS-232, GPI or IR**
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- **500 (cd/m²) brightness**
- **500:1 contrast ratio**
- **Excellent quality moving images**
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- **Security enclosure locks microphone and local adjustments**
- **Lighted Controls**

Use our TFT-MegaPixelT AV-840/AV-1040 as a direct replacement for podium microphones and benefit from the extra versatility of the integrated computer and Audio/Video monitor. The gooseneck microphone is manufactured by our renowned MXL division and delivers maximum clarity while the video/computer display expands the applications where a podium microphone is required. The system can be operated locally or via remote control RS-232 and GPI, plus there are General Purpose Outputs to provide interface to projectors, screens, lights, etc. A Universal voltage DC Power supply is also included for the system and phantom power.

Price: TBD

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Portable news systems:

Smaller, lighter and smarter

BY RICH WILDE

As a cameraman and satellite engineer based in Cyprus in the early 1990s, I used to spend about nine months a year on the road traveling from hotspot to hotspot. I would be sent out with the rest of the team to provide live coverage of everything from the genocide in Rwanda to the war in Chechnya via the inevitable long stints in Sarajevo. It was an exciting, though often dangerous, occupation.

Aside from the obvious buzz of being on-site while history was being made, the sheer logistical nightmare of what we were trying to do made it a job not for the faint-hearted. We would regularly travel with up to 120 flight cases on large satellite deployments, which could be scaled down to about 40 for a more straightforward job.

At around two metric tons, our excess baggage bills shot up into the tens of thousands of dollars, giving us instant VIP treatment from any airline we chose to travel with. Back then though, a 15-minute satellite feed used to be priced at around the $2500 mark. So, although the outlay was high, the rewards of being the first on-site were potentially huge.

However, it was about six months into this exciting new profession that I realized I was becoming a bit of a regular with my chiropractor. Imagine arriving at the Israeli border crossing into Gaza with a flatbed truck full of equipment and being told you had to carry it across into the Occupied Territories (a mere 700ft walk) to load it into a Palestinian truck on the other side — all this in the 100° heat of midsummer.

Lightweight flyaways

I did this for 10 years, until I'd finally had enough of getting shot at. I moved to the UK to become slightly more desk-bound in an operational management role. Much to my chagrin, it was about this time that the first of the lightweight flyaways started to appear. Over the last few years, the technology changed from analog to digital, and the units became smaller, lighter, smarter, lower-cost and easier to operate.

Then 9/11 happened. It was instantly clear there was going to be a lot of international news from often hostile environments that would require, above anything, mobility. Things were going to change, and fast.

Sure enough, the next few months witnessed an explosion in videophone reports and of the much smaller Sony PD150 camcorders over the traditional Betacam units. Although the quality of videophones back then was somewhat dubious, the benefits of being able to have a full kit that weighed the same as your personal luggage were undeniable, not to mention the financial savings that could be made compared with the traditional satellite feeds.

Store and forward

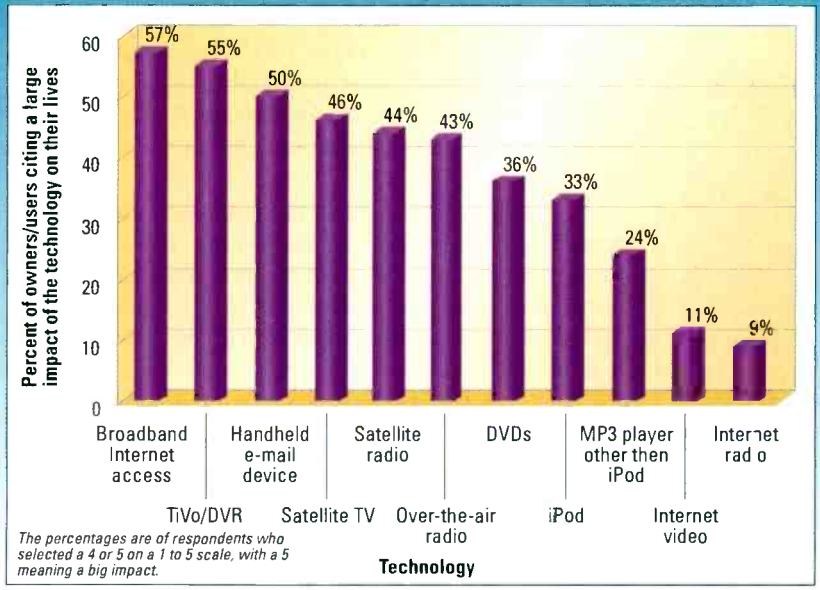
Along with this advance came the development of store-and-forward technology. Using simple FTP protocols, this technology gave journalists in the field the ability to send their news packages over satphone systems (as well as ISDN or landlines where available) back to their stations.

Suddenly, the world of newsgathering was looking like a different beast altogether. Portability and cost-effectiveness gave almost infinite possibilities to an industry where immediacy is crucial.

FRAME GRAB A look at the consumer side of DTV

Impact of technology on consumers

Broadband and TiVo/DVR have the greatest impact



The percentages are of respondents who selected a 4 or 5 on a 1 to 5 scale, with a 5 meaning a big impact.

Source: Arbitron/Edison Media Research *www.arbitron.com/www.edisonresearch.com*

The size of a notebook, this R-BGAN portable satellite terminal from Hughes Network Systems connects to a standard PC using the plug-and-play features available with most Microsoft Windows operating systems.

Live reporting via videophone

However, it took a little while to develop such technology for live applications. Five years ago, BBC News was one of the first to do this, experimenting initially with live transmission of stills of the Dalai Lama from India. Later, it was used for reports from Sierra Leone, providing images as they happened with no storage or transmission delay either by satphone at 64kb/s or by ISDN at up to 128kb/s.

Since then, we have all become used to the live satphone report. Despite improvements in compression standards and bandwidth availability, however, image quality remains less than desirable.

3G takes it a step further

3G mobile telephony is helping with these limitations, and broadcasters are beginning to experiment with the technology. In March of this year, the BBC announced it was introducing 3G video reports to news bulletins from five areas around the UK. The service is provided by Newbury-based All New Video using Radvision technology. It enables news reporters to make video calls to their news studio as part of 10-minute local news segments that viewers can activate interactively. Unlike other 3G services, which work only within the 3G network, this service provides two-way video calls between 3G mobile, ISDN and IP networks.

The image quality of these reports is still not what we term broadcast-quality, but increasingly, news is coming from many sources, not just the professionals. With 70 nonstop news channels around the world, there are more and more opportunities for the man on the street to be the man breaking the news. 3G technology will improve both the quality and immediacy of such contributions.

Live video over IP

The advent of IP-based technology is the next step in the evolution of newsgathering tools. Developments such as IP-based content exchange platforms, for example, will transform newsgathering. Such systems consist of a laptop with the software application and a USB key to gain access to a

VPN, plus an Internet connection. At worst, users would need to take a satphone or regional broadband global area network (R-BGAN) unit with them if there's no Internet access.

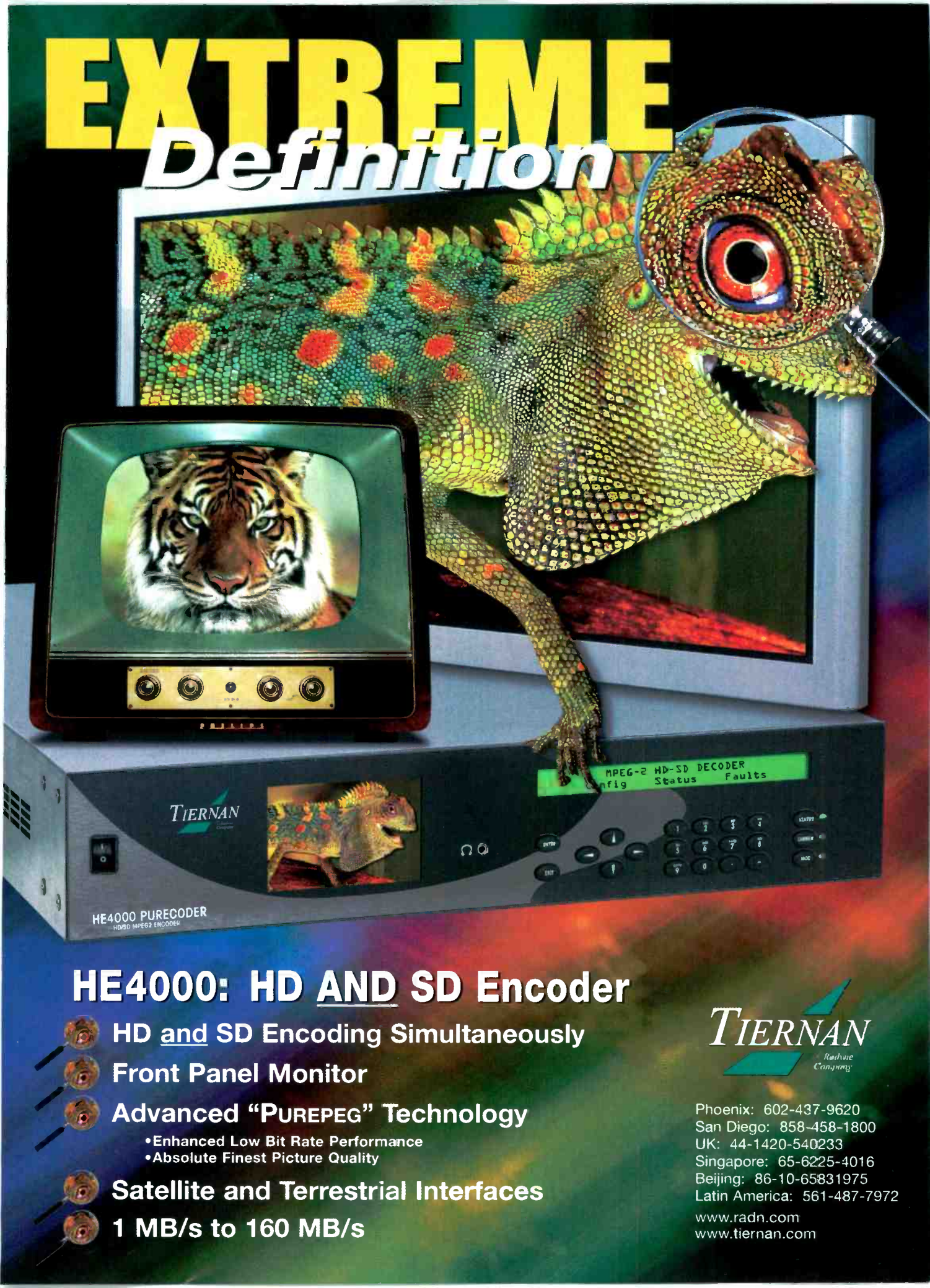
These next-generation store-and-forward systems work in a similar way to e-mail and text messaging. Unlike the traditional store-and-forward solutions, they do not rely on FTP, which is only point-to-point. Instead, these systems offer the advantage of being able to send files simultaneously to multiple recipients using a hybrid of Internet message access protocol (IMAP) and simple mail transfer protocol (SMTP) through a centrally hosted server. Similar to text messaging, users can also set up their preferences to indicate in what format they wish to receive files. The main server then transcodes the incoming signal on-the-fly to match each recipient's requested format.

Users can send packages not only back to London for transmission, for example, but also to the regional bureau simultaneously so it can re-edit them for the later news bulletin. In addition, any file sent is packetized. So, if the connection is lost, users don't need to resend everything. The server will pick up the download from where the users left off. They can even receive text messages on their phones to tell them their files have been received.

However, the Holy Grail in newsgathering terms is the ability to send live broadcast-quality footage from the field. When I used GlobeCast's IP-based WING content exchange platform and a stripped-down version of an MPEG-4 H.264 software encoder running on real-time protocol (RTP) along the lines of a high-quality webcam, I was live in seconds. The delay was slightly less than I was used to over a traditional satellite link. At 128kb/s, the quality was better than anything I'd seen on a videophone. There's also a messaging service attached, so I could chat to the folks at the receiving end. The universal nature of IP-based solutions means that users may use any available network, whether it be public (DSL, WiFi hotspot) or dedicated access (a satellite link, IP VPN). The only requirement is that the connection supports Internet protocol.

So here I am, suddenly able to work anywhere, doing what I was doing 15 years ago. But this time, all I have is a laptop and a small camera. Total weight is less than 20kg. Total price to send a three-minute package costs around $25. BE

Rich Wilde is technical advisor to GlobeCast News and Events.



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HURRICANE SNAPSHOTS

As Hurricane Katrina pounded the Gulf Coast, broadcasters rose to the occasion to keep their viewers informed.

BY PHIL KURZ

Desperate people pleading for help from roofs of flooded homes. Mile upon mile of devastation. Water pouring through broken levees. Fires, looting, a cry for help. Each snapshot of Hurricane Katrina evokes memories sure to live in the nation's consciousness for generations to come.

Broadcasters also have mental snapshots of Hurricane Katrina: climbing atop a downtown tower to see if the station's transmission tower 7mi away is still standing; caravanning to a distant city to set up temporary news operations; or abandoning a studio out of fear of flooding, looting or both. Katrina even uprooted a 16,000-lb concrete tower anchor and flung it into a second-story office.

All of these images and thousands more build a mosaic of what broadcasters experienced and did to fulfill their primary mission: public service. It's impossible to chronicle each broadcaster's story, but knowing even a few reveals just how seriously the broadcasters of New Orleans and the Gulf Coast states take their obligation to serve their communities.

Photo: CNN cameraman Scott McWhinnie (left) and correspondent Jeff Koinange (right) in the flooded streets of New Orleans, nearly two weeks after Hurricane Katrina struck. Photo courtesy Radhika Chalasani, Getty Images for CNN.

HURRICANE

HD eye in the sky: Helinet Aviation Service

SNAPSHOT: *Sunday, Aug. 28, at about the time Katrina was upgraded to a Category 5 hurricane, Helinet Aviation Services headed to Lafayette, LA, with an HD-equipped newsgathering helicopter. What followed were 13 12-hour days of aerial reporting.*

The first look the nation had at Hurricane Katrina's destruction came from taped footage shot by Helinet Aviation Services. Flying behind Coast Guard helicopters, company owner Alan Purwin and chief technology officer J.T. Alpaugh reached New Orleans about two and a half hours after Katrina hit. They quickly surveyed the damage from the air and realized the historic importance of what they were witnessing.

"I felt it was important to report on what I was seeing. By trade I am not a reporter, but this disaster had to have a voice, so I started reporting," says Alpaugh who sat beside Purwin in the Cineflex HD equipped chopper.

"One of the first things we saw was the amount of flooding, and it was substantial even before the levees broke," he recalls. "Numerous people were on rooftops trying to signal us by waving flags and towels and makeshift signs stating 'Help us.' People were on rooftops everywhere."

Initially, the pair flew to a fire burning in the marina on the south shore of Lake Pontchartrain. "There weren't just a couple of things to shoot," Alpaugh explains. "There were thousands upon thousands of things. You didn't know where to start."

For two hours the pair documented the immediate aftermath of Katrina. As fuel ran low, they flew to Baton Rouge, where they met up with a satellite truck. "Right as it went up, numerous networks were taking it raw," he says. "It wasn't five minutes after we had landed and the images were going out to world."

Share and share alike: WPXL

SNAPSHOT: *WPXL's transmitter site sits on the west bank in New Orleans, a higher area less prone to flooding. That left the station in a position to help the swamped local WDSU and WGNO stations get on the air after losing their transmitters to flood waters.*

Debris-strewn roads limited access to WPXL's transmitter site, so it wasn't until Sept. 1 that Paxson vice president of engineering Dave Glenn and a crew made it to the site. When they arrived, the access road was completely blocked off with fallen trees. Working with a tower crew they had met in Tallahassee, FL, they cut and dragged trees for hours to clear the 1000ft transmitter access road.

When the crew made it in, the site's generator was barely running. It was almost out of fuel, so the first job was to fill the tank with fuel brought from Florida. Next, was a site inspection.

Before arriving at the site, the staff was confident the transmitter sustained limited damage. When they tuned to WPXL, all they saw was black. Their suspicion bore out. A damaged, misaligned STL had taken the station off the air. A couple of hours of repair to the STL re-established the link.

Then Glenn could begin assessing the rest of the damage. "Our main NTSC antenna looked like it was bent; 3in HELIAX was wrapped around guy wires (see photo), and whole arrays of cellular antennas were destroyed," he says.

Prior to going in, Paxson had agreed to carry Hearst-Argyle's WDSU news coverage once the WPXL transmitter was operational. Taking down WDSU's signal at its operation center in Clearwater, FL, Paxson retransmitted it to its own transponder to be received at WPXL and transmitted to New Orleans.

A few days after getting WDSU on, Glenn and his staff returned to the transmitter site to assist Tribune Broadcasting's WGNO in putting the station up on one of its DTV subchannels. Tribune rolled in a satellite receiver at WPXL's transmitter site, and they put the station on the air.

SNAPSHOTS

On the road again: Harris Broadcast

SNAPSHOT: *Knowing the potential devastation Hurricane Katrina might inflict, Harris Broadcast readied a team to help broadcasters in the hurricane's sights. Tribune Broadcasting's WGNO in New Orleans benefited from that preparation.*

Following the blackout period after the hurricane, one New Orleans broadcaster in need of help was WGNO. A helicopter survey of its transmitter site showed a watermark 6ft high on the doors, indicating the transmitters had been submerged.

"The first priority was to get the analog WGNO on the air," says Joseph Seccia, Harris Broadcast's Katrina project manager. "Unfortunately, we did not have a transmitter in storage or on our test pad that was suitable."

However, WGNO's sister station WTIC in Hartford, CT, recently went on-air with a new PowerCD transmitter and donated its older unit. "In the digital transition era, we are often asked to convert analog transmitters to digital. The task with this transmitter was the opposite," says Seccia.

Tribune contracted United Concrete Products to build two 8ft x 20ft shelters that would be shipped on air-cushioned trailers to New Orleans, where they would be joined to form a temporary transmitter structure.

As work progressed on the shelters, Harris got an exciter and re-tuned the WTIC transmitter. Before decommissioning the transmitter, it was changed in place. Then it was shipped to United Concrete Products.

"The other heroic vendor here was Dielectric," says Seccia. "One of the long lead-time items in a typical IOT transmitter installation is the RF system. A typical six-week item, they built in four days."

Managing this recovery project for Harris has left Seccia with a valuable perspective on disaster response. "What's important in these situations," he says, "is learning to be as flexible as possible with what you have within reach."

Anchors away: WLOX

SNAPSHOT: *With pieces of the station coming apart around them, the 50 employees inside the WLOX building in Biloxi, MS, managed to keep the station on-air, broadcasting vital information to the people of southern Mississippi during Hurricane Katrina.*

"Throughout the day, we experienced hurricane force winds and at some point began to lose pieces of roof over the newsroom," says WLOX vice president and general manager Leon Long, remembering the day Hurricane Katrina made landfall. "We had to evacuate the newsroom, and then we began to lose some areas above the control room. Some of the roof began to disappear."

Things deteriorated even more when an STL tower outside the studio fell and unearthed a 64cu-ft block of concrete, which held a guy wire anchor in place. In the process of falling, the tower's guy wire did not break. As a result, the collapsing tower catapulted the massive piece of concrete — estimated to weigh 16,000lbs — through the second-story roof of the building. Ultimately, it came to rest on the floor of an unoccupied sales office.

"As we started to lose pieces of the building, we moved to the center of building to find the safest possible spot," says Long. "There were 50 people in the building at the time." Through it all, the staff of WLOX kept the station on the air.

While the WLOX studio sustained severe damage, the station's transmitter 27mi away remained unscathed. Much work remains ahead for the station in rebuilding its studio, as it does for most of the station's employees whose homes were damaged or destroyed by Katrina.

In the immediate aftermath of the hurricane, station owner Liberty sent crews from other stations to Biloxi to give the exhausted WLOX staff some relief. "We received a lot of help post Katrina," he says. "Had it not been for the relief crews, this ordeal would have been substantially worse."

Sinking feeling: WDSU

SNAPSHOT: *New Orleans' WDSU temporarily handed its operations to sister-station WESH in Orlando, FL, as its staff moved to WAPT in Jackson, MS. The station resumed operations from Jackson for 10 days before moving to WESH. Photos courtesy Dan Highland.*

After disassembling edit bays and servers and moving them to the second floor of the station's studio the night before Hurricane Katrina struck, WDSU chief engineer Chet Guillot and two-dozen station employees waited in New Orleans.

By 6 a.m. Aug. 29, the station was feeling the full force of the hurricane. Guillot and a few others stepped outside into a protected alcove. "We'd never seen these kinds of winds before," he recalls. "They were taking 6ft x 8ft metal sheets, and the buildings were falling apart and flying through the air."

The crew was watching the tower camera when Katrina took the station off the air at 9:20 a.m. At noon they attempted to drive to the transmitter.

"We weren't even on the road six minutes, and the water in New Orleans was up to the roofs of residential houses," he says.

Unable to proceed, the group returned to the station. In an effort to learn whether Katrina had taken down the tower, Raymond Williams, a WDSU engineer, climbed an ornamental tower on the studio building with a digital camera in tow. From there, he snapped a picture of the station's transmission tower 7mi away.

Video from a helicopter revealed that the transmitter building was submerged beneath 5.5ft of water.

With nowhere to go, the station's crew spent the next few days re-installing the equipment on the second floor. On Aug. 31, the need to evacuate became clear. "There was no water in the building," he says, "but we didn't want to wait for it to arrive or have gangs break into the building."

See ya later alligator: WGNO

SNAPSHOT: *Hurricane Katrina and the broken levees in New Orleans destroyed the transmitters of WGNO. The station moved critical news functions and personnel to WBRZ in Baton Rouge, LA.*

"We had just finished reinforcing our tower, hung new guy wires at the top level and a new antenna," recalls WGNO vice president and general manager Larry Delia. "After Katrina, we found a small alligator, nutrea and fish stuck in chain link fencing around the building. The building and its contents are a total loss."

On Saturday, Aug. 27, Delia called Rocky Daboval, general manager of WBRZ in Baton Rouge, LA, and worked out an agreement to allow his news department to work from WBRZ. With satellite trucks on their way from Houston and Dallas, backhaul of their signal to WGNO's transmitter would not be a problem.

At 2:30 p.m. Sunday, WGNO moved forward with its plan. Five hours later, all but a small contingent of journalists and engineers who volunteered to stay behind were in Baton Rouge to resume their work.

"We ended up integrating both news staffs," says Delia. "It was unprecedented putting two news staffs together that had nothing to do with each other and for eight days put the joint product on my station and theirs, as well as streaming on our Web site."

Relying on others for help extended beyond WBRZ. In an effort to get his station back on the air in New Orleans, Delia made a personal appeal to the president of Entergy, the regional utility, to re-establish service to the New Orleans World Trade Center, where the station had an old transmitter. Within a day, power was flowing, and 12 hours later WGNO engineers had the old unit operational.

Today, WGNO produces its newscasts from two double-wide trailers parked next to its old headquarters. The station's building won't reopen, and a new studio is 18 months away.

SNAPSHOTS

An ounce of prevention: WWL

SNAPSHOT: *Belo-owned WWL stayed on-air in New Orleans throughout Hurricane Katrina. Although rising flood waters came within a few blocks of its studios and forced personnel to relocate, the station's transmitter building and tower remained intact.*

Eight years ago when WWL director of technology and broadcast media Rick Barber moved to New Orleans, he quickly realized something many Big Easy natives lose sight of: The city is below sea level.

"When you are in New Orleans, you are sitting in a bowl with water around it," he says. That knowledge and the opportunity to redesign the station's transmitter site to prepare for digital broadcasting gave Barber the chance he needed to extract WWL from the bowl.

Drawing on U.S. Army Corps of Engineers' studies about the effect hypothetical hurricanes would have on New Orleans, Barber began his transmitter site design. "After I read that data, I became even more concerned about the vulnerability of our studio and transmitter site to the effects of a severe hurricane," Barber says.

His design called for the transmitter building to be elevated on concrete columns 14ft high. He specified solid concrete, tilt-up walls and a double-T concrete roof.

Envisioning loss of utility service after a hurricane, he specified an additional elevated concrete room to house a 1MW generator with a 1500 gallon feed tank and a separate 10,000 gallon reserve tank. To protect the station's new 1049ft tower, Barber insisted it be built to withstand maximum foreseeable wind speeds.

Uneasy about the vulnerability of the station's headquarters in the French Quarter, Barber added a room to the transmitter building to serve as a small production space to keep the station on-air if a hurricane knocked out its studios.

As it became clear Sunday, Aug. 28, that Hurricane Katrina would strike New Orleans, the station executed its emergency plan. Barber and a small group, including talent and production personnel, drove to the mass communications department at Louisiana State University (LSU) in Baton Rouge, LA. After meeting an SNG truck sent from KHOU in Houston, the crew set up an auxiliary studio and a satellite link directly to WWL's transmitter site.

The station sent another crew and talent to the transmitter production room. The setup allowed the station to stay on the air while staff at the main studio could evacuate to a downtown hotel.

For 36 hours, the LSU crew helped keep the station on the air in New Orleans. However, as WWL's evacuated staff began to assemble in Baton Rouge, it became clear a bigger facility was needed. Working out an arrangement with Louisiana Public Broadcasting (LPB), the station set up a temporary facility at the LPB studios in Baton Rouge.

As the WWL news team settled in at LPB and continued its coverage, Barber — escorted by a Belo-hired security team armed with semi-automatic rifles — returned to the transmitter site with a fuel truck to top off the generator's tanks. They met with no problems.

Once Katrina had done her worst, Barber and assistant chief engineer Bob Grass worked with other engineers and technical staff to assess and repair damage to the site. The whole experience has left Barber with a tremendous sense of admiration for his fellow WWL employees — 75 percent to 80 percent of whom lost their homes during the hurricane.

The hurricane has also impressed upon him the vital role of over-the-air broadcasting. "The FCC needs to understand the importance of local over-the-air broadcasting in times like this," he says.

Above all, the experience confirmed the fundamental truth of a motto Barber learned as a young man. "I was taught in Boy Scouts to be prepared, and it paid off," Barber says. **BE**

Phil Kurz authors several Broadcast Engineering *e-newsletters, including "News Technology Update," "HD Update," "RF Update" and "Sports Technology Update."*

Harris Automation, along with Leitch servers and routers, provides the backbone for HBO's expansive playout facility. These systems enable HBO to deliver hundreds of services to multiple time zones with associated branding and language elements.

The bottom line on automation

| BY CHRIS LENNON |

It wasn't so long ago that broadcasters first recognized the value of master control automation. In those early days, the key benefits included more reliable playout of commercials and fewer on-air mistakes. Oh, did I mention needing fewer operators? While the later factor may have been the key "unspoken" driver in the purchase of those early systems, that's no longer the case.

Today, broadcasters are looking for ways to deliver more media over more channels, of course without increasing staff. While the early driver of broadcast automation was primarly lower operating costs, the goal today

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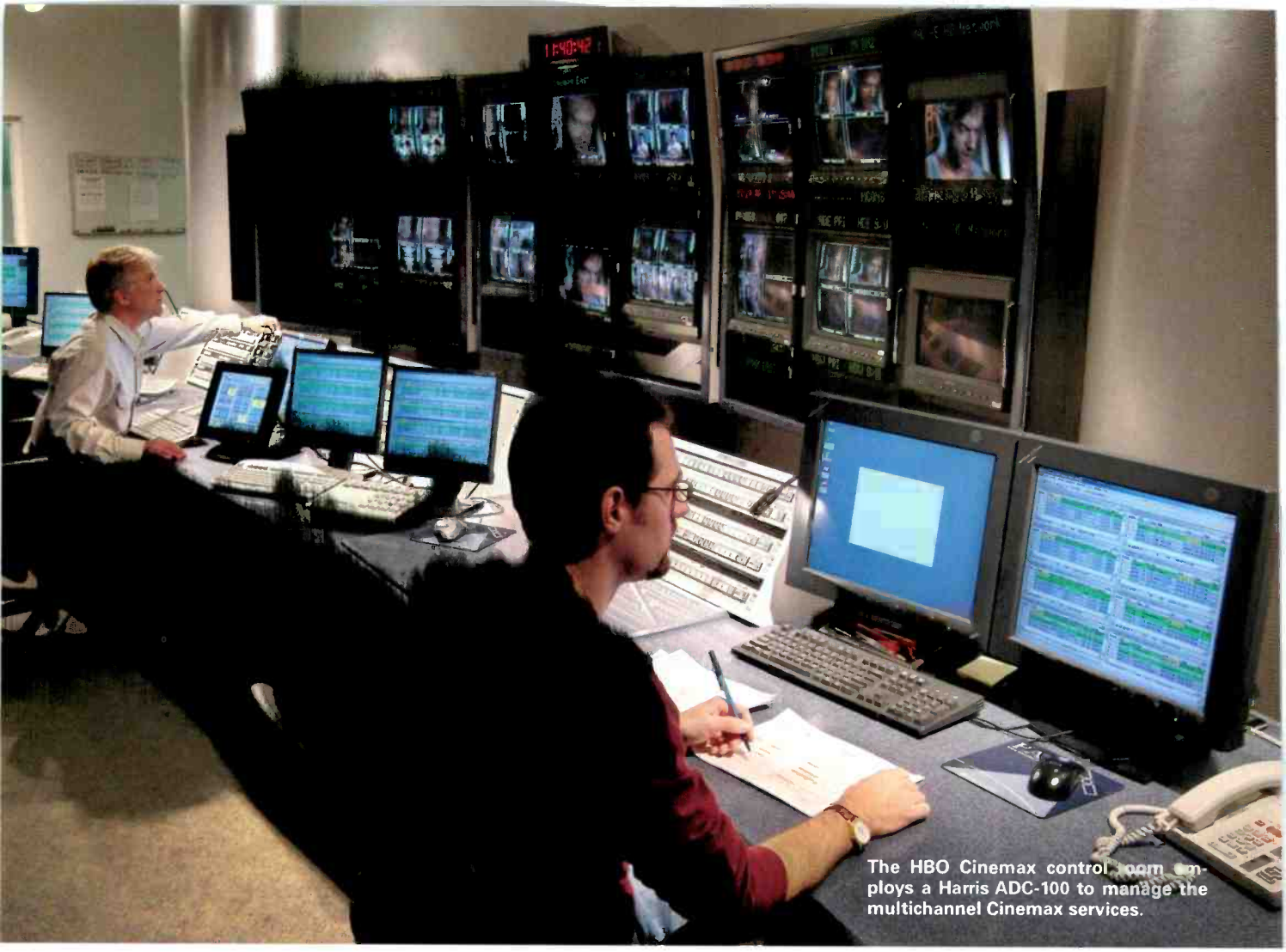

The HBO Cinemax control room employs a Harris ADC-100 to manage the multichannel Cinemax services.

is often additional revenue.

The harsh reality facing broadcasters is that the marketplace is increasingly fragmented by competing fare not just from the traditional players — cable, satellite and now telco — but also from new entertainment sources. These new competitors for the traditional OTA eyeballs include the Internet, video games, home theater, portable video/audio (MP3) players and other entertainment options. If that's not enough to make you cringe, under the current FCC must-carry rules, the cable and satellite companies, who control the pipeline to more than 70 percent of your viewers, are not required to carry any of your secondary DTV channels. What is a station manager to do?

Show me the money

The key to profitability in this highly competitive environment is for stations to repackage and repurpose digital and heritage content. Stations must fill their DTV channels with such unique, innovative and valuable programming that cable and satellite services will choose to carry those channels — and viewers will watch them.

Enough of the challenges. Let's focus on the opportunities. Broadcasters now have multiple channels in which to deliver content to viewers. To fill these secondary DTV channels, stations must explore and embrace new programming models that can attract today's media-savvy viewers. Here are a few possible new revenue-producing streams.

- *Interactive advertising.* These spots enable viewers to request more information using their remote controls.
- *T-Commerce.* These programs and spots enable viewers to purchase a product or service via their remote.
- *Advanced EPGs.* New guides could be advertiser sponsored.
- *Video on-demand.* VOD enables viewers to search a menu of program choices and select a title to watch from that list with their remote.
- *Dynamic pop-up ads.* These moving video ads, snipes or promos pop up on the screen during a program to ensure it will be viewed, even if a DVR is used to skip commercial breaks.
- *Streaming video over the station's Internet site (sponsored, of course).*

To fill these secondary DTV channels, stations must explore and embrace new programming models that can attract today's media-savvy viewers.

• *Mobile TV.* This requires reformatting, new resolutions and post-production. An estimated 125 million mobile handsets will be video-equipped within five years. Who has the hottest content — news and weather? Broadcasters!

Most of these new opportunities will require additional investment. Unfortunately, many broadcasters are still reeling from the money they have already spent on their DTV operations. For that reason alone, many are hesitant to invest again until they see how profitable DTV broadcasting is going to be.

Secret is in the workflow

In order to exploit new DTV programming opportunities, attract new audiences and generate additional revenues, broadcasters will need to make further investments in both automation and digital asset management (DAM) systems. While this capital outlay may be expensive, a solid return on this investment (ROI) can be realized within as little as 12 months.

• Eliminating redundant efforts through centralized storage and media management. Centralized ingest, quality control and edge servers can save enormous amounts of manpower for group stations.

An estimated 125 million mobile handsets will be video-equipped within five years.

Getting to that ROI comes down to:

• Automating time-consuming processes such as ingest, which consume huge amounts of manpower.

• Automating the time-intensive process of finding the media you do have, assuming it resides on servers and other digital storage systems.

• Automating costly, mundane but necessary tasks, such as dubbing tapes and transcoding media files to different formats and resolutions.

• Preventing costly broadcast errors, such as missed commercials because of missing assets, improper timing or incorrect metadata.

• Managing captioning, EBS, video programs description, PSIP and other data services. This will become a huge problem for stations as they begin multichannel operations.

The key is metadata

The enabler of all of these and

Workflows that leverage media metadata provide an efficient means for managing encoding and delivery equipment. HBO uses Harris systems to automate the process of converting movies into different formats as part of its distribution operations.

The Harris ADC-100 provides dual comprehensive redundancy mangement and failover capability.

even more functionality is metadata. Metadata is the hook that enables intelligent broadcast automation and DAM systems to make critical decisions about everything from ingest, to playout, PSIP generation, captioning and EBS — all the way to archive storage and retrieval.

Once the broadcast facility is equipped to define and handle metadata, the next step is to increasingly automate the broadcast workflow. Typical operational tasks include media ingest, video and audio format conversion, media movement, quality control checks, and play-to-air.

When media arrives at the station — whether it is a live satellite feed, a videotape or a digital file — it is typically accompanied by metadata that describes the content. Ideally, both the media and associated metadata are automatically ingested simultaneously, and the two remain associated throughout the content handling workflow process.

Unfortunately, there isn't really a "how to" metadata standard for broadcast automation and asset management. In fact, there isn't even an "official" metadata dictionary. This means that each station needs to carefully consider what metadata is needed, how to define the fields and then map this information to the tasks that need to be completed.

Typically, metadata provides such identifying information as the program title and type, video format, run-time, house number and perhaps usage rights. All of these characteristics must be understood by both the humans and the equipment in your station. Only then can the technology manage the broadcast workflow that must take place in an efficient, automated way.

For example, if the metadata indicates the incoming commercial is 00:00:29:16 long, then an automation system can automatically ingest that media without needing to have an operator manually time it.

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ORT-95012750-1	0.95–12.75 GHz

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Rainbow Network Communications uses Invenio, Harris' media asset management system, to manage the programming and distribution of material for 14 cable network clients.

Considering the amount of programming that pours into the typical station, just having this key piece of information can save tremendous amounts of time and free personnel to perform more important tasks.

A good illustration of how metadata can facilitate a broadcast workflow is shown in Figure 1. The five basic steps show media moving from ingest through file conversion, storage, traffic and delivery to a playout server. Such a workflow is seamless, efficient and operates in the background, leaving the station staff free for other duties.

In addition to the typical OTA playout, other workflow tasks should be handled by the automation platform. This workflow centers on the creation and post-production of content for new delivery platforms.

The automation system should be

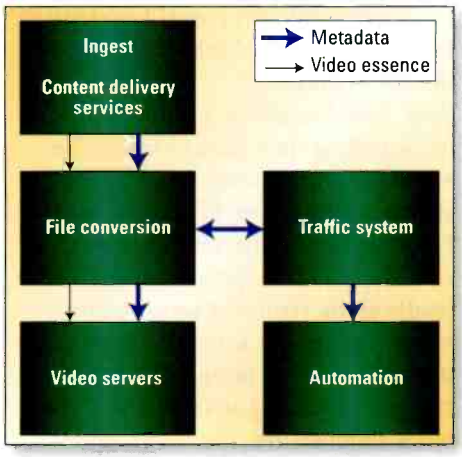


Figure 1. The key to monitizing broadcast content is an integrated metadata flow. The appropriate data must be captured at ingest or generated as the content is produced. For defined media to be fully monitized, the metadata must be accurately maintained through the entire production and transmission process.

able to generate the proper versions and formats for mobile and webcasting operations. These tasks should automatically take place in the background, merely providing reports to the system operators that all the needed versions have been generated and are ready for air or that operator intervention is needed.

FCC requirements

The expansion of DTV means a wealth of new information must be transmitted. These requirements center on generating captions, visual program descriptions, transmitting proper EAS announcements and PSIP.

The FCC has fined several stations this year for failure to provide proper captioning, or permitting excessive commercials in defined children's-programming hours. A properly-implemented automation system could have monitored these operations and either generated the needed captions, prevented the broadcast of too many commercials in kiddy shows or signaled the need for operator intervention.

A station's PSIP signal will increasingly become critical to viewership, and stations will want to be sure their listings are correct and up-to-date. When last-minute changes in programming occur, the automation system should automatically update the PSIP schedule.

With multiple 24-hour channels now the norm, there is no practical way for a station to ensure FCC compliance for all of these requirements without the support of a metadata-equipped automation system.

The need for DAM

To take full advantage of new DTV opportunities, broadcasters will need to make yet another investment in powerful, sophisticated digital asset management capabilities. These new

systems will need to be integrated with the station's broadcast automation.

To achieve maximum workflow benefits, it's vital that the asset management system and broadcast automation products be open, integrated, modular, scalable and Web services-enabled. Using open standards ensures that rich media files will move along the workflow pipeline automatically and efficiently.

In addition to being able to keep the day-to-day operation humming along, an effective DAM should perform the indispensable job of maintaining and updating the vital metadata associated with every media file that is created. Even if you don't want to air that particular piece of content today, you may need it later. Will you be able to find it?

For broadcasters with large libraries, searching for a desired media file without a proper asset management system is like looking for a needle in a haystack. In the time-sensitive broadcast business, time spent searching for media assets results in lost opportunities. The faster a sought-after piece of media can be found, the sooner revenue-producing decisions can be made about its use.

Keeping metadata current

Every day a TV station receives perhaps dozens of commercials, ENG news feeds, live and taped network feeds, and special interest programming, such as video news releases or infomercials — all of which have important metadata attached.

As the media arrives, a sophisticated DAM solution should be able to update the media's own metadata records by adding any house numbers or identifiers, all without human intervention. Once the DAM system is able to generate and update metadata to both traffic systems and automation systems automatically, then operators don't need to get involved. The result is fewer errors.

Time spent searching for media assets results in lost opportunities.

Without this level of integration between a DAM and modern automation system, broadcasters will find it impossible to physically handle all of the tasks related to tracking and managing their ever-growing media archives.

Archives are no longer those dusty, old, barely-labeled tapes in a back room. Today's archive may consist of terabytes of data — all invisibly recorded onto a server. Without a good

DAM, there is no way to monetize that investment.

Building an archive

The process of ingesting a station's existing, tape-based media assets to digital media archives, complete with metadata can seem a monumental process. Some stations may choose to not do so.

Broadcasters also may hesitate to commit to a DAM solution for fear that their investment in building a digital media archive with their chosen metadata method will become obsolete. While it's true that some DAM solutions are closed and proprietary, others are open-standards based, allowing broadcasters to configure their metadata in any manner required.

Without a good DAM, there is no way to monetize that investment.

Ideally, the most seamless interface might result from a single-vendor DAM, traffic, and automation solution. In reality, most installations are hybrids, with bridges between the various components.

The bottom line benefit

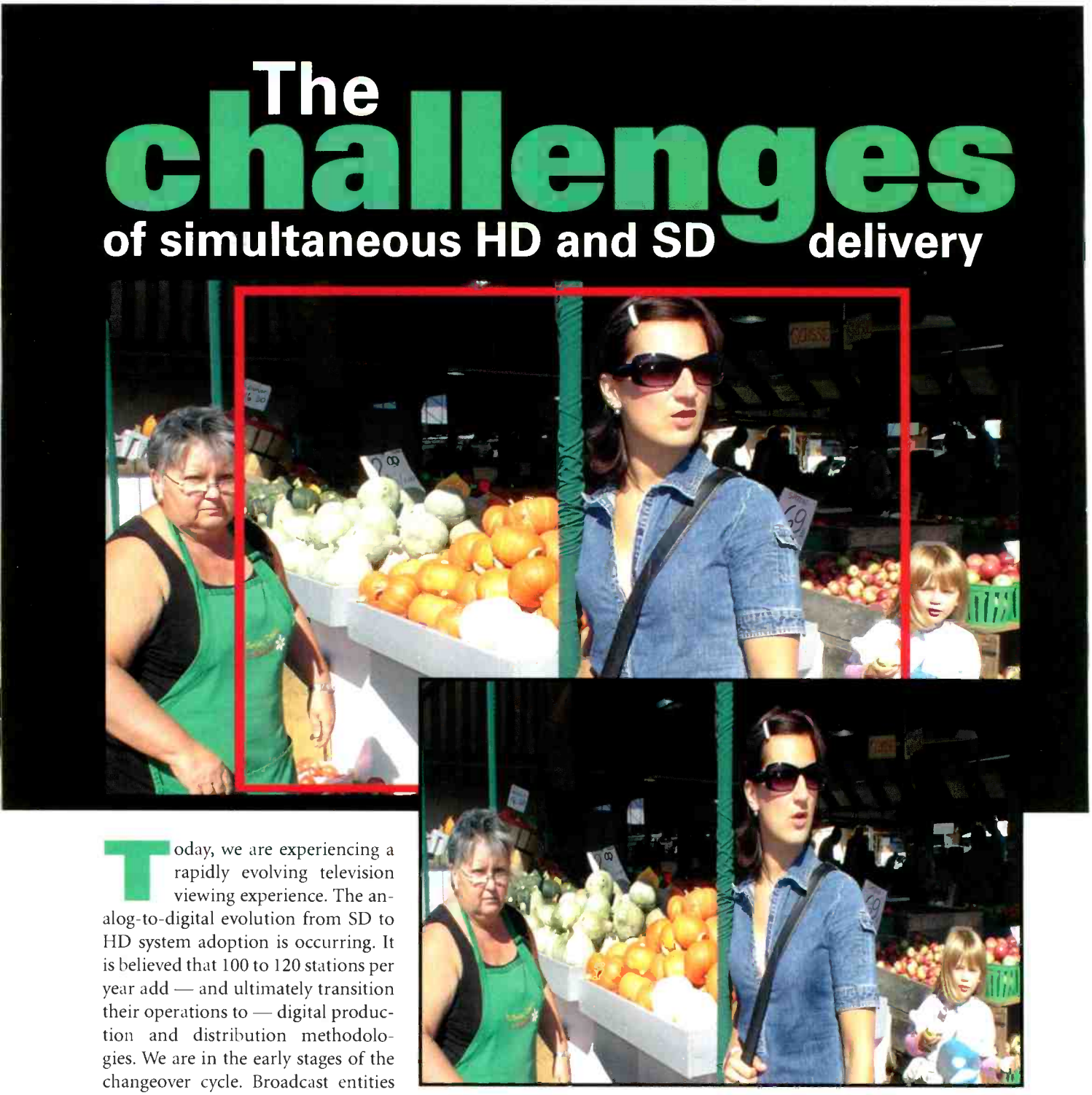
Initially, the digitization of rich media was seen as simply better quality pictures. Today, savvy broadcasters realize that digital media affords them many new benefits beyond a pristine picture. This includes the ability to develop new products and channels along with revenue options that never existed in analog. Stations can now produce, manage and transmit media to additional OTA broadcast channels, station Internet Web sites, VOD and mobile video applications.

For those stations willing to step to the plate by investing in integrated automation and digital asset management tools will be well poised to provide these new services — and reap the accompanying profits. The time to begin considering these opportunities and how your station will take advantage of them is now. **BE**

Chris Lennon is product manager, Automation Solutions, Broadcast Communications Division, Harris.

SPECIAL REPORT: BY TOM OHANIAN

The challenges of simultaneous HD and SD delivery



Today, we are experiencing a rapidly evolving television viewing experience. The analog-to-digital evolution from SD to HD system adoption is occurring. It is believed that 100 to 120 stations per year add — and ultimately transition their operations to — digital production and distribution methodologies. We are in the early stages of the changeover cycle. Broadcast entities tend to go in 10-year cycles, and this transition is proving to be no different. Two years down, eight to go.

Figure 1. Image displayed in its correct aspect ratio on a 16:9 screen with a center cut for 4:3 viewing (top). Below that is the same anamorphic image displayed on a 4:3 screen.

SD and HD adoption

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and economic hurdles of shooting some form of HD are no longer barriers to adoption.

Similarly, as more stations offer HD broadcasts, we will naturally see the creation of HD-originated programming. Whether or not we experience the immediate cutoff of SD broadcasts, today's television program makers will constantly be reminded of the complexities of feeding both SD and HD audiences.

The solution for the producer is to shoot for the 16:9 aspect ratio but protect the important aspects of the image for the 4:3 aspect ratio.

Challenge: Legacy

Anyone who has watched a classic epic, such as "Lawrence of Arabia," shot in an amazing aspect ratio of 2.20:1 on a 4:3 television screen can attest that the experience is less than desirable. A number of objectionable artifacts are present:

- Conversations take place between people while you see only one person.
- People are much taller and skinnier.
- Titles and credits disappear offscreen.
- The wide vistas of such a classic are terribly compromised.

Figure 1 on page 88 is an example of the obvious effects of improperly displaying the original aspect ratio of an image. For the viewer, the solutions are to either view the letterboxed material in its original aspect ratio on the 4:3 screen or to enjoy it with considerably less letterboxing on a 16:9 screen.

Challenge: Today's programming

Some of the pertinent questions to consider when one is faced with original productions for today's television marketplace include:

- What is the application? News, documentary or film?
- What resolution is required?
- What format should be used?
- What frame rate should be used?
- What aspect ratio should be used?
- How will I derive my HD and SD masters?
- How will graphics, titles and credits be created?
- How will program interchange with rest of world be accomplished?

These questions demand television content producers closely examine the distribution format necessary for both a domestic and worldwide audience. When one takes into account the number of distribution formats that are necessary and that may have different aspect ratios, frame rates, resolution requirements and language requirements, it is not unusual to find that upwards of a dozen actual distribution masters become necessary.

Current acquisition and post methodologies for news programming do not demand a change in frame rate. It is expected that content will continue to be acquired at 29.97fps for news applications. Certainly, there will be a migration from 4:3 to 16:9 aspect ratio support.

Figure 2. The figure at right is an obvious distortion of shape and elements that occurs when a graphic originally created for 4:3 (shown at left) is stretched to fit a 16:9 display.

Creative challenges and issues

The producer who is faced with creating a program for 16:9, 14:9 (in the United Kingdom) and 4:3 aspect ratio consumption must consider what origination format and aspect ratio to use. If the program is shot in a 16:9 aspect ratio, how will the 4:3 master be derived? What happens to editorial timing? If we see a character enter the frame in the 16:9 version, it could be several moments (seconds) later that we see the character in the 4:3 version. What aesthetic issues suddenly become important considerations?

The woman cut out of the right image in Figure 1 on page 88 is an example of what can occur when the original aspect ratio of the acquired image does not take into account the display format. The solution for the producer is to shoot for the 16:9 aspect ratio but protect the important aspects of the image for the 4:3 aspect ratio. In so doing, the producer can then derive a 4:3 center cut from the 16:9 image for 4:3 SD viewing. While pan and scan versions of feature films exist, they are decreasing in frequency, and it is extremely rare to find HD-originated television programming with a pan and scan version for obvious economic reasons.

Graphics, titles and credits

There are similar aspect ratio and placement considerations for the creation of graphic elements and titles that are often overlooked. If a production has originated in 16:9 and is deriving a 4:3 center cut, the creation of all graphic elements should ideally be accomplished in two separate stages.

Originating titles and graphics in 16:9 and then resizing to 4:3 (or vice versa) has been the method budget- or time-challenged producers have relied on. (See Figure 2 on page 90.) However, it is much more desirable to generate two sets of original graphics elements for both 16:9 and 4:3 transmissions.

The four dimensions of a format

The ultimate goal for producing content for television is to master once and derive all required formats from a single master. There are four dimensions for us to examine:

• *Resolution.* Whenever possible, acquire content in the highest possible resolution matched to the resolution that will be required for distribution. If the ultimate goal is an uncompressed 1920x1080 HD master, all attempts should be made to acquire at that resolution.

• *Aspect ratio.* For simultaneous television delivery of content in both 16:9 and 4:3 aspect ratios, it is desirable to acquire in 16:9 and protect for 4:3 transmission via a center cut.

• *Frame rate.* Which frame rate should we acquire at? 24fps, 25fps or 29.97fps? For purposes of program interchange, at the non-news level, the most logical choice for program mastering is 24fps. It is interesting to note that while news production will continue to maintain its 29.97fps heritage, this may undergo re-examination. As videotape acquisition for news decreases, and as the broadcast infrastructure migrates to a data-centric one, will 24fps adoption be considered?

• *Scan method.* Interlaced or progressive? A progressive scan method allows for the superior derivation of interlaced deliverables. The converse, deriving a progressive master from an interlaced master, requires conversion methods that may yield objectionable spatial and temporal artifacts.

Through the use of a 16:9 HD 24-frame progressive master, one can then derive all NTSC, PAL and 4:3 deliverables. Graphics should be originally composed for both 16:9 and 4:3 aspect ratios. Through the use of template-driven proxies, even on-the-fly substitution of aspect ratio correct graphics can be accomplished. A template-driven proxy allows a content distributor to insert the appropriate graphics (either the 4:3 set or the 16:9 set) as the program is being aired. This is accomplished through the use of triggers within the template that refer to a lookup table of graphics.

The changing delivery and viewing experience

As we create content for the HD and SD television marketplace, we will certainly face issues as we encounter the changing distribution and viewing experience. When we begin to view content delivered to us over IPTV and when we view content on portable devices such as telephones and digital signage venues, a new host of challenges becomes apparent. What we call the television marketplace today will change rapidly in concept and definition in the near tomorrow. BE

Tom Ohanian is senior director for Autodesk Consulting Media and Entertainment.

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Panasonic's VariCam:
An industry workhorse

BY BARRY BRAVERMAN

Pro shooters have come to swear *by* it and not *at* it — a remarkable achievement in itself for a complex electro-mechanical device. The Panasonic VariCam has earned its reputation as an industry workhorse, performing with great reliability while producing superb images under extreme conditions.

The camera's natural fall-off of image contrast and color saturation in the shadows has always been a notable advantage; its DVCPROHD 100Mb file size also proves more practical and manageable than other HD codecs on desktop workstations and servers. In many ways, however, the camera is still a work in progress. Indeed, low-light performance and noise issues have been addressed in the latest VariCam model — the AJ-HDC27H.

The VariCam AJ-HDC27H permits instant changing of frame rate via a USER button on the side of the camera. Two assignable USER buttons are provided in VariCam models. Photo courtesy Panasonic. All other photos ©2005 by Barry Braverman.

Basic setup

As is the case when working in the HD arena, the camera's setup requires a sufficiently large monitor (15in or more) to properly assess focus, detail level and colorimetry. My pet peeve with most HD cameras, including the VariCam for that matter, is the tiny viewfinder that fails to provide sufficient reassurance of focus during normal camera operation. It's only logical that the shooter/engineer uses a large enough monitor to see HD's higher resolution and what the heck he or she is recording.

The VariCam akin to most broadcast cameras features a dual filter wheel that should be positioned to reflect ambient lighting conditions. Tungsten (3200° K), daylight (6300° K) and mixed illumination (4300° K) settings are provided along with the usual exposure control filters: clear, 1/4 ND, 1/16 ND and 1/64 ND. In general, shooters should use the strongest ND possible in order to achieve the widest aperture setting. This will help reduce the excessive depth of field condition as well as diffraction anomalies that lead to a significant loss of contrast.

Shooting in bright daylight at small f-stops can produce noisy low-contrast images devoid of life. Your camera's exposure control filters can help by enabling a larger iris setting — an important strategy for VariCam and HD shooters in general.

The unit's claim to fame in many ways is its 720p imager, which allows variable frame rate flashing. This is a capability not found in cameras such as the Sony HDW-F900, which features interlace-type imagers. Variable frame rates from 4fps to 60fps in 1fps increments are selectable now in the camera via a USER button, giving the shooter additional flexibility in higher-end commercial and documentary production.

During my nearly 20 years at the National Geographic, I recall very few scenes (other than sync interviews) shot at "normal" 24fps speed. Shooting out of moving cars or capturing wildlife with long lenses usually demanded higher than normal frame rates just so subjects appeared normally paced on screen. In other words, the (film) camera's variable frame rate capability was not used solely, or even mostly, for slow-motion effects. The savvy shooter uses the camera's multiple frame-rate capability the same way — subtly, almost imperceptibly.

As a VariCam shooter, you earn your stripes everyday. Make sure you understand what the zebras are doing in your camera.

Setting exposure

In simple terms, correct exposure reproduces white as white, gray as gray and black as black. The shooter targeting a white or gray card typically adjusts the iris while referencing

the camera's two sets of zebras. I usually set pattern 1 to 70 percent and pattern 2 to 98 percent. If you're confused by the jumble of diagonal lines covering the frame, you can disable the lower set; the upper pattern provides a reference to guard against clipping.

Gamma drama

The VariCam 27H features three gamma curves, two curves for film output and film-like video output, and the traditional video gamma. In the menus, one can select FILM REC mode, which at 9.5 stops of latitude is optimized for output to film scanners. The VIDEO REC gamma also incorporates the extended dynamic range of film while ultimately anticipating output to the video sphere. While some users will appreciate the VariCam's multiple gamma settings, most broadcasters will prefer the standard video gamma for live programs, including sports.

Independent filmmakers and shooters of narrative fare generally will opt for the gentle toe and heel characteristic of cine-look. The cine-look gamma produces more gradations of gray in the shadow areas, which can be desirable as it often adds life to the darkest areas of the frame. On the other hand, the same shadows, if severely underlit, may appear washed out or noisy when lifted in this fashion. For this reason, an on-camera fill or frontal wash should always be considered, especially when shooting close-ups of talent, because overly dark facial shadows may exhibit substantial noise and unusual hue shifts.

The same drill applies for black stretch. If black stretch is applied too aggressively, random noise may bloom in the shadows and wreak havoc throughout a production. Such defects may appear trivial on a set's production monitor, but single-pixel artifacts often are amplified and can become serious troublemakers during subsequent compression to DVD or satellite.

Grappling with noise

The AJ-HDC27H addresses the noise issue head-on (literally) as the new imager and block lowers the noise floor considerably. The model achieves this in part through improved heat dissipation through the front of the camera. It feels warmer to the touch at the front of the housing, which is reassuring. It means the camera's redesigned signal amplifier and beefier heat sinks are doing their job.

Panasonic also reduced the noise previously apparent in the blue channel when shooting in low light. This was one of my criticisms of the 27F; the camera lacked flexibility under such conditions. In the updated model, an alternative low-light algorithm is provided for shooting weakly illuminated scenes. Under most routine conditions, shooters will still want to stay with the VariCam's normal compression scheme. For the occasional challenging setup at low or no light levels, however, the alternative setting provides superior results.

There's another dimension to this noise discussion as well. The camera now incorporates a more precise 12-bit DSP (as opposed to the 10-bit version in the previous model), so sampling is more accurate, and a greater amount of highlight detail can be retained. This means that hot areas of the frame such as an exterior window are less likely to appear blown out as the oversampled detail is squeezed into DVCPROHD's 8-bit gamut. The additional detail helps reduce the risk of noise appearing in these areas.

More to gain

The camera allows a range of gain settings to boost (or reduce) the imager's analog signal. Levels of gain up to +30dB or higher (+36dB with super gain enabled) are possible albeit with dramatically increased noise that may negate any benefit derived in the first place from improvement in gray scale. Many shooters and engineers looking ahead to compression for DVD, satellite transmission or video on demand may want to use a negative gain of -3dB or even -6dB to suppress this shadow noise. But be careful: Blacks can become impenetrable at very low gain levels, so caution must be exercised.

A better and simpler approach in my experience is the use of a camera filter to lift dark areas of the frame. The Schneider Digicon or Tiffen Ultra Contrast filter can help transfer surplus highlight values into deficient shadow areas. In urban night scenes, the ultra contrast-type filter is one of the best things you can do to improve the look of your VariCam images. This applies as well to ENG-type footage frequently shot under such conditions.

Conclusion

Many noise-related improvements in the AJ-HDC27H have their roots in Restrictions On Hazardous Substances (ROHS), a recently adopted mandate that has impelled manufacturers to redesign products in accordance with environmental concerns. Fortunately, Panasonic used the opportunity to address key performance issues, most notably the lowering of the noise floor in the VariCam imager. BE

Night exteriors can be problematic due to noise appearing in underlit areas of the frame. The AJ-HDC27H addresses the noise issue in substantial ways.

Barry Braverman is a veteran cinematographer with more than 20 years experience in feature films, documentaries and music videos. He is currently serving as a digital media expert and consultant to major studios. His latest book, "Video Shooter," is available from CMP Books at www.cmpbooks.com.

Telemetrics' robotic cameras at The Weather Channel

BY MICHAEL SMERESKI

On-camera meteorologists, technicians, operators and producers work in shifts to offer 24/7 weather coverage to more than 89 million homes in the United States. Last winter, The Weather Channel (TWC), headquartered in Atlanta, GA, decided the time had come to update its look. Logos, tag lines and the program line-up were spruced up. And a new studio set and on-camera talent were added. The big behind-the-scenes change was the decision to update its robotics control system.

The Weather Channel's new Studio 1C uses the TeleGlide camera track system.

The camera system for The Weather Channel's new show, "Weekend View," is controlled by the CPS-ST-S.

This Ikegami HDK-75EXCF camera hangs from the ceiling in Studio 1C on a dual-rail track TeleGlide.

The original robotics system was installed in 1996 when TWC moved into the building. Last winter, we met with several manufacturers, looking for a company with a viable solution to merge and control three systems, including an existing camera pedestal, new track and new studio systems. The Telemetrics system offered the best fit for our needs.

New Telemetrics robotics camera system heads were installed in studios 1A and 1B, where "Your Weather Today" and "First Outlook" are produced. A Telemetrics TeleGlide was installed in the new Studio 1C, home to the new "Weekend View." The track system and the camera pedestals are controled by the the new Telemetrics control system.

The design allows operators to control all 17 cameras on the three systems from any of the five locations.

Five-location control

At the heart of the new camera control system is the Telemetrics CPS-ST-S studio control system software installed on dedicated computers next to the "Your Weather Today" set and outside the "Weekend View" studio. CP-D-3A desktop serial control panels were installed in both of these locations, which are the primary control stations, as well as in the two production rooms and master control room. All five control areas include pan-and-tilt and pedestal control, as well as DS-4 device servers for Ethernet transmission.

The design allows operators to control all 17 cameras on the three systems from any of the five locations, calling up presets and making adjustments. Operators can also build story boards with the on-board GUI, store shots in memory, preview live video display and control the outdoor HD-HOU-W weatherproof housing and camera.

Revamping two studios

For "Your Weather Today," three PT-LP-S3 servo pan-and-tilt heads with virtual studio interfaces and RS-422 control were deployed with three Ikegami HDK-75EXCF cameras. The setup offers operator-like moves with programmable, timed presets to start and stop all axes simultaneously.

On the set of "First Outlook," two additional servo pan-and-tilt heads and cameras are used, and four are placed between the anchor desk and chroma key sets. New Ikegami cameras were also added.

New studio, new design

Perhaps the most innovative engineering feat was the custom-designed system for the new Studio 1C. The ECM-PT-S2 camera mount works like a Televator, but instead of being on the floor, it is connected to

To control the camera system, operators use the CD-D-3A desktop serial control with CPS-ST-S studio control software.

the overhead track system. The ceiling-mounted, 35ft, dual-rail track TeleGlide camera trolley system is servo-controlled for smooth operation with location feedback for preset positioning and motion control.

An Ikegami HDK-75EXCF camera is attached to the track system with a PT-HP-S2 pan-and-tilt head with an ECM-PT-S2 extendable camera mount, which allows for more than 2ft of vertical travel. This offers additional camera shot options. And the wraparound cradle-type pan-and-tilt device allows the camera to be rotated directly on the center line. The extended arm allows for additional tilt range and camera orientation. An additional camera and pan-and-tilt head with camera control is ceiling mounted on a custom mount in the producers' area.

In addition to increasing range and speed, the new design incorporates the older pedestals into the overall control system. The Televator interfaces with two legacy pan-and-tilt and pedestal devices through the CP-D-3A, which adds a roving pedestal option. A DS-4 was changed to translate between the Telemetrics protocol and the existing robotics system. And control was added to the CPS-ST-S. This blending of the old and new system has worked well, providing us with more camera angles and looks.

The final product

Another advantage of the system is the control redundancy because it is both Ethernet and serial based (RS-232/RS-422). This allows easier work arounds when something goes down. Many of the necessary signals can be sent through the system using its control and signal capabilities, which cleans up the cabling and control system. The new Telemetrics camera robotics system allowed us to improve both the technical side and the look of our productions. BE

Michael Smereski is chief engineer for The Weather Channel.

New camera technology

BY JOHN LUFF

Can anything really still be new in camera technology after all these years?

Consider the advancements in the last 40 years, from the introduction of color to the miniaturization of cameras. Engineers in Japan, Europe and, to a much more limited degree, the United States produce something new out of an old concept each year.

With Sony's XDCAM HD, users can record 1080i video at three data recording rates: 18Mb/s, 25Mb/s and 35Mb/s.

It is actually quite simple: Focus light on an electronic sensor, assemble the image in a serial fashion, transmit it to a monitor some distance and time away, and display the picture. It is the very nature of television, which the German language descriptively calls fernsehen, literally translated as "to see far away."

The latest advancements

The latest round of advancements are wrapped up in new camcorder technology, which is not so much the acquisition of the image, but a novel way to record it and move the recording to a distant point. In the last couple of years, it was the introduction of HDV camcorders. These small marvels are true HDTV samplers with good-quality recording, wrapped up in a quasi-consumer/professional package for less than $6000. Moreover, HDV is not only cheap, but it also outputs multiple standards and multiple frame rates. In addition, it records standard DV and long GOP MPEG.

Although the format was conceived of for HDTV consumer camcorders, it immediately found its way into professional use. Event photographers, news professionals, documentary filmmakers and even commercial producers snapped up the first units and recorded some pretty stunning footage. Edit system manufacturers were quick (a relative term) to provide packages that allow all the usual range of nonlinear editing functions.

Grass Valley's Infinity camcorder features SD and HD video formats and 14-bit digital signal processing using JPEG 2000 coding.

What sets this new idea apart is that HDTV has dramatically dropped in price. Although these cameras are not the tools George Lucas wants for primary photography in the entertainment business, at least they democratize the acquisition of HDTV images and accelerate the shift in consumer electronics. The most insidious fact is that $50,000 camcorders contain much of the same electronics. With the introduction of solid-state recording of HDTV images by both Japanese and European companies at IBC this year, the medium moved further along. These were not consumer products gussied up, but rather products intended for professionals, geared to entertainment production. I read this as a huge shift in the market, and the ripples will be felt in many ways.

Panasonic's AG-HVX200 DVCPRO HD P2 handheld camcorder provides 1080i and 720p recording with 100Mb/s DVCPRO HD quality.

Working technology

There were three important introductions that happened at IBC2005. Sony showed working models of professional Blu-ray XDCAM camcorders in HD. Panasonic featured the AG-HVX200, a P2-based palmcorder in HD. Grass Valley introduced the Infinity Series: a line of solid-state and removable drive camcorders with matching workflow products.

What began with JVC's introduction of a consumer crossover camcorder a couple of years ago has

Although these cameras are not the tools George Lucas wants for primary photography in the entertainment business ... they democratize the acquisition of HDTV images.

blossomed into a wide range of products that drop the entry-level price of HD into unprecedented territory. Editing system manufacturers have delivered products to support some or all of the new approaches.

Solid-state recording vs. spinning media

Under the hood, the debate about solid-state vs. spinning media recording goes on. Grass Valley claims to offer both, with Iomega REV removable disks and SD memory. Panasonic has gained traction with P2, which consists of repackaged consumer memory technology. Sony offers the highly portable and IT-friendly, DVD-like, high-capacity disk, which is based on proprietary Blu-ray technology. Ikegami has developed a hard-disk-based HD camcorder using a codec developed by Avid. Hitachi developed another hard-disk-based recording system that mates with its Z-3500 and other cameras to make a complete camcorder system.

What all of these have in common is a fresh look at what the recording medium is and the impact of workflow on field production cameras. If you get the impression that linear tape is on its way out as a field medium, I agree.

How soon? Maybe three to five years before videotape begins to disappear. If you remember how long U-Matic lasted, you might understand how the inertia in the industry changes. In this case, nonlinear editing has made the switch to nonlinear camera recordings more compelling.

Fernsehen

But in front of the recorder, we will always find cameras with sensors and lenses. After all, the point of all of this camera technology is to turn photons into electrons and deliver a representation of reality to a distant screen (remember fernsehen).

What is new in cameras is incremental in nature, but profound in the ability of manufacturers to deliver incredible product performance for a lower cost. This is partly based on the penetration of high-quality cameras into consumer markets. The research and manufacturing expertise put into still and moving image electronic cameras benefit the professional marketplace.

The HDV cameras showing up in professional use are a clear example of this consumer crossover business. The monochrome moguls of the '50s and '60s would hardly believe we are so lucky today with the newly-minted technology. BE

John Luff is the senior vice president of business development for AZCAR.

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

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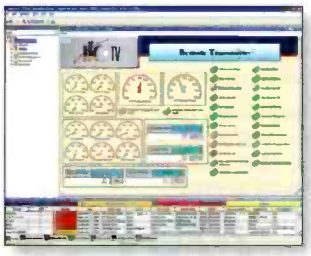

ILC MaxView 5.0 for broadband: Management system consolidates networks into one view; reduces integration time; diagnoses the source of a network failure; issues a trouble ticket; automates recovery activities; can manage third-party systems; interface can be accessed from anywhere with a network connection.

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Teranex Mini: Portable palm-sized DTV format converter features PixelMotion de-interlacing; multi-direction diagonal filter eliminates "jaggies;" has a two- to four-frame delay mode and per-pixel temporal recursive noise reduction; includes aspect ratio conversion and nonlinear anamorphic aspect ratio; has embedded audio handling and scene change detection.

407-858-6000; *www.teranex.com*

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Panasonic AG-DVX100B: Handheld camera allows camera-to-camera time-code sync and user-settable file transfer over IEEE 1394; is 24p/30p/60i; includes 16:9 letterbox display mode on the electronic viewfinder and 3.5in color LCD monitor for distortion-free squeeze mode or anamorphic display.

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KTEH-TV is seeking an experienced Broadcast Maintenance Engineer to join our Engineering team. The applicant must be proficient with computers/networking technologies, analog and digital video recorders, digital audio/video systems, Harris Flexicoder/NetVx plus microwave and UHF transmitters. Applicant must have a positive attitude and a strong work ethic, along with good verbal communication skills. Requires 5-7 years direct experience in a TV Broadcast/Production environment and a strong working knowledge of Digital TV Standards. SBE certification or FCC credential preferred.

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Help Wanted

Help Wanted

nmt
National Mobile Television

ENGINEER IN CHARGE

National Mobile Television, a leader in sports entertainment broadcasting, has openings for Engineer in Charge (EIC) in Miami, Los Angeles, Boston and the New York/New Jersey area.

About the Position

The EIC is responsible for the overall management, operation and quality of a mobile broadcast unit. As supervisor on the unit, the EIC must maintain the unit and must also conduct necessary training of new engineers, assistant engineers and engineer trainees. In addition, the EIC must supervise technical crew and assist them with any technical problems related to NMT owned or NMT rented equipment. As part of the client service team, the EIC must maintain a courteous and professional demeanor at all times, representing the Company's best interest and, leading by example, must ensure the other engineering staff on the unit maintain the same helpful, client friendly attitude.

Do you have what it takes?

This position requires a comprehensive understanding of Analog/SD/HD video and audio broadcast production systems. In addition to demonstrated engineering skills, the ideal candidate must possess good written and verbal communication skills and the ability to manage both staff and freelance technical crew. An AS Degree in Electronics (minimum) and SBE Certification or equivalent broadcast experience is required.

Are you interested?

If you meet the stated qualifications and are interested in applying for consideration, please submit your resume, with salary history to careers@nmtv.com

National Mobile Television, Inc. is an Equal Opportunity Employer and maintains a drug-free work environment. This is an IBEW Local 45 Union Position. Our benefits package includes Medical, Dental, and 401(k), paid holidays and paid vacation accrual. For more information about our company and what we do, visit our website at www.nmtv.com.

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Stinkin'
standards wars

BY PAUL MCGOLDRICK

We tend to remember decades in our life by something that was close to our hearts, fashion statements or, for far fewer of us, technology progress. For me, the '70s are remembered by real-color television and 2in quadraplex video recorder improvements and the '80s for the war between Sony and almost everyone else over Betamax and VHS.

Sony lost that fight big time, although the company was subsequently smart enough not to let the defeat keep it out of the market. In more recent years, Sony has not been as nimble on its marketing feet as some of us had come to expect of it.

And I have heard regrets from individuals that the prestige of manufacturing broadcast equipment isn't what it used to be. That's not a criticism of Sony; the whole broadcast equipment market has evolved in directions that many of us hardware-oriented engineers have already experienced. And the difference in quality between professional, prosumer and consumer is closing rapidly.

The current fight

With Sony's experience in the standards wars with its arch rivals Panasonic and JVC, it is interesting to watch the company's behavior concerning the next generation of DVD standards. Would Sony even be in the fight for the market if the company remotely thought it could lose?

I cannot predict the winner of this battle because it will be the consumer who will choose — and not necessarily for any logical reason.

The two proposed standards on the table (hopefully there is no longer any time for a third alternative) are based on using blue lasers instead of the red lasers in conventional DVD. (It's funny how you can use the word conventional for a system that has been around for such a relatively short time.)

The blue laser, with its much shorter wavelength, allows for a large increase in the amount of data storage, which could be used for longer recordings or higher standards, such as HDTV. Longer storage is not a need at the moment, so both groups are focusing on HD.

Blu-ray vs. HD-DVD

The protagonists are Sony, with its Blu-ray, and Toshiba, with its HD-DVD. In the Sony camp is long-term rival Matsushita Electric (aka Panasonic) and a PC triple threat of Apple, Dell and HP. In the Toshiba camp sit Samsung, Microsoft and Intel.

From a disc-production perspective, HD-DVD is clearly ahead right now because the architecture is similar to current DVDs, and manufacturers should be able to use existing production equipment. HD-DVD also has its read-only standards fully agreed.

On the other side, Blu-ray's read-only standards should be in place by the time you read this column, and Sony and friends are busy trying to simplify the manufacturing processes for production.

Content is, of course, going to play a major component in the consumers' decisions about which way to jump — or whether to jump at all. And movies are a major part of that content. Paramount was deeply committed to the HD-DVD camp but has now said it will produce content in both standards. Universal and Warner studios also support HD-DVD, but rumor has it that Warner is also leaning towards playing the neutral role. Supporting Blu-ray are Walt Disney Pictures, Columbia (Sony Columbia, that is) and Twentieth Century Fox.

Paramount's decision to stand middle ground on the issue is widely believed to be because Sony will have a Blu-ray player in the PlayStation 3 when it's released in spring 2006.

Old rivals, new friends?

With all of these old rivals on the same side and Apple and Microsoft on opposite sides — with Intel users HP and Dell pitched against Intel itself — it is an odd situation indeed. Insiders at Microsoft and Intel say that "We don't want no stinkin' standards wars" has become the internal mantra for both companies.

Insiders at Microsoft and Intel say that "We don't want no stinkin' standards wars" has become the internal mantra for both companies.

The two sides have tried to work together in the past, but both sides have been proprietary about their architectures. At this time, with encouraged reflection about peace on earth, can these two sides get together again and agree on one standard before the disaster of two incompatible systems like Beta and VHS? We will see. Happy New Year! 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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