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JANUARY 2006

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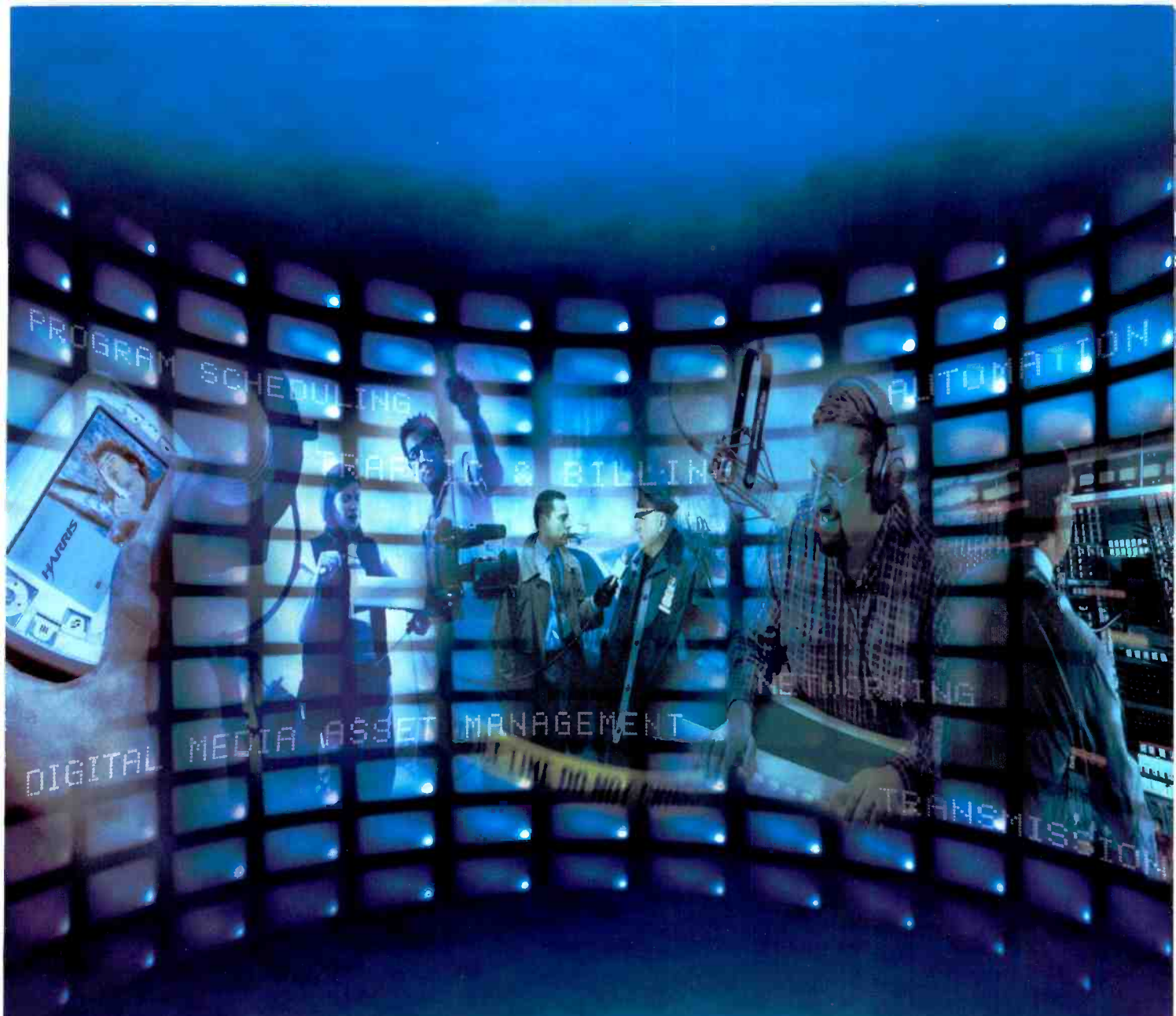

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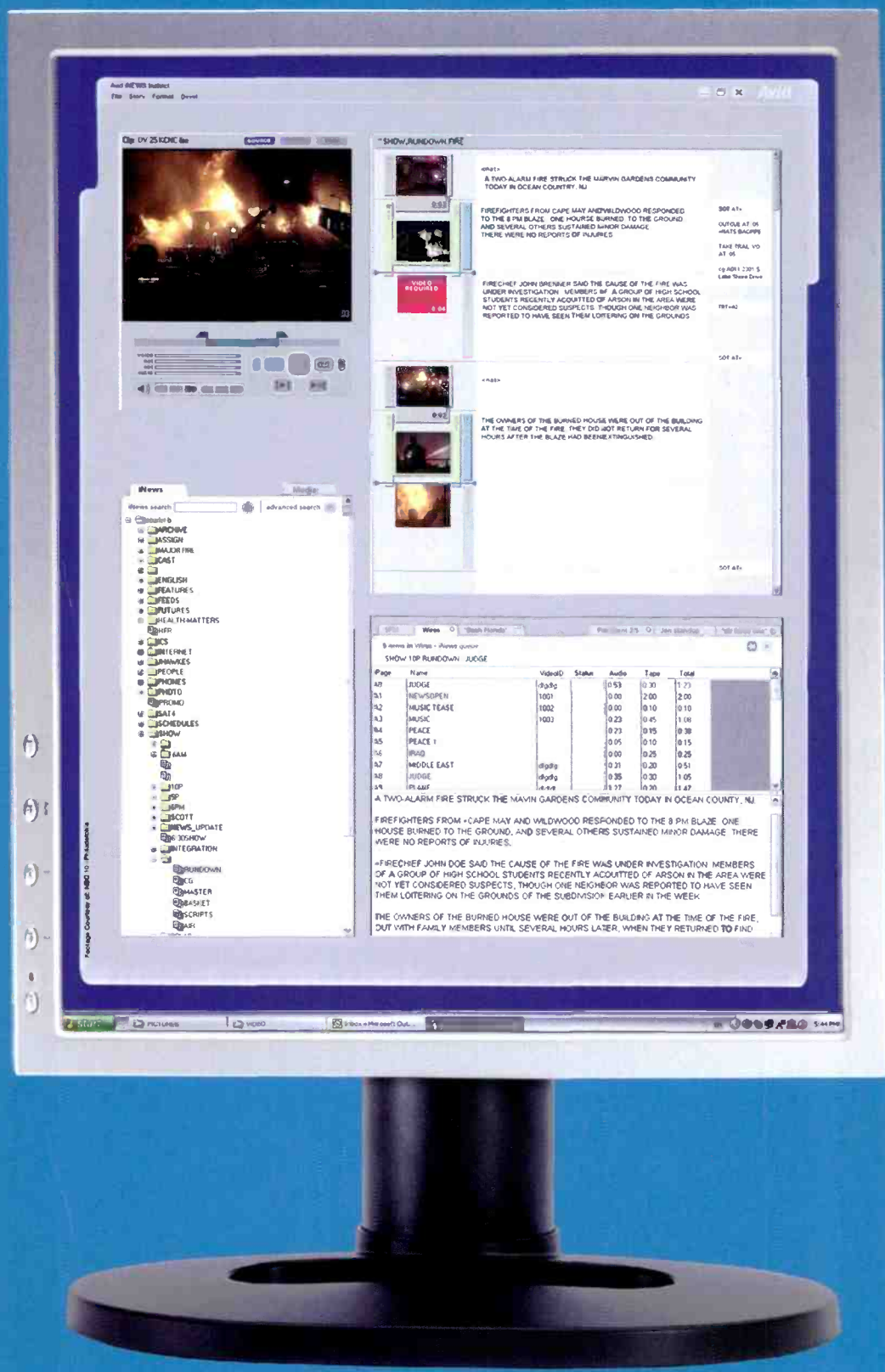
SHOW_RUNDOWN_FIRE
A TWO-ALARM FIRE STRUCK THE MARVIN GARDENS COMMUNITY TODAY IN OCEAN COUNTRY, NJ
FIREFIGHTERS FROM CAPE MAY AND WILDWOOD RESPONDED TO THE 8 PM BLAZE. ONE HOUSE BURNED TO THE GROUND AND SEVERAL OTHERS SUSTAINED MINOR DAMAGE. THERE WERE NO REPORTS OF INJURIES.
FIRE CHIEF JOHN BRENNER SAID THE CAUSE OF THE FIRE WAS UNDER INVESTIGATION. MEMBERS OF A GROUP OF HIGH SCHOOL STUDENTS RECENTLY ACQUITTED OF ARSON IN THE AREA WERE NOT YET CONSIDERED SUSPECTS, THOUGH ONE NEIGHBOR WAS REPORTED TO HAVE SEEN THEM LOITERING ON THE GROUNDS
THE OWNERS OF THE BURNED HOUSE WERE OUT OF THE BUILDING AT THE TIME OF THE FIRE. THEY DID NOT RETURN FOR SEVERAL HOURS AFTER THE BLAZE HAD BEEN EXTINGUISHED.
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A TWO-ALARM FIRE STRUCK THE MAVIN GARDENS COMMUNITY TODAY IN OCEAN COUNTY, NJ
FIREFIGHTERS FROM +CAPE MAY AND WILDWOOD RESPONDED TO THE 8 PM BLAZE. ONE HOUSE BURNED TO THE GROUND, AND SEVERAL OTHERS SUSTAINED MINOR DAMAGE. THERE WERE NO REPORTS OF INJURIES.
+FIRECHIEF JOHN DOE SAID THE CAUSE OF THE FIRE WAS UNDER INVESTIGATION. MEMBERS OF A GROUP OF HIGH SCHOOL STUDENTS RECENTLY ACQUITTED OF ARSON IN THE AREA WERE NOT YET CONSIDERED SUSPECTS, THOUGH ONE NEIGHBOR WAS REPORTED TO HAVE SEEN THEM LOITERING ON THE GROUNDS OF THE SUBDIVISION EARLIER IN THE WEEK.
THE OWNERS OF THE BURNED HOUSE WERE OUT OF THE BUILDING AT THE TIME OF THE FIRE, OUT WITH FAMILY MEMBERS UNTIL SEVERAL HOURS LATER, WHEN THEY RETURNED TO FIND

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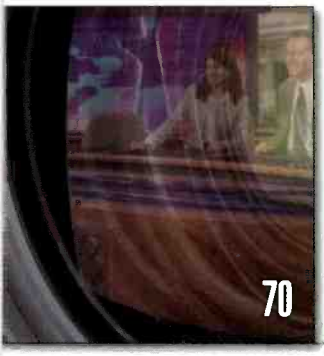


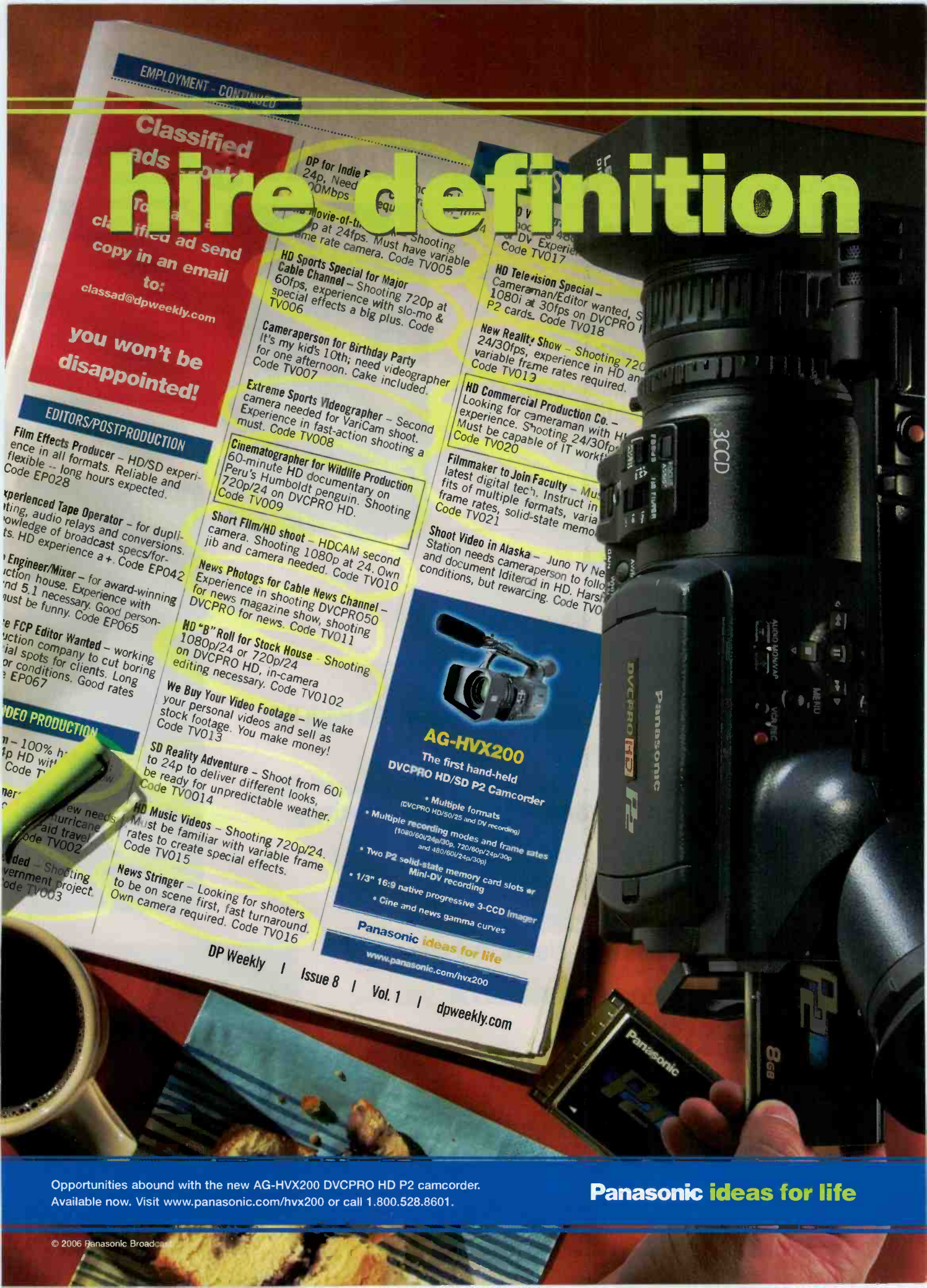
ON THE COVER:

The audio control room for "The Daily Show With Jon Stewart" features a Solid State Logic C100 digital audio console and a Digidesign Pro Tools workstation. Photo courtesy Dave King.

BEYOND THE HEADLINES

DIGITAL HANDBOOK

(continued on page 8)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e FCP Editor Wanted – working uction company to cut boring ial spots for clients. Long or conditions. Good rates EP067
DEO PRODUCTION
n – 100% h 4p HD wit Code T
ner
ew needs hurricane aid travel ode TV002
ded – Shooting vernment project. ode TV003
DP for Indie F 24p. Need 20Mbps
movie-of-th p at 24fps. Must have variable ame rate camera. Code TV005
HD Sports Special for Major Cable Channel – Shooting 720p at 60fps, experience with slo-mo & special effects a big plus. Code TV006
Cameraperson for Birthday Party It's my kid's 10th; need videographer for one afternoon. Cake included. Code TV007
Extreme Sports Videographer – Second camera needed for VariCam shoot. Experience in fast-action shooting a must. Code TV008
Cinematographer for Wildlife Production 60-minute HD documentary on Peru's Humboldt penguin. Shooting 720p/24 on DVCPRO HD. Code TV009
Short Film/HD shoot – HDCAM second camera. Shooting 1080p at 24. Own jib and camera needed. Code TV010
News Photogs for Cable News Channel – Experience in shooting DVCPRO50 for news magazine show, shooting DVCPRO for news. Code TV011
HD "B" Roll for Stock House – Shooting 1080p/24 or 720p/24 on DVCPRO HD, in-camera editing necessary. Code TV0102
We Buy Your Video Footage – We take your personal videos and sell as stock footage. You make money! Code TV013
SD Reality Adventure – Shoot from 60i to 24p to deliver different looks, be ready for unpredictable weather. Code TV0014
HD Music Videos – Shooting 720p/24. Must be familiar with variable frame rates to create special effects. Code TV015
News Stringer – Looking for shooters to be on scene first, fast turnaround. Own camera required. Code TV016
Shooting
Dv Experie Code TV017
HD Television Special – Cameraman/Editor wanted, S 1080i at 30fps on DVCPRO P2 cards. Code TV018
New Reality Show – Shooting 720 24/30fps, experience in HD an variable frame rates required. Code TV019
HD Commercial Production Co. – Looking for cameraman with H experience. Shooting 24/30fp Must be capable of IT workfl Code TV020
Filmmaker to Join Faculty – Mus latest digital tech. Instruct in fits of multiple formats, varia frame rates, solid-state memo Code TV021
Shoot Video in Alaska – Juno TV Ne Station needs cameraperson to follo and document Iditerod in HD. Harsh conditions, but rewarcing. Code TV0
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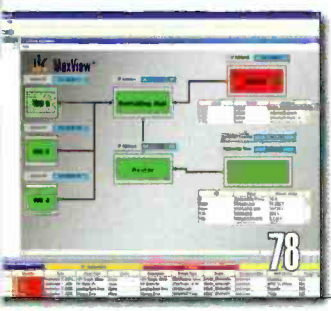

New Products & Reviews

Applied Technology

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Departments

Freezeframe

Define the following acronyms as they apply to DTV technology:

DCT, DMD, GOP, HANC, JPEG, MPEG, SDTI, TCM, VITS, VLC

Readers submitting winning entries will be entered into a drawing for *Broadcast Engineering* T-shirts. Enter by e-mail. Title your entry "Freezeframe-January" in the subject field and send it to: editor@prismb2b.com. Correct answers received by March 1, 2006 are eligible to win.

MARCY GILBERT ▶ BLOWN AWAY BY MAXELL

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Recordable Media Data Storage Portable Energy Technological Partnerships

To tell the truth

In December 1956, CBS began airing the program "To Tell the Truth." The popular evening show lasted 11 years and was responsible for helping launch the genre of quiz/celebrity television.

The idea was that three contestants were introduced to a panel of celebrities, each claiming to be the same individual (e.g., a baker, FBI man or someone with a unique job or characteristics). Host Bud Collyer would

describe the real life, activities and experiences of the person each of the contestants claimed to be. The key was that two of the people were liars. The goal of the celebrity panelists was to discover through questioning who was telling the truth.

After the questioning, each celebrity panelist voted for the contestant he or she thought was really the deal. The more effective the contestants were at fooling the celebrities, the more money the imitators won. The famous closing line for each round was: "Will the real [baker, FBI man, etc.] please stand up!"

The reason for this long-winded story is based on a recent survey released by Scientific-Atlanta. From the looks of things, perhaps American TV viewers should be asking, "Will the real HDTV programming please show up!"

As of Jan. 1, 2006, some 16 million U.S. households have HDTV sets. Unfortunately, according to the Scientific-Atlanta survey, almost half (49 percent to be exact) of these homes don't have any HD service. In other words, almost half of new HD set owners aren't seeing any HDTV!

About a quarter of these new HDTV owners felt the new set gave them better reception. But, 18 percent didn't realize they needed other equipment, such as a set-top box or antenna, to receive HD.

While researching the topic, I found a professional Web site discussing this issue and was a bit surprised to find so much misinformation about the reception of HD. Several viewers said they had HD sets, yet had no plans to buy HD programming from their cable or satellite service. "It just looks better," said one respondent about his HD set's picture sans HD programming.

Many of the posts were filled with claims and counter claims on digital vs. HD. A few examples:

- Yes, stations would broadcast digital. But, no, it wouldn't necessarily be HD.
- HD was digital; SD wasn't, but it could be sometimes.
- The FCC has mandated HD broadcasts.

Then, the participants got into a discussion over screen size, numbers of pixels and interlace vs. native progressive displays. Next, the participants seemed to focus on whether an HD set would display NTSC signals better or worse than an analog set. The consensus was that if you are going to watch NTSC programming, better keep the ol' set.

Near the end of the posts, one fellow pretty much summed up my feelings about the discussion, "My head hurts; someone wake me when it's over."

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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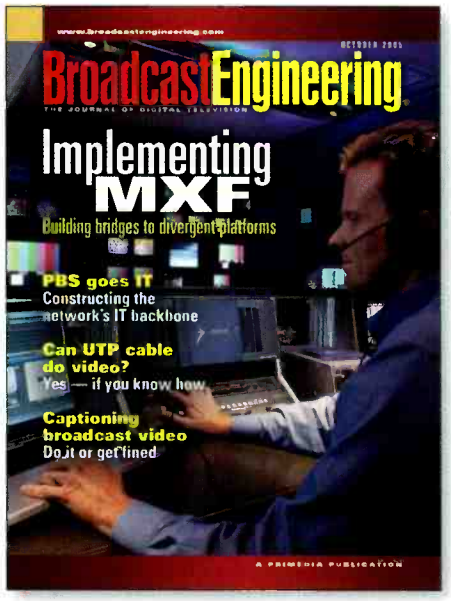
HDTV: MAKING IT HAPPEN



Italian anarchy

Paul McGoldrick:

Very interesting article on Italian anarchy in the October issue. I didn't completely follow the whole story and wondered if you knew if it had been chronicled anywhere else in more complete form, such as a book or longer article.

Larry Olson
DV3 Productions
Wilmington, NC

Paul McGoldrick responds:

I couldn't find any story in English chronicling the pirate times, but the funny thing is that it is all happening again. That original pirate, Berlusconi, is now regarded as a media mogul by the Italian public, and pirate TV stations are starting up in competition with him! You can watch a short documentary about it at *www.archive.org/details/telestreet2.*

Televised conference

What's the best way to televise a large conference? Say 250 delegates? I was thinking about using three cameras and a control station for mixing and post production and then distributing the video over the Internet.

It's a research question right now, and any feedback that you can provide would be most appreciated.

Jeremy Phillips
Regina

Dan Stark, CBNT, of Stark Raving Solutions responds:

Jeremy, if you are doing a meeting as a one-time event, I suggest you use an event video production company. It will have all the equipment needed, including cameras, switchers, an intercom, projectors, screens and other video production requirements, as well as qualified technicians and operators.

Several excellent companies are available for this. One of our clients, Big Picture Productions, based in the Kansas City area, travels all over the country for events like this. The costs are difficult to estimate because it depends so much on the production gear and staff requirements, plus the duration of your event. Certainly an issue to discover quickly is how readily available a high-speed Internet connection is in the venue where you plan to hold your event.

If your meeting space requires its own facilities, several quality levels and costs are available. You could easily spend between $25,000 to $500,000, depending on your specific requirements. Selecting the appropriate technology is as complex as figuring out what kind of automobile you might require. Do you need a Geo Metro, a Cadillac or a semi tractor trailer? 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 editor@prismb2b.com

September Freezeframe:

Q. The September freezeframe question asked for the proper wiring color-code for an RJ 45.

A. As several readers noted, there are two standards of RJ-45 writing, T-568A and T-568B. The more common is the T-568B, which was the answer we were looking for. However, anyone who submitted the correct writing for the T-568A standard was counted as having submitted a correct response and will receive a T-shirt.

Unfortunately, many readers got the right colors but reversed the nomenclature. Therefore, their answers were incorrect.

The T-568B standard calls for a white wire with an orange stripe to be connected to pin 1. This wire would be designated as white/orange. Pin 7 needs a white wire with a brown stripe, designated as white/brown.

Some readers reversed the their use of the color codes — in this example, designating pin 7 as brown/white. This is incorrect. Wiring practice dictates that the predominate wire color be referenced first, followed by the color of the stripe (or the larger of two stripes if there are two).

Freezeframe winners:

Frank Butler
Tim Costley
Jeff Ebner
Robert Getsla
Dwight Huffman
Richard Kuhn
Dan Kyte
Andrew Levine
Melissa Lowver
Roger Perales
Bob Peticolas
John Proctor
James Scott
Eugene Scott
David Smith
Jeffrey Snell
Robert Sulecki
Cindy Watanabe
Tom White

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- Upgrade capabilities without disruption to your current system
- Robust software applications
- Boundless format support

For more information about K2 Media Storage & Delivery Systems visit **www.thomsongrassvalley.com/K2**

The real digital TV transition begins

BY CRAIG BIRKMAIER

If you are a broadcaster who has spent millions upgrading your transmission facility for DTV broadcasts, a DBS service spending billions to launch new satellites to support the expanded availability of local HDTV broadcasts, or a cable multi-system operator attempting to migrate your subscribers to digital tiers and cable modems, you might believe that the television industry is approaching the completion of a long migration path to its digital future.

Despite billions in investment in new digital technologies by the distributors of television content, a new reality began to emerge as 2005 drew to a close. The future of digital television has little to do with the digitized version of television to which viewers became addicted during the past half-century. It would be more accurate to assert that the era of analog television may finally be drawing to a close, paving the way for the real digital transition to begin.

In 2005, we began to see some signs that huge media conglomerates are ready to let go of the past and move into new forms of digital content distribution, even if it means established institutions, including local television broadcasters, may become irrelevant. Consumers around the world are now addicted to their daily media fix. The real digital transition is now beginning; the ability to consume any media, anywhere, at any time is the emerging digital television reality. What remains to be determined, however, is whether consumers will support the approaching digital tsunami at any price.

A new DTV deadline?

Dec. 31, 2006, was to be an important date in the history of free-to-air television broadcasts in the United States. On April 3, 1997, the FCC adopted the Fifth Report and Order in its proceedings on a DTV broadcast service (which began in 1987). The new service, authorized by Congress as part of an extensive overhaul of telecommunications law with the 1996 Telecommunications Act, was intended to allow OTA broadcasters to remain competitive as the television industry moved to digital technologies that would allow the delivery of higher-quality TV images and sound and/or more programs in a given amount of bandwidth.

As part of the Fifth Report and Order on DTV, the FCC established a timetable for existing broadcasters to build out their DTV facilities and a period of NTSC and DTV simulcasts to allow consumers to migrate to new digital receivers. At the end of the simulcast period, the NTSC channels would be recovered, with portions of the recovered spectrum to be used for emergency communications services and the rest to be auctioned for new applications. The FCC timetable set Dec. 31, 2006, as the final day for NTSC broadcasts.

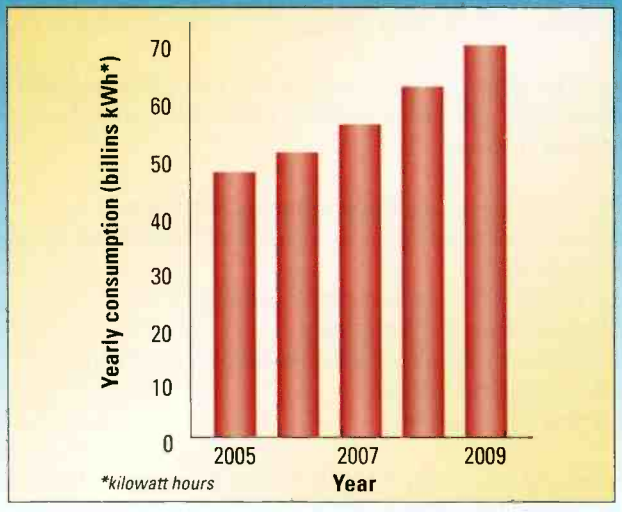
By 1997, broadcasters were beginning to accept the reality that they would be required to begin the transition to digital broadcasts. The timetable, requiring the return of their analog channels, was an unexpected outcome of the DTV process — an unacceptable outcome.

Within six months, broadcasters used their considerable influence over Congress to render the FCC order meaningless. An amendment to the 1997 Budget Act established a series of market-based tests that had to be met before broadcasters in a market would be required to return their analog channels. The amendment

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

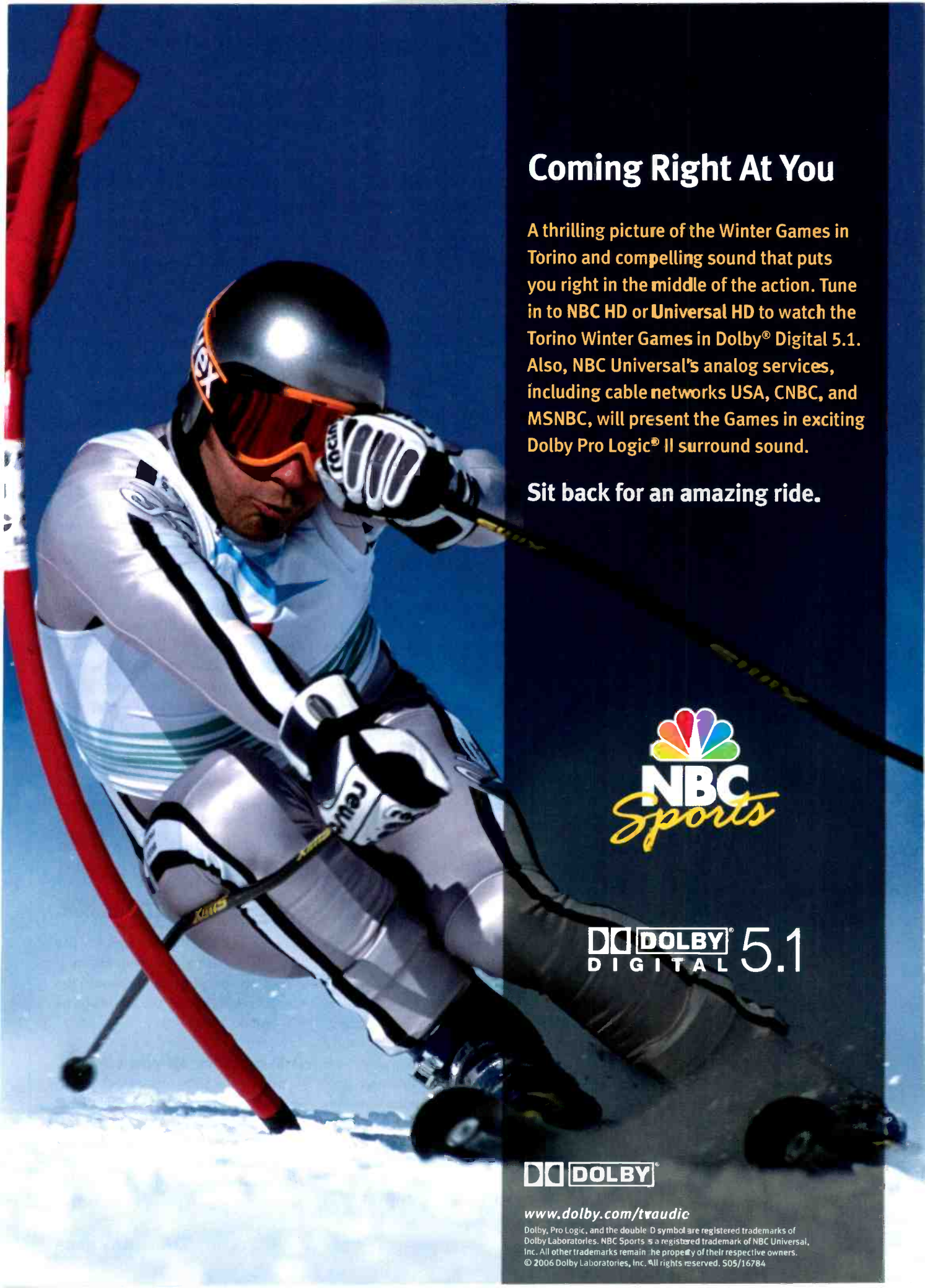
The amount of energy used yearly by U.S. TVs

Energy use for TVs to increase by more than 50 percent by 2009



Source: Natural Resources Defense Council

www.nrdc.org



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requires that 85 percent of the homes in a market must have the ability to receive all local DTV broadcasts before the analog channels would have to be returned. Today, less than a year before the FCC deadline would have taken effect, the percentage of homes that meets these market tests remains less than 10 percent.

Congress is once again threatening to impose a hard deadline for the DTV transition. As 2005 drew to a close, both the House and Senate passed bills that called for the end of NTSC broadcasts in 2009. The bills were attached to a budget reconciliation package that nearly passed, as Congress rushed to complete work before recessing for the holidays. A conference version of the bills cleared the House, but the Senate made a few changes that require House approval; the House is expected to approve these changes this month.

The legislation sets a new deadline for the end of NTSC broadcasts: February 18, 2009. A portion of the spectrum that is to be vacated — channels 52 to 69 — will be reallocated for emergency communications services. The remainder will be auctioned for new services beginning January 28, 2008.

The bill creates a $1.5 billion fund to help consumers pay for D/A converters to extend the life of their analog NTSC receivers. Coupons worth $40 toward the purchase of these converters will be issued by the government beginning in January of 2008; each household will be able to request two coupons. It does not appear that the coupons can be used to purchase integrated digital TV receivers or the more sophisticated HD-capable set-top boxes needed for HDTV-capable monitors.

Eliminated from the House version was an energy pre-emption provision intended to override state laws that impose strict energy consumption guidelines on set-top receivers for DTV broadcasts. Regulations in New York and California limit the power a DTV receiver can consume to 8W while operating and 1W in standby. It should be noted that these states do not impose the same limits on set-top boxes for cable and DBS multichannel services.

Because of the need to support HDTV formats and complex equalizers in the ATSC receiver, existing DTV receiver designs require considerably more than 8W operating power. It is unclear whether set-top receivers that meet these power limits can be manufactured. Meanwhile, more than 30 states are considering similar power limits on DTV receivers.

Also eliminated from the legislation was a provision giving the cable industry the right to downconvert a broadcaster's DTV signal for presentation on the analog tier of a cable system. This was removed because of Congressional rules limiting the scope of legislation that can be attached to a budget bill. It is expected that a separate bill related to the broadcast DTV transition will be required during the 2006 legislative session.

Because the new DTV deadline was created as part of the annual budget reconciliation process, it is unclear whether this deadline is any more meaningful than those that have come and gone since 1997. The budget reconciliation process is an exercise that Congress must go through each year in an attempt to identify sources of revenue and spending levels for the next five years. Any deadline legislated this year can be rendered meaningless in subsequent years — as was the case with the 2006 FCC deadline and several Congressional deadlines for auctioning blocks of spectrum currently occupied by TV broadcasters.

This could be a critical year for TV broadcasters. As always, it is difficult to predict what will happen in Congress, especially during an election year when members of the House and a third of the Senate will be focused on raising hundreds of millions of dollars to fund their re-election campaigns.

Local TV broadcasters remain focused on protecting a business model that is becoming increasingly irrelevant.

Eliminating the middleman

One thing is becoming clear: Broadcasters can no longer rely upon political gerrymandering to protect their lucrative franchise. The transition to new forms of digital distribution is accelerating, but local TV broadcasters remain focused on protecting a business model that is becoming increasingly irrelevant.

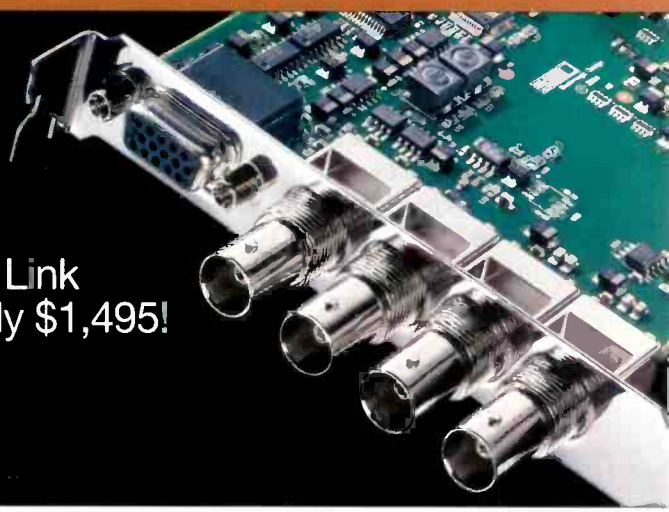
The deadline for broadcasters to focus their considerable resources on the development of DTV as a viable replacement for the NTSC service has already passed. More than half of the homes in the United States now subscribe to a digital multichannel TV service. The telcos are deploying IPTV services to compete with cable and DBS. And with improved broadband connections, the Internet is becoming a viable channel for the distribution of video programming direct to consumers, without the commercials that are the life-blood of TV broadcasting.

Broadcasters can no longer rely upon political gerrymandering to protect their lucrative franchise.

À la carte or all you can eat

Perhaps the most important lesson learned during the first decade of the DTV transition is that the disruptive nature of digital technologies is helping consumers to take control of their media experiences. Digital technologies are making it possible to provide

Blackmagic Design **DeckLink**™



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greater programming choices, while simultaneously empowering consumers to find content of interest and to consume it when they want, where they want.

Time and place shifting are no longer sci-fi visions supported by computer-generated special effects. The terms DVR, PVR and TiVo are now part of the language. They define a new way for consumers to acquire and control the TV programming they view, just as Apple's iTunes and iPod have redefined the ways in which consumers can manage and use their personal music collections. But this just scratches the surface of the changes that are taking place with digital distribution.

The *New Oxford American Dictionary* declared the term *podcast* as the word of the year. The term is defined as "a digital recording of a radio broadcast or similar program, made available on the Internet for downloading to a personal audio player." The word is derived from a combination of iPod and broadcasting. It will be added to the online version of the dictionary during the next update in early 2006.

Unfortunately, the definition above is already outdated. Video podcasting burst onto the scene at the end of 2005, and it represents far more than a new way for the media conglomerates to distribute their high-value content. Now anyone can distribute video content with little more than a camera, computer and a broadband connection.

As reported in November 2005, Apple's newest iPod plays video, and the iTunes music store is now selling music videos and episodes of top-rated TV shows from ABC, NBC, The Sci-Fi Channel and USA Network. TiVo has announced the ability to transfer programs recorded on its PVRs to the video iPod and Sony PSP. And Apple may up the ante again this month with a Mac Mini featuring an Intel processor, PVR functions and possibly a service to stream movies to this in-home media center.

The Internet is threatening the way television programs are packaged and sold. This threat is causing the media conglomerates and their distribution partners to rethink the entire model for content distribution.

The media conglomerates view the transition . . . as an opportunity to impose tighter restrictions on when and where their content can be consumed.

For decades, broadcast and multichannel TV services have offered content on an all you can eat basis. Broadcast TV stations aggregate content that is paid for with advertising; consume all that you like.

Cable expanded the menu, providing the means to collect subscriber and license fees in addition to advertising revenues. Today, about a third of the monthly cost of expanded basic cable is paid to the media conglomerates filling that tier with programming. The DBS services are riding the same bandwagon.

But pressure is building to provide an alternative to tiering, which forces most consumers to pay for channels they do not want. Under the guise of imposing decency standards on nonbroadcast networks, the FCC and consumer groups have gained a concession from the cable industry.

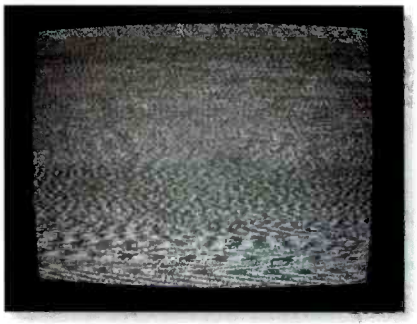
Testifying at a Senate Commerce Committee hearing on Dec. 12, 2005, the National Cable and Telecommunications Association President Kyle McSlarrow outlined preliminary plans for a number of cable operators to voluntarily start selling family-friendly tiers. Shortly thereafter, Time Warner and Comcast announced new family tiers, but cable critics quickly characterized them as being inadequate, increasing their calls for the ability to choose cable channels on an à la carte basis.

Content protection

While consumers are beginning to enjoy the benefits of time and place shifting, the media conglomerates view the transition to digital technologies as an opportunity to impose tighter restrictions on when and where their content can be consumed. Last year, a U.S. District Court of Appeals threw out the broadcast flag regulations ordered by the FCC to control redistribution of TV content.

The courts said that the FCC does not have legislative authority to impose such regulations on downstream devices. Congress plans a number of hearings in 2006 to deal with content management and copyright issues.

So the stage is set for an interesting year in Washington. TV broadcasters would be well served to ignore the politics and focus their resources on the development of a viable business model for the emerging digital world.



Is this what viewers will see on Feb. 18, 2009, with their old NTSC receivers?

Fortunately, whatever happens in Washington, broadcasters will benefit in the short term, as they receive the lion's share of the money that the politicians raise to fund the 2006 elections. BE

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

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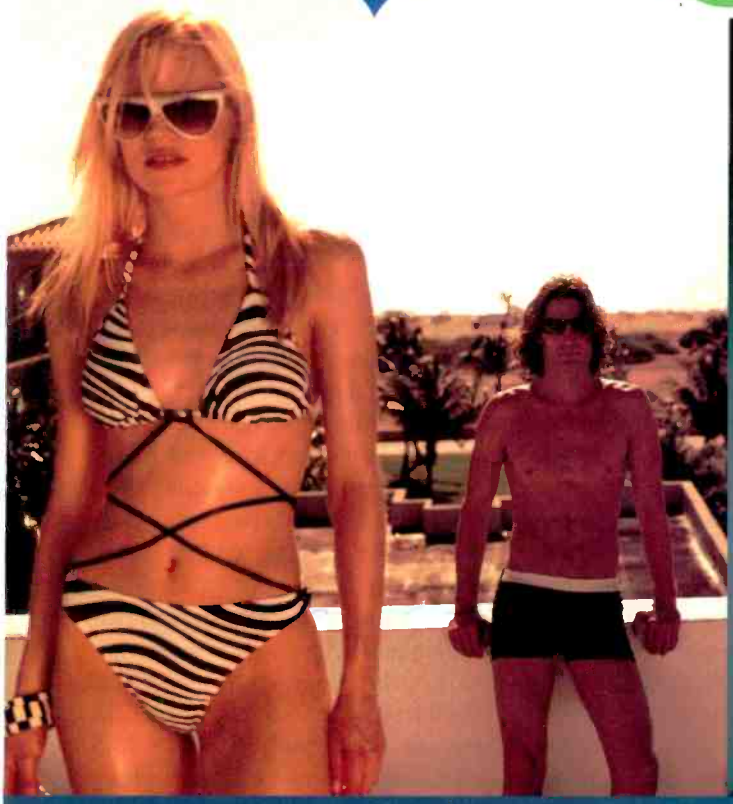

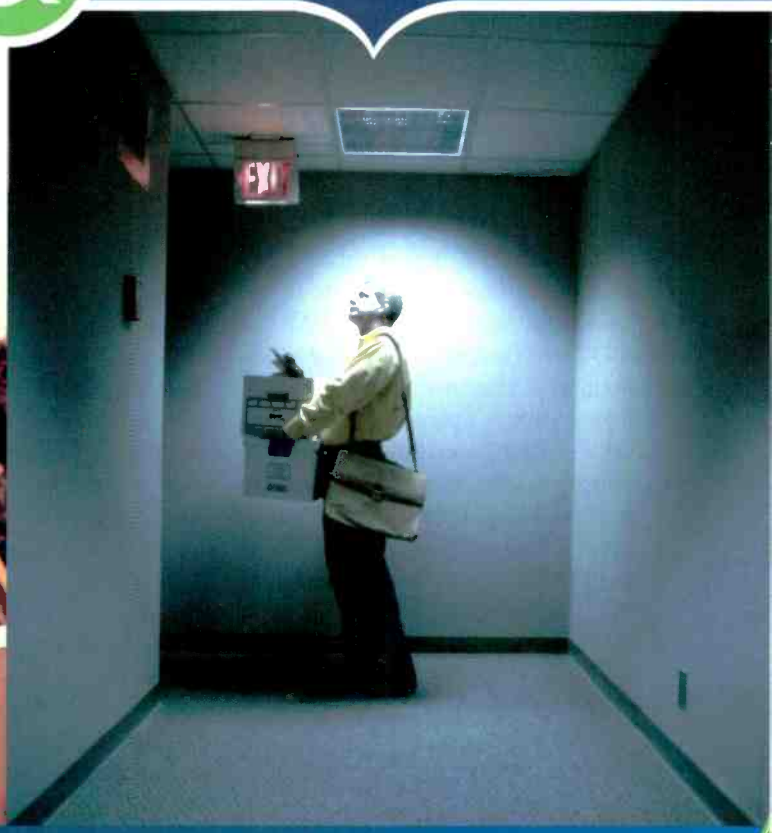

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BEYOND THE HEADLINES

FCC extends Emergency Alert System

BY HARRY C. MARTIN

In the wake of terror threats and hurricanes, the U.S. government is doing what it can to maximize access to emergency preparedness information, and the FCC is doing its part. The agency recently announced that it is extending the reach of its Emergency Alert System (EAS) rules to include DTV, digital cable television, direct broadcast satellite (DBS) television, digital radio (DAB or IBOC) and satellite radio (SDARS) in national EAS activations.

Broadcasters operating digitally (in DTV or IBOC) and satellite programming providers must begin participating in national EAS alerts by Dec. 31, 2006. DBS television providers have until May 31, 2007, to participate.

In the meantime, DTV operators, including digital LPTV and digital Class A television licensees, have the same EAS obligations as analog television licensees. This includes installing endec units so that monitoring and transmitting EAS test messages can be done at all times.

Multicasting DTV stations that participate in state and local EAS transmissions, which is now voluntary, must provide EAS messages on all program streams that the DTV station offers, including subscription streams. However, DTV stations will have significant flexibility in determining the method they will use to deliver EAS messages on those various program streams. One option available would be to transmit EAS messages on only one program stream and simultaneously force all receivers to tune to that stream.

Digital cable systems may likewise determine the method they will use to distribute EAS messages to viewers of digital cable channels. The primary requirement is that all viewers receive the complete EAS message on the channel they are watching. The plug-and-play agreement requires that, to be labeled as digital cable ready, a TV set must respond to EAS messages transmitted in compliance with the Digital Video Service Multiplex and Transport System Standard for Cable Television. Digital cable systems with less than 5000 subscribers, like similar analog and wireless cable systems, may provide a video interruption and an audio alert message on all channels and the EAS message on at least one channel.

DBS providers will be required to participate in national EAS activations, as well as provide national EAS messages to viewers of all channels. They must comply with EAS rules regarding encoding and decoding equipment, monitoring of EAS sources and EAS testing. Although participation in state and local EAS activations remains voluntary, DBS must pass through all EAS messages aired on local channels to the subscribers viewing those channels.

Over-the-air AM and FM radio stations that transmit a digital signal using the IBOC technical system in addition to transmitting an analog signal will be required to transmit the EAS messages that they air on all audio streams they provide.

SDARS (subscription services provided by Sirius and XM) will be required to transmit national EAS messages on all channels. They must receive national EAS messages through an endec unit from which they monitor at least two sources (including one primary entry point station) or directly monitor the FEMA. SDARS providers are encouraged to have the ability both to receive EAS alerts from state and local emergency managers and to disseminate them on the local traffic and weather channels they offer. They must comply with EAS testing requirements and monitor a state or local primary source to participate in testing.

The FCC also issued a notice of proposed rulemaking under which it will explore, along with other government agencies and the communications industry, ways in which emergency information may be made available more efficiently and effectively using new technologies. BE

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

SEND Send questions and comments to: harry_martin@prismb2b.com

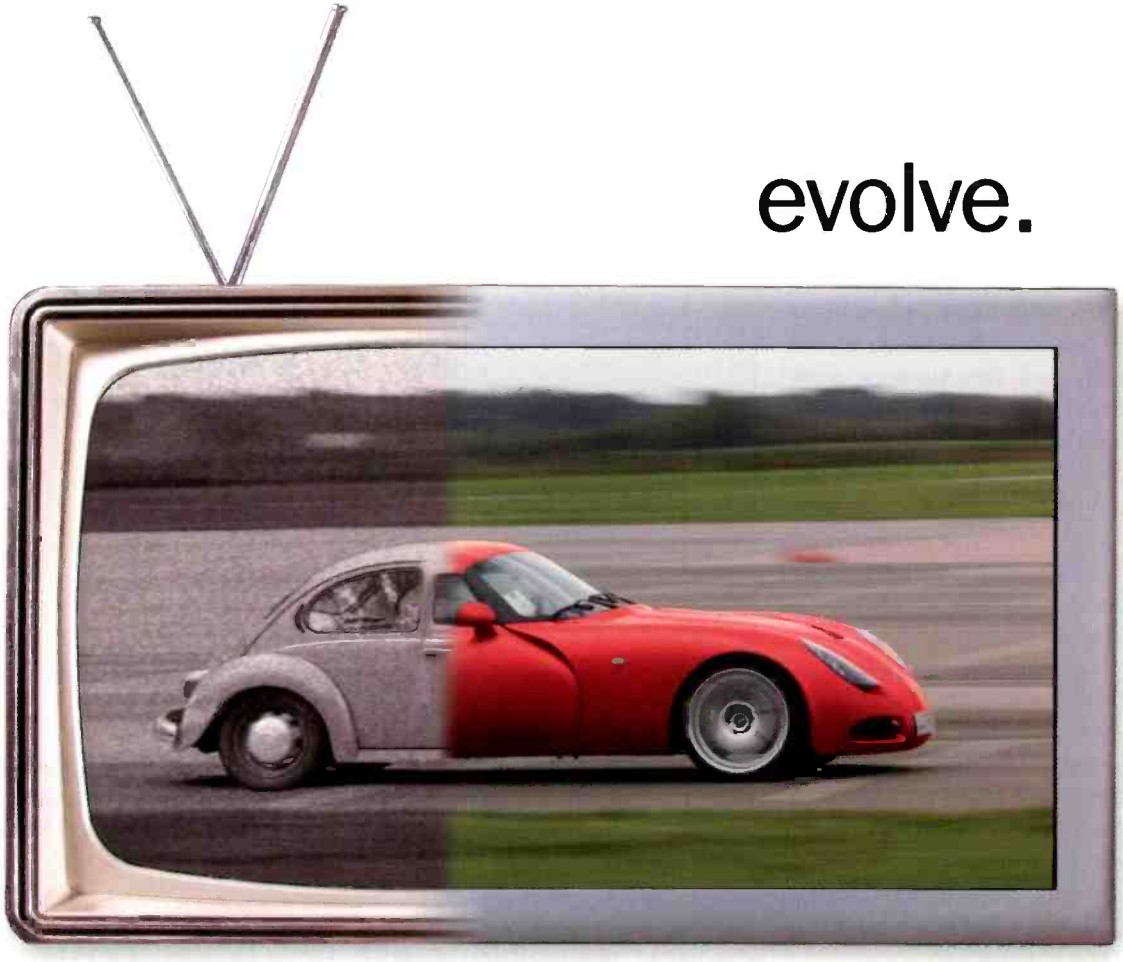
Dateline

Feb. 1 is the deadline for TV, LPTV, Class A TV and TV translator stations in Kansas, Nebraska and Oklahoma to file their 2006 license renewal applications. TV and Class A TV stations in those states must file their EEO program reports along with their renewals. Only TV stations must file biennial ownership reports with their renewals.

TV stations in Texas must begin their renewal pre-filing announcements on Feb. 1, in anticipation of filing their renewals on April 1.

Feb. 1 is the deadline for TV stations in New Jersey and New York to file their biennial ownership reports.

Feb. 1 is the date that TV and Class A TV stations in the following states must place their annual EEO reports in their public files and on their Web sites: Arkansas, Kansas, Louisiana, Mississippi, Nebraska, New Jersey, New York and Oklahoma.



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Digital video basics

BY MICHAEL ROBIN

Analog composite signals, such as NTSC, PAL and SECAM, are subject to cumulative distortions and noise that affect the quality of the reproduced picture. Separate distortions of the luminance and chrominance components, as well as intermodulation between them, are likely to occur. Such distortions can be reduced, but not completely eliminated, by performing all or at least a major part of production and post-production operations using component analog video signals.

The cumulative composite or component analog video signal impairments and their effect on the reproduced picture can be reduced considerably by using a digital representation of the video signal and effecting the distribution, processing and recording in the digital domain. The A/D and D/A conversions introduce some impairments.

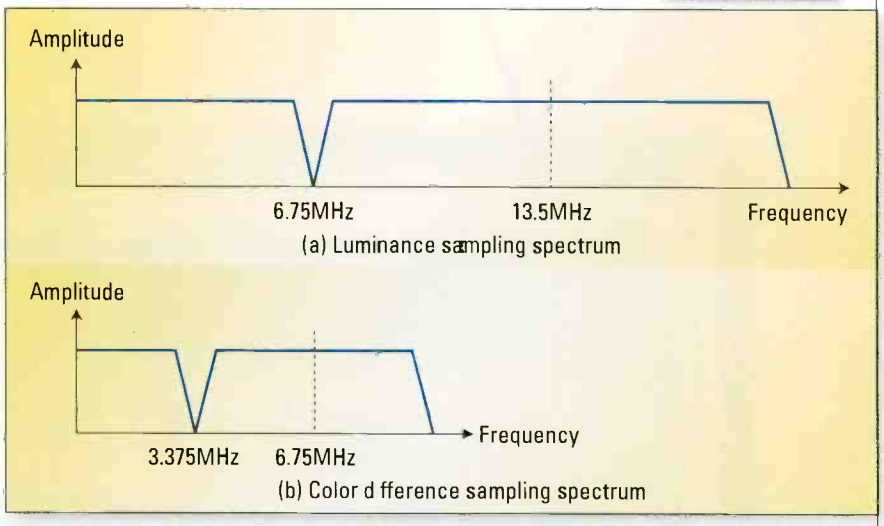


Figure 1. Sampling spectrum of 4:2:2 SDTV signals

By a proper selection of two parameters, namely the sampling frequency and the quantizing accuracy, these impairments can be reduced to low, visually imperceptible values. As long as the digitized signals are distributed, processed and recorded in the digital domain, these impairments are limited to those introduced by a single-pass A/D and D/A processing.

Sampling

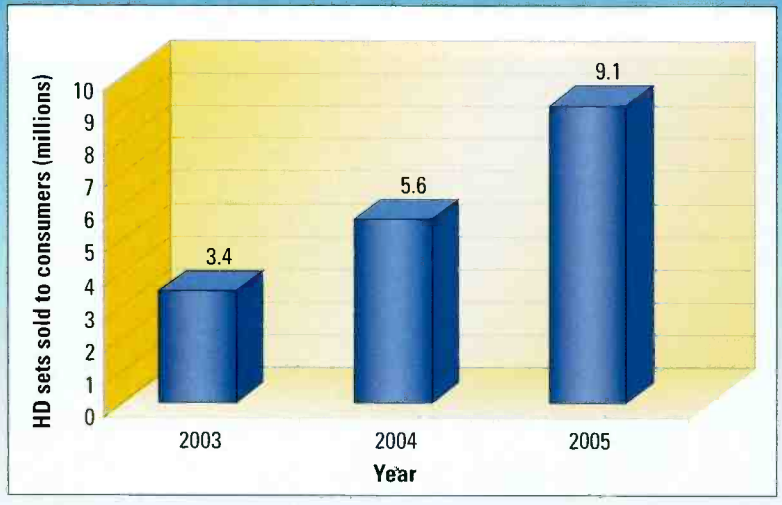
The sampling of the video signal is essentially a pulse amplitude modulation process. It consists of checking the signal amplitude at periodic intervals (T). (See Figure 1.) The sampling frequency (F_S=1/T) has to meet two requirements:

- It has to be higher than twice the maximum baseband frequency of the analog video signal (F_B), as stipulated by Nyquist. This is required in order to avoid aliasing. Aliasing is visible as spurious picture elements associated with fine details (high frequencies) in the picture. The only way to avoid aliasing is to use an anti-aliasing filter ahead of the A/D converter. The task of this filter is to reduce the bandwidth of the sampled baseband to less than $F_S/2$.
- It has to be coherent with and related to an easily identifiable and constant video frequency.

FRAME GRAB A look at tomorrow's technology

HDTV sets sold to consumers

In 2005, 9.1 million sets were sold to consumers



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An early approach, $3F_{SC}$, sampled the composite video signal at three times the color subcarrier frequency. This resulted in F_S = 3 x 3.58MHz = 10.7MHz in NTSC and F_S = 3 x 4.43MHz = 13.29MHz in PAL. A later approach, $4F_{SC}$, sampled the composite video signal at four times the color subcarrier frequency, or 14.3MHz in NTSC and 17.7MHz in PAL.

While sampling at a multiple of F_{SC} works well in NTSC and PAL, it doesn't work at all in SECAM. This is due to the inherent nature of SECAM, which uses two separate line-sequential frequency-modulated color subcarriers carrying, respectively, the D_B and D_R color-difference signals.

It appeared evident in the 1970s that a digital video system in which the luminance and chrominance are individually coded would ease the program interchange between the PAL and SECAM countries. This resulted in the component digital concept, which is at the core of all contemporary digital video systems.

The component digital concept uses three separate A/D converters, one each for the E'_Y, E'_{CB} and E'_{CR} component video signals. The sampling frequencies are a multiple of the horizontal scanning frequency F_H. The most pervasive SDTV sampling strategy, the 4:2:2, samples the luminance signal at 13.5MHz and each of the two color-difference signals at 6.75MHz. The luminance signal is low-pass filtered starting at 5.75MHz, and the color difference signals are low-pass filtered starting at 2.75MHz, resulting in a comfortable guard-band with respect to the Nyquist frequency and an alias-free sampling. The sampling frequencies are the same in the 525/59.94 and the 625/50 standard, resulting in an equal number of samples, 720 luminance samples and 360 each color-difference samples, during the active line in the two formats. Similar sampling strategies are used with the HDTV formats.

Quantizing

The pulse amplitude modulation results in a sequence of pulses, spaced at $T=1/F_S$ intervals, whose amplitude is proportional to the amplitude of the sampled analog signal at the sampling instant. There are an infinite number of shades of gray — ranging from black (lowest video signal amplitude) to white (highest video signal amplitude) — that the analog video signal can represent.

Experiments have shown that when less than eight bits per sample are used, the quantizing errors appear as contouring.

The instantaneous sampling pulse amplitudes can be represented in the digital domain by only a limited number of binary values, resulting in quantizing errors. The possible number of shades of gray is equal to 2^n, where n is the number of bits per sample.

Experiments have shown that when less than eight bits per sample are used, the quantizing errors appear as contouring. With eight bits per sample or more, the quantizing errors appear, in general, as random noise (quantizing noise) in the picture. In practical applications, in order to avoid clipping, the signal occupies less than 2^n steps, resulting in a specified quantizing range.

Figure 2 shows the relationship between the E'_Y, E'_{CB} and E'_{CR} analog component signal levels corresponding to a 100/0/100/0 color bars signal and the 10-bit Y, C_B and C_R digital sample values, as specified in ITU-R BT.601. In a 10-bit system, there are 1024 digital levels (2^{10}) ranging from 0 to 1023 (000 to 3FF hex). Levels 000, 001, 002, 003 and 3FC, 3FD, 3FE, 3FF are reserved to indicate timing references. Note that the sync is not sampled. This leaves a maximum quantizing range of 1016 digital levels,

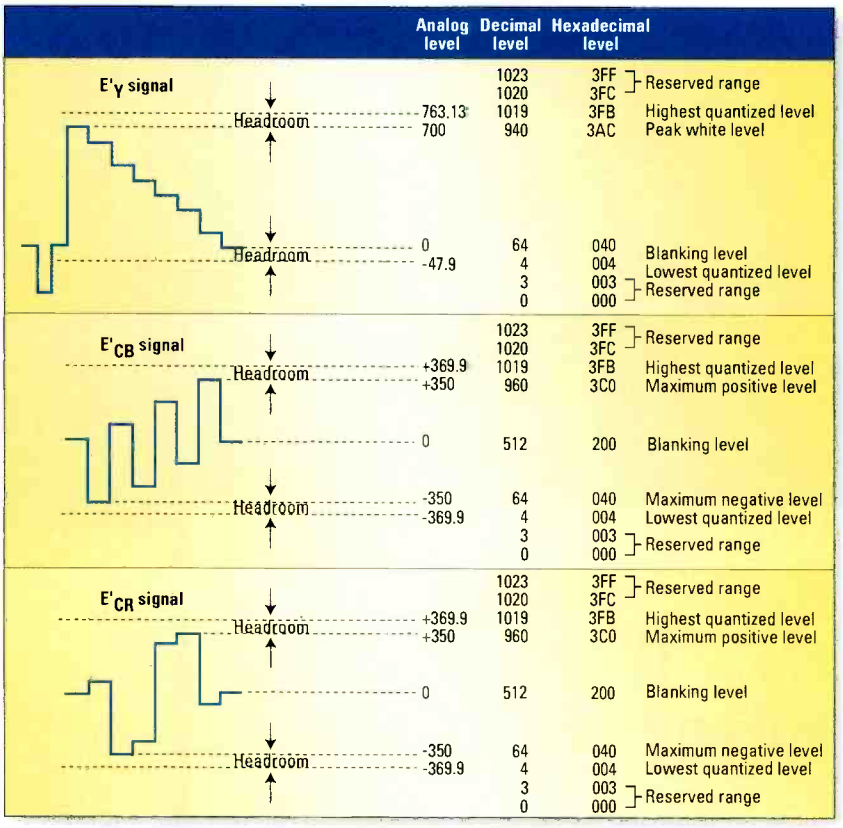

Figure 2. Relationship between analog component signals and 10-bit Y, C_B and C_R digital sample values

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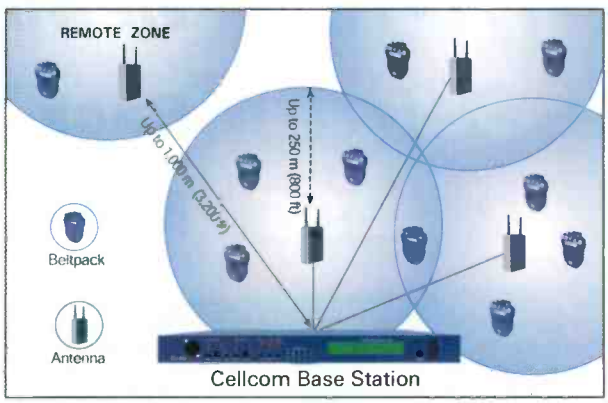

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ranging from four to 1019 to represent the signal levels.

The normalized (700mV p-p) Y signal levels are assigned a range extending from 64 to 940, a total of 877 quantizing levels. This leaves a small upper headroom (940 to 1019) and lower headroom (four to 64).

The normalized (700mV p-p) C_B and C_R signal levels are assigned a range extending from 64 to 960, a total of 897 quantizing levels. This leaves a small upper headroom (960 to 1019) and lower headroom (four to 64). An eight-bit system would have 220 quantizing levels for the Y component and 225 quantizing levels for the C_B and C_R components.

Advantages and disadvantages

The advantages of digital video are:

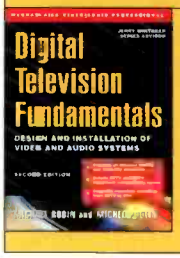
- Single-pass, analog-type impairments are non-cumulative if the signal stays digital. However, a concatenation of digital black boxes using analog interfaces leads to cumulative analog signal degradations and should be avoided.
- There is a reduced sensitivity to noise and interference.
- Digital equipment efficiently and economically performs tasks that are difficult or impossible to perform using analog technology.
- It is amenable to the application of techniques for efficient retention of essential information such as compression.

The disadvantages of digital video are:

- Analog-type of distortions, as well unique digital distortions related to sampling and quantizing, result in a variety of visible impairments.
- Wide bandwidth requirements for recording, distribution and transmission necessitate sophisticated bit rate reduction and compression schemes to achieve manageable bandwidths.
- Unlike analog signals, the digital signals do not degrade gracefully and are subjected to a cliff effect. BE

Michael Robin, a fellow of the SMPTE and former engineer with the Canadian Broadcasting'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.

SEND Send questions and comments to: michael_robin@prismb2b.com



The second edition of Michael Robin's book may be ordered directly from the publisher by calling 800-262-4729. The book is available from several booksellers.

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A tutorial on IP network addressing

BY BRAD GILMER

Understanding how computer network addresses work is fundamental to understanding how networked computers communicate. It is important to properly configure your networks, as well as to understand how computers on your network communicate with computers on the Internet. This month and next, we will look at network addressing in detail.

IP addresses

Internet Protocol (IP) addresses take the form xxx.xxx.xxx.xxx, where xxx is a number between zero and 255. There are public IP addresses and private IP addresses. Public IP addresses are assigned by the Internet Corporation for Assigned Names and Numbers (*www.icann.org*) and are routable over the Internet. Private IP addresses are not routable over the Internet: They are intended to be used within a facility.

In addition to IP addresses, computers use a subnet mask to determine which addresses are valid on a network. Subnets are critical to understanding how the Internet works, so we are going to spend the rest of this month's article on this topic.

Subnet masks defined

A subnet mask is a mask that is applied to an IP address to determine which portion of the address refers to the network and which portion refers to a host on the network. You might wonder why you would ever need to use a subnet mask. In fact, many times a subnet mask is not used. Most computers have their network masks set to 255.255.255.0, which effectively turns the subnet mask off. If this is the case, then what is the subnet mask for?

The primary use of a subnet mask is to apportion network addresses in an environment where these addresses are scarce. If you are working with an internal network where you can create all the addresses you need, then you may never worry about a subnet mask. On the other hand, if you ever work with a piece of equipment that is directly connected to the Internet, then you will almost always need to set the subnet mask appropriately.

CIDR notation	Available addresses	Usable addresses	Subnet mask
/32	1 valid address	0 usable addresses	255.255.255.255
/31	2 valid addresses	0 usable addresses	255.255.255.254
/30	4 valid addresses	2 usable addresses	255.255.255.252
/29	8 valid addresses	6 usable addresses	255.255.255.248
/28	16 valid addresses	14 usable addresses	255.255.255.240
...			
/25	128 valid addresses	126 usable addresses	255.255.255.128
/24	256 valid addresses	254 usable addresses	255.255.255.0

Table 1. This table illustrates subnet masks. The number after the "/" in the CIDR notation indicates the total number of IP addresses available.

If you ever work with a piece of equipment that is directly connected to the Internet, then you will almost always need to set the subnet mask appropriately.

Understanding subnet masks

It may be easier to understand subnet masks if we look at an example. Let's say that you are an engineer at a television station that has a T1 connection to the Internet. Your Internet Service Provider (ISP) tells you that you have six public IP addresses and that your CIDR address is 66.235.22.8/29.

If you are not familiar with CIDR, you may be a little confused. First, you should know that CIDR stands for Classless Inter-Domain Routing. CIDR resolved a problem with a shortage in Internet addresses, but more on CIDR next month. As you look over the information from the ISP, you may wonder what the /29 stands for. It means that there are eight IP addresses in this network.

By giving you the CIDR address of 66.235.22.8, the ISP is telling you that your network-addressing block starts at this address. The /29 specifies that there are a total of eight IP addresses in this block. As Table 1 shows, the number after the "/" indicates the total number of IP addresses available.

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Why is it that Table 1 shows that you were issued eight addresses, but the ISP told you that you only have six? The reason is that the first and last addresses are reserved. Given the CIDR of 66.235.22.8/29, you would be free to assign the addresses 66.235.22.9 through 66.235.22.14 to host computers you want to connect directly to the Internet.

Note that you would set the subnet mask on these computers to 255.255.255.248. This would tell these computers that the only valid IP addresses on this network are from 66.235.22.8 to 66.235.22.15.

Why in the world does /29 mean that there are eight addresses available? IP addresses run from 0.0.0.0 through 255.255.255.255. But what is magic about 255? It turns out that this is an easy number to represent in binary. You may remember that in binary, the right most digit represents ones, the next digit to the left represents twos, the next digit to the left represents fours, and so on. (See Table 2.)

Base-10 value	128	64	32	16	8	4	2	1
Binary	1	1	1	1	1	1	1	1

Table 2. In binary numbers, the right-most digit represents ones, the next digit to the left represents twos, the next digit to the left represents fours, and so on.

IP Address	66	235	22	8
Binary	01000010	11101011	00010110	00001000

Table 3. Network addresses assigned by the ISP

Subnet mask	255	255	255	248
Binary	11111111	11111111	11111111	11111000

Table 4. A network address' corresponding subnet mask in binary numbers

As you can see from the table, a binary value of "11111111," or eight "ones" equals 128+64+32+16+8+4+2+1= 255. With eight bits, you can represent values from zero to 255 (a total of 256 unique values). A group of eight binary digits is sometimes referred to as an octet. Internet addresses are specified by four octets separated by periods. Note that 255.255.255.255 is equal to four octets, with each octet set to a value of all "ones" in binary. The reason 255 is a common number in Internet notation is that it is easy for computers to count from zero to "11111111" in binary and to make decisions based upon values that are all ones or zeros.

Network addresses

Now back to the question: Why would the number /29 be chosen to represent eight addresses on our network? To answer this question, it might be useful to look at the network address assigned by the ISP and its corresponding subnet mask in binary. (See Tables 3 and 4.)

If you count the number of "ones" in the binary representation of the subnet mask, you will find that there are 29 of them. (Ah ha!) Not only that, if you look at the subnet mask, you will see that only three binary numbers are set to zero — the last three. A binary value of 111 equals seven. So, if you use the subnet mask to strip off all but the last three digits of the assigned IP address, the maximum number of values that can be represented is eight (zero through seven).

As you can imagine, it is possible to design logic that can quickly strip off the first 29 bits, or the last three bits. Why would this be important? Because in Internet technology, it can be important to know what addresses are local and what addresses are network. Put in other terms, it may be important to determine whether traffic on the network is meant for a local host or for the Internet.

One reason CIDR notation is common is that it is convenient. It is much easier to say "66.235.22.8/29" than it is to say "66.235.22.8 with eight valid IP addresses," or "66.235.22.8 with a subnet mask of 255.255.255.240."

Setting the subnet mask

Finally, you may wonder if it is a problem to leave your computers set to a subnet mask of 255.255.255.0. That depends on your situation. If you are working with host computers connected to the Internet, it would be best to set the subnet mask correctly. If you are dealing with workstations connected to a private network, then setting the subnet mask correctly is not as critical.

To learn more about IP addressing, take a look at an article titled "IP addressing and subnetting for new users," available at *www.cisco.com*, document number 13788. You may also want to download a free advanced subnet calculator from *www.solarwinds.com*. The calculator not only does subnet calculations, but also converts between CIDR and conventional subnet notation as well as performs other useful tasks. BE

Brad Gilmer is a SMPTE Fellow. He is also president of Gilmer & Associates, executive director of the Video Services Forum and executive director of the AAF Association.

SEND Send questions and comments to: brad_gilmer@prismb2b.com

During the last mission by Discovery, audio engineers, Royce Bowie and Greg Wiseman (standiing, l-r), with John Stoll, senior audio engineer and audio engineer Beth Weissinger (seated, l-r), in the Johnson Space Center Audio Control Room, handled all the communication and media feeds as well as NASA TV broadcast audio from the System 5-B.

NASA Lifts Off With Euphonix

NASA has installed a 64 fader System 5-B audio mixing system to handle audio from the shuttle and space station communications, mission commentary, media feeds, Presidential and VIP hookups, and audio from the various NASA operations centers together with audio for NASA TV.

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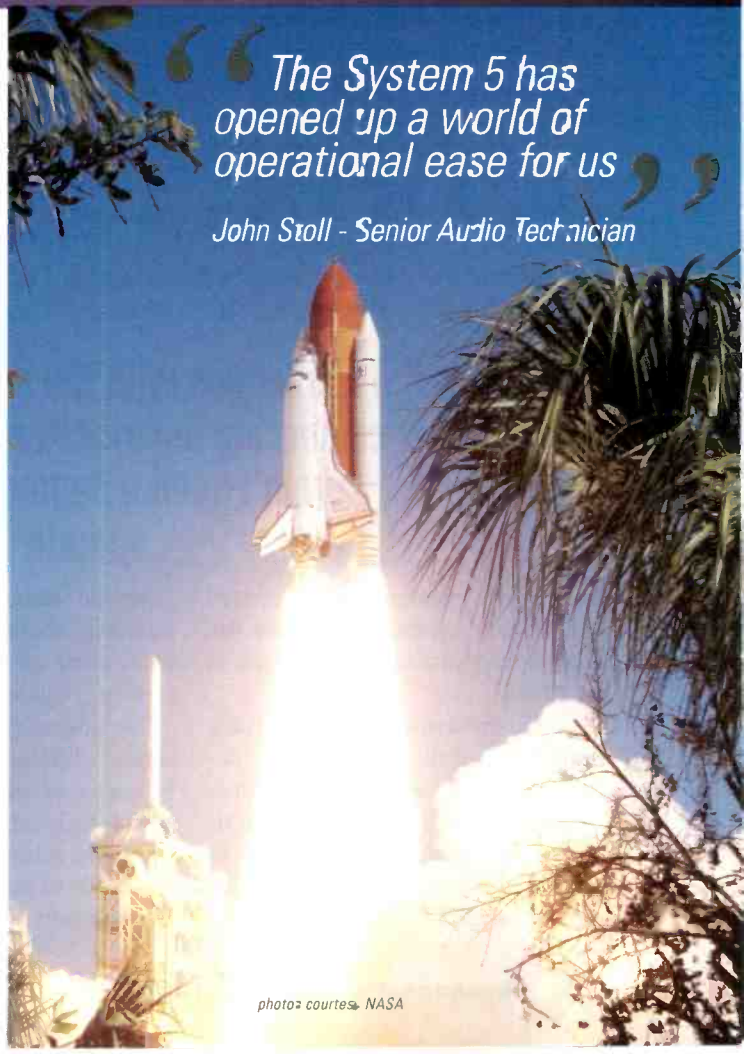
digital emotion



Microphones
for surround sound

BY GARY ESKOW

The migration to HDTV may be taking longer than some experts predicted back in the mid-'90s, but it is taking place. Are consumers clamoring for the benefits that enhanced picture and audio can bring to network and local television programming? With regard to surround sound, and the new microphone technologies that make multichannel audio easier to capture than ever, it's clear that viewers are in the driver's seat. Demand will dictate the pace at which the move to surround sound advances.

The audience

Multiple speaker systems are now available at prices that nearly anyone with an interest in surround sound playback in the home can afford. It's clear that many consumers enjoy hearing film scores played on inexpensive DVD machines. To date, however, the advantages that surround can bring to local newscasts, for example, have not captured the collective imagination of the public. Will the average homeowner eventually be interested in watching coverage of a local fire and hearing trucks screeching around a 5.1 field?

Among the manufacturers with the most to gain if this encroachment occurs are the microphone companies whose product lines include multicapsule microphones. Designed to eliminate the need to place a series of individual mics throughout an environment, this technology has already been used on Super Bowl broadcasts and other high-profile events. But local television stations have — to this point — remained a tough sell, despite these microphones' strong selling points.

B Format basics

Assuming that an audience exists for surround audio, the logistics involved in setting up six or seven microphones to cover an unfolding news story make them impractical in the fast-paced, budget-conscious ENG marketplace. This is particularly true when a shock-mounted microphone attached to a camera or a single boom are the only ways that audio is captured.

One soultion: B Format technology. (See Figure 1.) SoundField's three surround microphones (the ST250, SPS422B and Mark 5) all use this multiple-axis concept that references all four capsules of a surround microphone against a single point. In effect, the four capsules are angled to cover the four corners of the universe, but each one is electronically placed in the same spot, eliminating any possibility of phase cancellation.

One advantage of B Format is that several different audio streams can be output at one time, making it possible for a local broadcaster to deliver surround sound and stereo to cover the needs of its entire audience base. Because only four capsules are used, however, any multichannel setup that needs more outputs (read: 5.1) requires algorithmic manipulation to achieve the task. In SoundField's case, this consists of a hardware box or a plug-in that needs to be inserted into a Pro Tools or Nuendo session if five or more channels are called for.

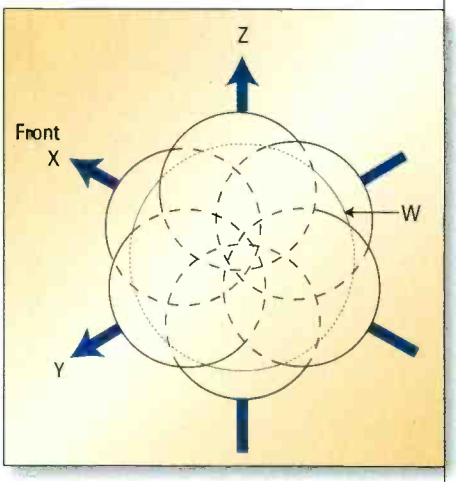


Figure 1. B Format recordings capture audio in three planes (X,Y and Z) as well as at a central reference (W). Recording all four tracks allows the precise audio image at the microphone's location to be recreated later. The four discrete images can be manipulated in post, creating an infinite variety of microphone patterns.

One of the challenges with the new technology is convincing broadcasters that shooters won't need a degree in calculus to operate the equipment. (They won't.)

And, as we mentioned at the outset, viewer demand is also critical. Do you ever turn on your local cable station to watch a local high school football or basketball game? Would surround sound augment the experience for you? Working down the chain even further, would that wedding video you had shot mean more to you if it was delivered in a multichannel format?

While SoundField uses four capsules

One of the challenges with the new technology is convincing broadcasters that shooters won't need a degree in calculus to operate the equipment.

Academy Award-winning sound designer and composer Frank Serafine used the H2-Pro to capture wind noise in the Grand Canyon.

and algorithms to output full surround spectrums, Holophone takes a different approach. Early on in the company's 12-year history, Holophone built a 10-channel microphone.

Holophone's H2-PRO consists of eight discrete microphones. The concept is to allow the multiple-mic array to hear the surround image as the human brain would.

Holophone microphones have been used in the coverage of major sporting events since the 1999 NHL All Star game. In addition to the sonic reality that surround microphones provide, their ease of setup is a big reason why they are gaining popularity. For example, at last year's Super Bowl, setting up a pair of H2-PROs took 45 minutes (compared with several days for the system used the year before). One microphone was placed on a 30ft pole at the 50-yard line to capture the ambience of the game. The other, a wireless microphone that worked with an eight-channel wireless transmitter, was used to pick up the crowd.

Holophone is working on its latest product, the PRO mini, which will be used by NBC when it covers the Turino Winter Olympics in February 2006 and released shortly thereafter. The PRO mini, a six-capsule microphone, will mount on a camera and follow its moving perspective. Using SRS Circle Surround II, this device will record six audio tracks onto a stereo pair.

B Format's future

As impressive as Super Bowl and Olympic presentations are, manufacturers cannot sustain viable businesses by catering exclusively to the major networks. Education and experience will play a pivotal role if surround sound is to move into the local broadcast environment and become a part of the every day viewing experience of the American public. BE

Gary Eskow is a composer and journalist.

SYSTEMS DESIGN SHOWCASE

THE DAILY SHOW

relocates to house larger laughs

BY MICHAEL GROTTICELLI

The breakout success of "The Daily Show With Jon Stewart" on cable's Comedy Central channel has meant a larger viewing audience and bigger laughs. It's also necessitated larger studio facilities.

The entire cast and crew recently moved from NEP Studio 54 into a new space across town in New York City from its smaller digs (where it had been since 1998), with the help of NEP Studios, in a mere two weeks. Comedy Central did not want to have any significant amount of downtime for the show, so the move to the new facility, which opened in July, had to happen quickly. New construction to get the facility ready and make room for expanded offices and production space began in January 2005 and spanned six months.

The audio control room features a Solid State Logic C100 digital audio console and a Digidesign Pro Tools workstation. Photos courtesy Dave King.

NEP Studios owns the studio space and has agreed to lease it to "The Daily Show" for four years. John Chow, NEP Studios' vice president of engineering, oversaw the engineering project, which was renovated to Comedy Central specifications. This includes the show's desire to have all of the production rooms located on the same floor. Also, the graphics workstations are now located close to the editing systems so that the staff can collaborate on projects more effectively.

The show's producers wanted the tape operators to be able to see the control room, so a hole was cut and a window built between the two. In most cases, the show's staff would rather communicate across the rooms to one another than send and grab a file off of a network. However, the staff does have access to a Telex/RTS Matrix Intercom system with wireless intercoms units.

Top photo: The spacious SDI production control room employs a Sony DVS-9000 switcher, a Pinnacle DVEXtreme digital video effects system, Ikegami monitoring and a Telex/RTS Matrix Intercom system.

Bottom photo: The large 100ft x 75ft studio audience area accommodates more than 200 people. The set is equipped with Sony BVP-950 cameras and three large rear-projection screens.

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Erik Duke, President, Chelsea Television Studios

Studer Vista 8 in live use for "Martha" Stewart show at Chelsea TV Studios, NYC

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Chow also supervised the purchase of several new pieces of digital production equipment, as well as the transfer of existing systems to the new facilities. There's also a new serial digital/fiber-optic network connecting the systems and expanded space for the show's studio audience, writers and administrative staff.

The facility did not go completely digital. (It's 601 digital and AES with analog video and audio layers.) There's a Grass Valley Venus analog router with dozens of Grass Valley Gecko signal conversion cards and numerous Betacam SP decks in use. However, it does takes advantage of several digital islands — for editing (Avid Media Composer Adrenalines) and for graphics (Discreet flint, Quantel Paintbox, etc.) — connected via a Gigabit Ethernet connection, that help streamline the sometimes frenetic production process. Four Avid workstations share material via a LANShare server with 2.88TB of storage.

Because it's such a graphics/video-intensive production, the show also uses five Grass Valley M-Series iVDR (two record and two playback channels, with 16 hours of 25Mb/s storage per unit), Profile servers (eight channels), TiVo digital video recorders and four digital betacam VTRs to capture images off-air for use in the show. The editors also use Sony DVW-M2000 and DVW-A500 source decks.

An analog transmission path at the old location has been converted to a DS-3 digital link. As the show is being taped live, video and audio is sent to Comedy Central's office at 1515 Broadway, in New York City. Then it's bounced to the network operations center, in Hauppauge, NY, for playout across the country.

Audio also has been greatly enhanced, with a new Solid State Logic C100 digital audio console serving as the centerpiece of a retrofitted audio production room. Tim Lester, a freelance audio engineer who has been with the show since its inception, said the new console includes all of the features he

The tape/server operations room looks into the production room. It uses Sony Digital Betacam, a Grass Valley M-Series iVDR, and DNF and Lance controllers.

Technology at work

Adobe After Effects workstation
Avid Technology
- Media Composer Adrenaline systems
- LAN Share server

Chyron iNFiNiT! CG
Digidesign Pro Tools|HD3
Discreet flint workstation
DNF Controls 2034CL Clip Instant Access System with ST 420 Shotbox
ETC Expression 3-800 lighting control console
Grass Valley
- M-Series iVDR
- Venus routing switcher
- Signal converters

Ikegami
- 14in and 17in broadcast monitors
- Rack-mount LCD panel

Lance HSE-200 four-VTR controller-editor
Leader SDI waveform/vectorscopes
Mackie Onyx 1640 analog audio mixer
Pinnacle Systems
- DVEXtreme digital video effects system
- Lightning stillstore

Quantel Paintbox workstation
Sennheiser EM 3532 wireless mics
Solid State Logic C100 broadcast audio console
Sony
- BVP-950 digital portable camera system
- DVS-9000 switcher
- DVW-M2000 Digital Betacam editor
- DVW-500 Digital Betacam VTRs

TASCAM MX-2424 SE hard-disc recorder
Tektronix SPG 422 SDI sync generator
Telex/RTS Matrix Intercom systems w/wireless intercoms
Vinten
- Vector 70 pan/tilt heads
- Fulmar pedestals

wished he had in the existing facility.

"The Daily Show" selected the SSL C100 due to a number of live production features. The new version 2 software includes expanded I/O capacity and TouchPan, a feature that allows Lester to have full 5.1 panning access on every channel from the console's central touch screen. The console's ability to handle full 5.1 surround sound mixes was another key factor in selecting the unit, as "The Daily Show" plans to begin producing the show in Dolby Digital sometime this year. Lester also uses a Digidesign Pro Tools system and a TASCAM 24-track, 24-bit hard disk recorder to create sound effects.

An expanded production studio, which is the former home of The Food Network shows such as "Emeril Live," includes four Sony BVP-950 digital cameras (with switchable aspect ratio), an ETC lighting system and a larger studio audience area. The studio audience area accommodates more than 200 people, twice the amount of people the older studio held. The set also has been redesigned, with the addition of three large rear-projection screens.

A renovated control room features a four M/E Sony DVS-9000 SD production switcher, fully loaded with 80 inputs and 48 outputs. Images are stored for each night's show on a Pinnacle Systems Lightning server, which can be called up through the switcher for insertion into the show as well. Ikegami monitors fill out a comprehensive monitor wall, where the director and TD sit and call the shots.

The new digital facility offers Jon Stewart and his staff a chance to spread their wings and produce more complex segments than they could before. The frenetic pace of producing the show is still the same, but now there is more room to roam. BE

Michael Grotticelli regularly reports on the professional video and broadcast technology industries.

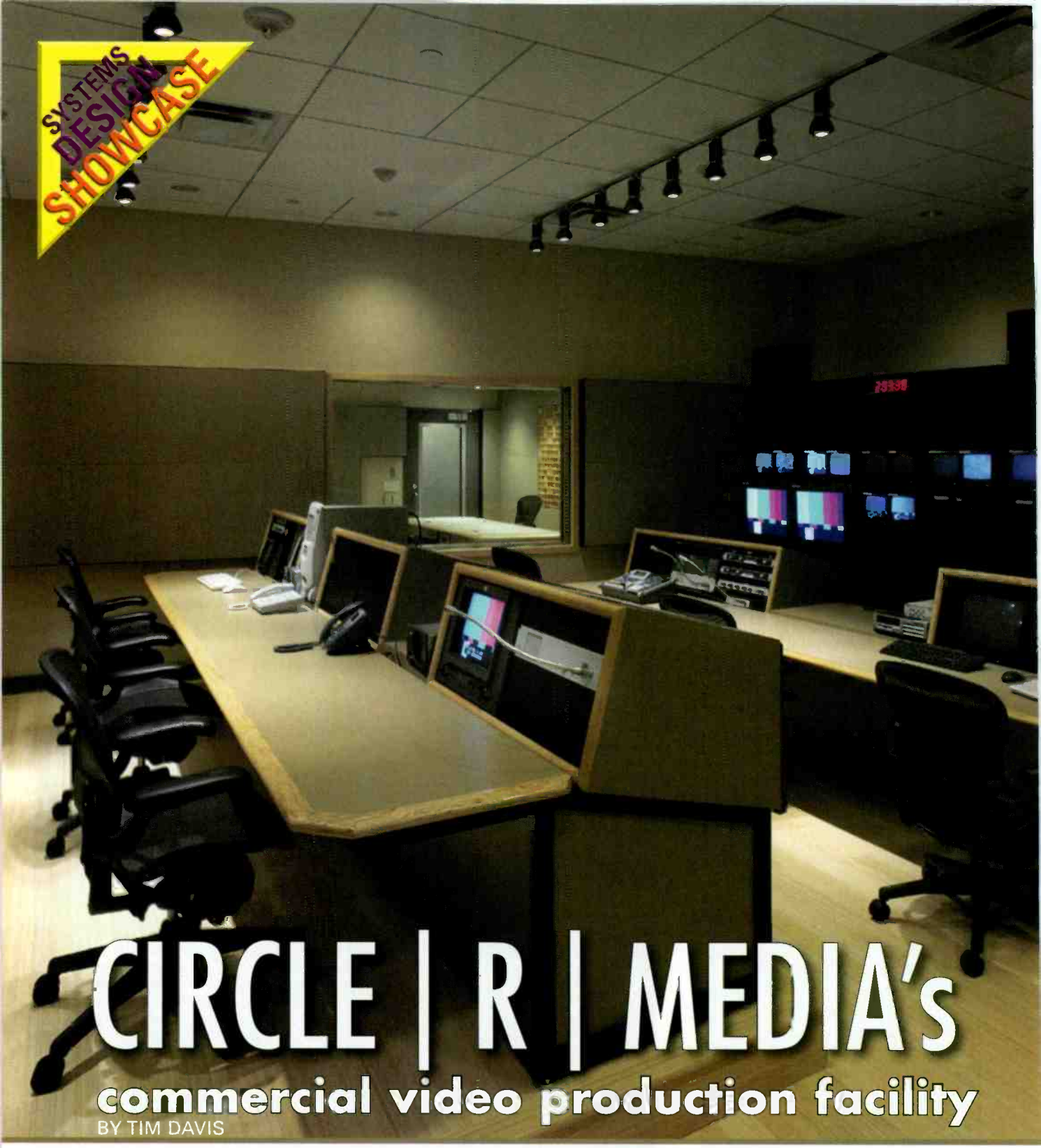
Design team

NEP Studios
- Charles Pontillo, president
- John T Chow, VP of engineering
- Kevin Tobin, chief engineer Studio 52
- Lorenzo Handsford, engineer Studio 52
- Adriane Truex, facility manager Studio 52
- Bill Willig, project manager
- Georgia Pappas, executive in charge of production
- Ray DeMartini, director of support services-engineering & facilities

Kevin Tobin & Ed Modzel, design engineers

Sonny Waysack, installation supervisor

Alan Garry, Kossar & Garry Architects



CIRCLE | R | MEDIA's commercial video production facility

BY TIM DAVIS

Texas is not exactly the first place that comes to mind when considering hotspots of broadcast and production facilities in the United States. But Circle R Media aimed to change all that with the construction of a new facility in the heart of North Texas. The company replaced its existing facility with a 48,000sq-ft video, film and audio production facility that opened in downtown Fort Worth in May 2005.

Forward-thinking design

The first step to creating a world-class production facility was taken when Circle R Media hired Russ Berger Design Group (RBDG). In addition to baseline goals such as centralizing the facility's UPS system, the company presented RBDG with several important requirements, including:

- creating a first-rate critical listening environment in the edit suites and control rooms;
- increasing the studio grid height with a retractable grid system;

Track lighting sets the mood for those working in the video control rooms while the completely patchable monitor bridge can be easily viewed from anywhere in the room.

tuned within the rooms. In addition, the noisy equipment in the half height racks outside the suites was isolated. Perhaps most significantly, the new facility was constructed with a dual-floating slab and sound-sealed doors that ensure ultra-quiet rooms.

Circle R Media's previous facility was reasonably sized at 40,000sq ft, but it was designed around a central elevator system that created areas of unusable space. At 48,000sq ft, the new facility is only slightly larger, but with an absolute minimum of wasted space.

A high level of space efficiency was gained by installing a retractable grid system to increase the grid height in the studios. Of the new facility's three studios, the largest — which measures 83ft x 45ft with a grid height of 25ft — is equipped with a DeSisti retractable light grid system.

In addition to increasing the studio grid height, the system allows for quick set lighting changes and saves the company an average of two hours per shoot day. The light bars are autoload balancing, which eliminates the need to evenly space the lights on the bar. Also, because the system uses a series of hoists that can be lowered to the studio floor from a control panel, it's not necessary to use a lift or ladders to position each light above the set.

In keeping with the expectation that the new facility should last at least 15 years, Circle R Media put a good deal of thought into creating a space that was flexible and fully upgradable. This was achieved in part by using as much digital equipment as possible and upgrading the central routing to SDI digital video and AES/EBU digital audio. With the exception of a minimal amount of analog video monitoring and live audio equipment, 90 percent digital implementation was achieved in the new facility.

The company also chose a Leitch Integrator Gold Series 128 x 128 router for its modularity, multiformat capabilities and upgrade path. The fully modular digital video, audio and machine-control router moves high-speed signals from up to 128 locations throughout the facility, making it easy to control complex production from a single point and provide superb-quality sound. And because the previous analog router was also made by Leitch, it was possible to reuse several of the route head controllers.

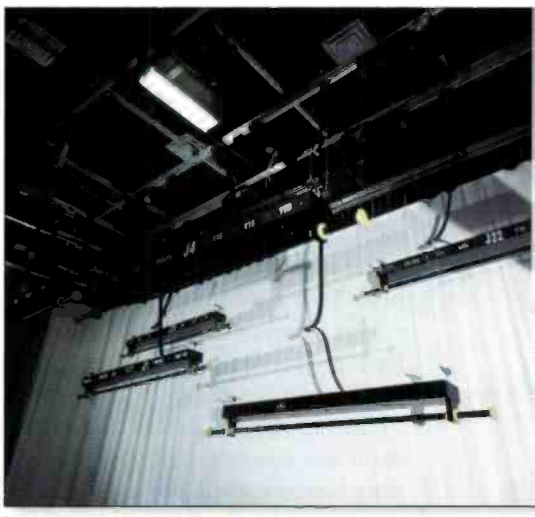
Upgradability was also foremost in mind when deciding on Signal Transport's modular panel system, which allows for quick termination of the proper room connections with the latest connector types.

Finally, as a newly independent

- developing a space that was flexible and fully upgradable;
- and enabling the company to independently run its own IT operations.

The high level of critical listening in the edit suites was achieved in part by having AEC — specialists in architectural noise control — install soundproofing wall fabrics to keep acoustics

The 3800sq-ft sound stage comes complete with a DeSisti retractable lighting system equipped with 160 dimmers and HDC hoist digital control.



Studio A's DeSisti lighting system contains movable, self-leveling battens and an HDC hoist digital control system.

private company, it was important that Circle R Media handle and manage its own IT operations. As a result, all the data connections in the facility were routed to terminate in the central machine room instead of the BDF closets. A firewall, exchange server, file servers and FTP server system were all installed. The company also had to provision its own connectivity into the campus and demark it at the central machine room. The extra work was extensive but well worth it because it provides the flexibility to react quickly to customers' IT needs.

The audio control room is isolated from the video control room, making for a more precise listening environment — the envy of any audiophile.

The facility's engineers provide service to the three individual stages and two control rooms from one central area. Cameras, intercom stations, tallies and routers can all be easily switched from one to another in seconds.

Assembling the technology

From the beginning of the project, it was determined that Circle R Media would use its in-house engineering staff for all system integration and installation, using VidCAD for systems documentation. The internal engineering staff consists of five full-time engineers with combined broadcast engineering experience of more than 100 years.

In terms of equipping the new facility, some equipment was simply transferred from the old facility to the new. This included Sony BVP-700A studio cameras that were deemed to have several more years of good use left on their life cycle.

Naturally, a good deal of new equipment was also acquired. The new editing systems are comprised of two Avid Media Composer Adrenalin HD systems, Avid Symphony, Avid Express Elite and an Avid DS|HD for finishing. For EFP, the company purchased a Panasonic AJ-HDX400, as well as the AJ-HD1200A DVCPRO HD VTR for its 1080i capability and for the open use software codec that easily interfaced with two new Apple Final Cut Pro HD systems. The Final Cut systems were chosen as a good complement to the facility's Avid systems with Unity storage for standalone productions that don't require a collaborative editing environment.

Storage needs were met with the selection of an Apple XRAID for the Final Cut Pro HD systems, while an existing Unity drive system was upgraded to 4TB with 2Gb switching. ETC dimmers and controls were chosen for studio lighting, with systems varying in size from 48 channels in the small stage to 226 in the large stage. The grid and all the lighting instruments in the three studios, including battens and the dimmer control, are operated using DMX control.

The facility's graphics and animation studio was equipped with dual Xeon processors running on a gigabit backbone server. This technology was selected because it provides a render network of eight dual-processor servers that hasten the production of animation sequences. The main programs used are Maya, Adobe After Effects, Boujou motion tracking software and Smedge 2 for render farm management.

All of the new facility's video and audio control rooms were outfitted with soundproof soffits for possible future installation of projection systems. For the time being, however, Sony LMD2105 and LMD4420 LCD monitors were installed. This reduction of weight allowed for experimentation with a different monitor mounting scheme. The decision was made to use standard computer relay racks for monitor bridging to save space and give the bridges a streamlined look. The control rooms were also outfitted with power outlets at speaker height to allow the use of powered audio monitors, if required.

One of the most important technology decisions made in the new facility was to incorporate fiber optic as the main transmission method. Circle R chose to service its clients with fiber optic via Genesis Networks. This provides the ability to schedule and monitor loops over the Internet and vary bandwidth according to program needs. It has proven to be both cost-effective for the company and a great value for its clients.

The new facility is also hardwired to 11 locations at the nearby corporate office of RadioShack, one of Circle R Media's clients, including board rooms, model stores, training rooms and outdoor locations. The external locations are wired and terminated with triax, audio, video, hybrid copper fiber combo and single mode fiber, which enable the company to roll its studio cameras to these locations and broadcast to the more than 7000 RadioShack stores via EchoStar in Cheyenne, WY. By using hybrid and single-mode fiber, the company is assured of staying connected well into the future.

Challenges and completion

Although the project flowed well and was ultimately successful, the facility had a few minor challenges to overcome. Not the least of these challenges was how to create pristine acoustical integrity in a building facing one of the area's busiest thoroughfares.

Architecturally, it was necessary to place the facility's west wall against the parking garage and the main entrance along the busiest street in downtown

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Fort Worth, thus presenting a real challenge to build a vibration- and noise-free facility. Ultimately, the solution came in the form of a dual-floating slab system designed to provide true vibration-free recording stages and soundproofed listening areas. Other measures that further ensured acoustical integrity included installing sound-lock doors, placing noise-producing equipment in a central machine room and implementing a room-within-a-room suite design. In addition, Gordon Ceilings' custom-designed suspended ceiling grids were used for all editing and audio suites.

The bamboo flooring in the audio suites and video-audio control rooms sits atop a dual floating concrete slab foundation. This, along with the sound absorbing material on the walls, makes for an ultra-quiet working environment.

The central machine room is the main hub from which all processes take place. Noise is kept to a minimum within the surrounding edit suites because routing, patching and tape playback occur in this area.

Another challenge was keeping the old facility online until the new one was fully functional. This took a tremendous amount of planning and coordination, stretching the company's engineering staff to the limit. Not only was it necessary to manage the equipment move, but also the move of the staff and offices. Every engineer logged more than 60 straight working days to effect a smooth transition.

Circle R Media has been in the new facility since May 2005 and is now logging more than 3000 hours per month supporting its clients. Today, the facility's world-class capabilities combine cutting-edge video production, animation and graphics studios, and offer producers, directors and production managers both full production and post-production capabilities.

The three spacious studios are all large enough for staging television productions, as well as the most up-to-date animation, motion capture and 4-D design and production capabilities. The facility also offers the company's clients enhanced capacity for national television spot production.

In addition to the studios, the new facility features nine video and audio edit suites, video and audio control rooms, sound booths, an engineering lab, a conference room that seats 30, duplication and replication rooms, a tape library and archive, dressing areas, a commissary, a master control room, and office area for 15 employees.

More important than the space, however, are the technological capabilities offered by the advanced motion capture laboratory, which can handle up to five "mo-cap" figures in a single shoot and a 4-D video process capable of producing amusement park-quality videos and studios for retail, sales motivation and other corporate applications. In addition to advanced production capabilities, the company also provides clients with a wide range of professional services, such as Internet simulcast, network origination, digital

satellite network integration, broadcast equipment installations, syndication uplinking, studio remotes and network news inserts. BE

Tim Davis is chief operating officer and chief technology officer of Circle R Media and a 30-year veteran of the broadcast engineering field.

Design team

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- Barbara O'Toole, president

Beck Associates

Circle R Media
- Tim Davis, COO/CTO

ILS Integrated Lighting Systems
- Rob Boltinghouse, president, CEO

Russ Berger Design Group
- Richard Schrag, design principal, acoustics and architectural engineering

Technology at work

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Avid
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- Symphony NLE
- DS|HD NLE

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Digidesign Protools HD 2 Accel audio editor

ETC Express light dimmers

Inscriber INCA HD/SD CG

Leitch Integrator Gold Series SDI video routing switcher

Panasonic
- AJ-HDX400 HD cameras
- AJ-HD1200A DVCPRO HD VTRs

Ross Synergy 2 switcher

Sony
- BVP-700A studio camera
- DVW-500A digital recorder
- DSR-2000 DVCAM recorder

VidCAD

Videotek VTM440HD/SD rasterizer

Wohler LM106-6AC3 audio monitoring

Recovering from a catastrophe

BY DON MARKLEY

It's bad enough trying to make everything work again when a routine component failure occurs. In a more serious repair problem, the facility has suffered from a fire or, as along the Gulf Coast this year, one or more hurricanes with accompanying wind and water damage. While these two situations would seem to be totally different, the repairs have a certain amount of similarity.

Extinguishing the flames

If the flames actually are around the equipment, it probably is destroyed. It's then necessary to order new pieces. What becomes a more difficult situation is when the equipment is not directly exposed to the fire but simply finds itself in an environment that causes harm. That environment includes both smoke damage and the results of extinguishing the flames.

One problem with transmitter site fires is that the sites are usually unmanned. Good fire and smoke sensors with an extinguishing system are an absolute must.

The most desirable solution is a Halon system. In a complete system, the power would be shut off at the main breaker with a shunt trip, the building air vents would be closed, and the building would be filled with Halon in a gaseous form.

However, Halon poses a problem. Halon rises in the air and ultimately attacks the ozone layer. As a result, it is now illegal to manufacture Halon in the United States. On the other hand, there is no good way to get rid of the existing Halon.

So far, the solution has been to recondition existing Halon by cleaning it both physically and chemically. Then, the leftover Halon can be reused in fire extinguisher systems. While it is illegal to manufacture Halon, the Federal Aviation Administration urges the use of Halon systems for aircraft. This results in an interesting dilemma. One government agency says you can't make the stuff, while another urges its use.

Halon simply creates an atmosphere where nothing will burn without an additional stimulus. In low concentrations, it isn't harmful to people, but for numerous reasons, one should leave the building. Besides the Halon, fires in electrical equipment generate gases that can be extremely harmful, if not fatal. If members of the station staff happen to be in the area when the system fires, they should leave, making sure the doors are closed, and call the fire department. After the fire is totally out, the building can be vented and systems brought back online.

A major problem with fires is that well-meaning staff or firemen spray everything with dry powder fire extinguishers. While good at putting out the fire, the compound used in those extinguishers is harmful to equipment. The material combines with the copper on circuit boards and connectors as well as some other metals. The plating on tape paths is destroyed, with only the base metal remaining. Bearings in motors or tape decks are damaged. The general corrosion of the copper starts immediately.

As an absolute rule, no dry powder extinguishers should be allowed anywhere near the station. In addition, visit the local fire department and request that it does not use dry chemicals if it is called to the site.

For the station, if a complete, fixed Halon system cannot be installed, portable extinguishers are available with Halon in a liquid form. It should be sprayed at the base of the flames until the fire is out. Obviously, the power should be turned off to eliminate the cause of the fire or to reduce the probability of the fire rekindling.

If a dry chemical has been applied, the equipment should be treated as soon as possible by an experienced cleaning service that has the necessary solvents to stop the effects of the chemicals.

Proper cleaning can greatly reduce the bad effects of the chemical extinguishers. In one case, a studio full of

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REVENUE ($)	2005	2010
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Asia Pacific	$0.3 billion	$1.1 billion
Latin America	$0.1 billion	$0.4 billion
Total	**$3.2 billion**	**$10.8 billion**

Source: Informa www.informa.com

high-end cameras was badly exposed to smoke and the dust from dry chemicals used to put out the fire. The cameras were cleaned by a professional service, but the station was worried that the cameras wouldn't be reliable, so they were sold to another local station. The cameras ended up providing years of reliable service, with no more than usual routine maintenance needed. The continued good performance of those cleaned cameras changed many minds, including mine, about the ability to clean electronics equipment.

Water damage control

The other big problem is water damage resulting from major storms. This includes salt water flooding from hurricanes and the loss of building roofs due to tornadoes.

For equipment that has been immersed in salt water filled with sand, mud and chemicals, in most cases, the obvious solution is replacement. It isn't just the salt water; that can be cleaned up. The problem is all the crud that gets carried in at the same time, in addition to the inability to get the equipment cleaned quickly.

Exposure to rain isn't necessarily a problem. Pure rainwater is essentially cleaner than the best quality tap water. Unfortunately, the rainwater gets filtered through dirt on the roof, in the attic, on top of the racks, etc. The result is that the equipment is exposed to all sorts of unwanted contaminants. The damage will probably be repairable if the power is shut off quickly to avoid damage from the operating voltages.

The repairs, if no mechanical or electrical damage occurs, usually involve cleaning by a professional service. However, simple fresh water exposure is usually treatable by the station staff.

Cleaning house

Contacting the station's insurance carrier immediately is a good idea. The carrier will help to get professional cleaners in as soon as possible. Getting the corrosive materials out of the equipment works best if done before extensive corrosion occurs.

Damage to equipment from unwanted contaminants in the water can be repairable if the power is shut off immediately. This helps to avoid further damage from the operating voltages, which could completely destroy the equipment.

Engines, as in the standby power plant, can be returned to service with minimal problems. Engine service facilities, especially on the coasts, are experienced in dealing with total immersion when boats sink. The repairs normally involve lots of flushing with various solvents and running the engine for short periods with oil changes between those periods. All electrical systems, not just the electronics equipment, need a thorough cleaning, lubricating, recalibrating, etc. As a rule, motors should be serviced by a good service facility.

Getting back on-air

The one remaining problem normally found with major damage is that the stations cannot return to the air immediately.

The one good experience that the staff will have is in dealing with manufacturers to get replacement equipment to the station. Generally, manufacturers will bend over backwards to help get stations back on the air. That may include using equipment from their lab and diverting deliveries for other stations where delays won't cause those stations to be off the air. The broadcast industry, especially on the technical side, generally pulls together in major calamities. BE

Don Markley is president of D.L. Markley and Associates.

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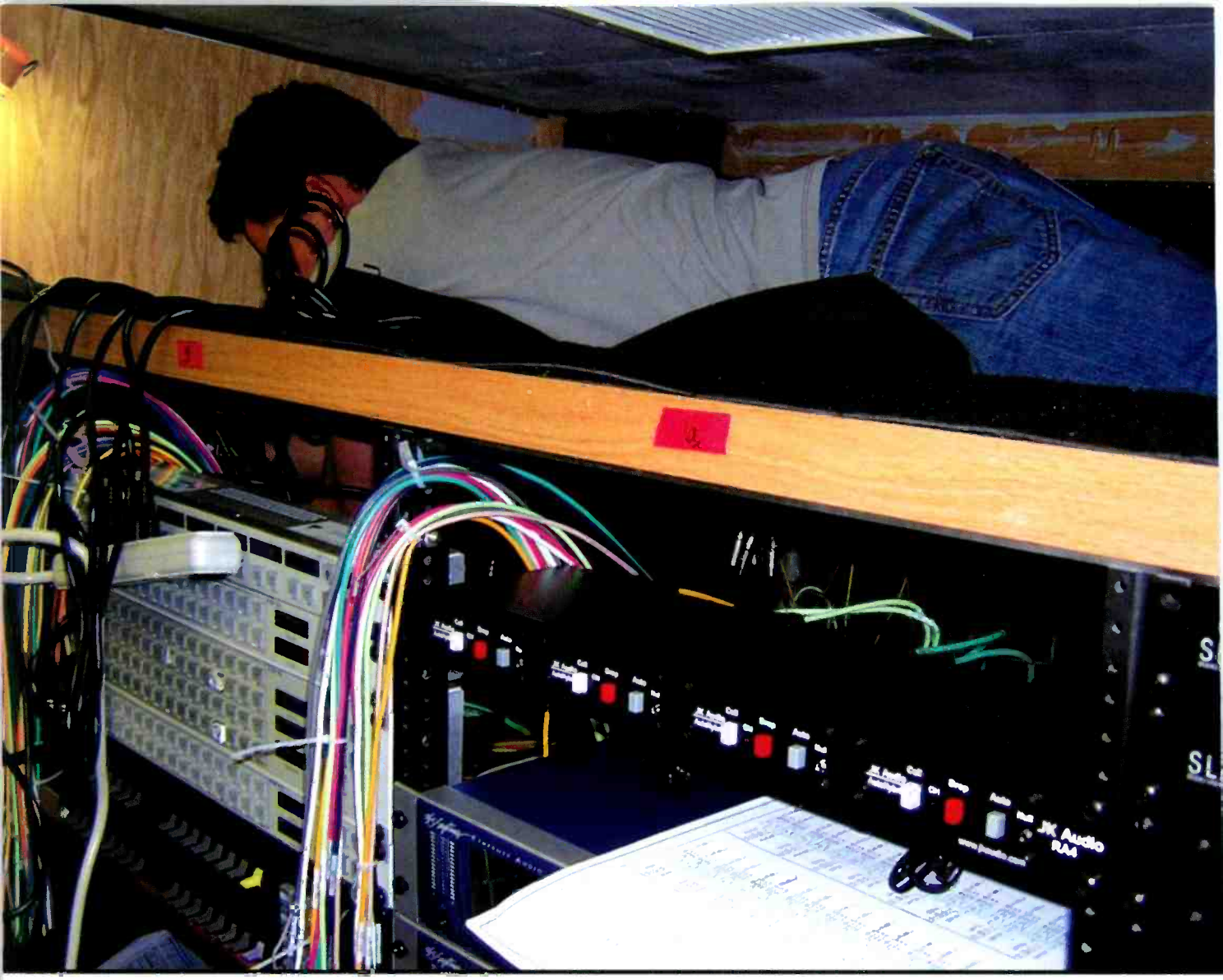

BY BARRY BENNETT

UPGRADING to HD

Previously I've addressed the issues facing the NTSC truck owner considering a video system upgrade to SD. Many of the issues of that upgrade path also apply to the current quandary facing many truck owners. Considering an upgrade from SD to HD, while an entirely separate technical challenge, still involves similar questions regarding the physical issues of the existing trailer, power, heat, air conditioning, etc. This article focuses on the various questions that must be addressed to turn an SD truck into an HD truck.

To be HD or not to be HD

The time has come. Your clients have been pressuring you for the past year or more to offer them an HD production vehicle. You, of course, with one or several SD trucks in your fleet and

Photo: Upgrades sometimes require getting into tight spots to avoid removing a lot of equipment needlessly. Small installers are ideal for this purpose.

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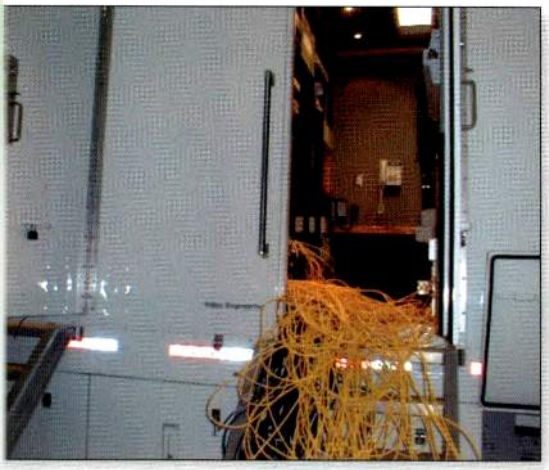
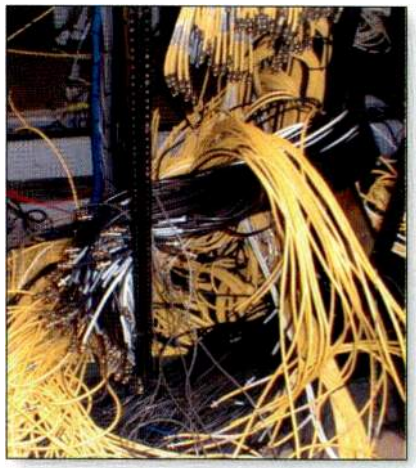


A decision must be made initially whether to save existing wiring or start from scratch.



This upgrade required moving the old video wiring and starting at the beginning.

perhaps several analog trucks, have jumped right in with multi-million dollar upgrades for each and every vehicle in your fleet, right? WRONG! You have barely begun paying for that shiny new SD truck you built only two or three years ago. How can you now justify an upgrade that will set you back roughly one half to three quarters of the original price of the truck, the initial cost of which you have only barely begun to write off?

The answer to that question is simple: You will have to find a way. HD is here to stay, and you are being driven by market forces to provide this service. If you don't, you'll be left behind by those who do. The intricate and usually painful details of financing this upgrade are not the subject of this article. Neither are the various client-oriented discussions you, your banker and your staff have been undertaking for most of this past year as to whether or not to upgrade vs. build an entirely new vehicle. While the concept of upgrading is relatively simple, the mechanics by which it may be achieved are not.

This article will focus on the nuts and bolts of actually accomplishing the conversion. We will examine the pros and cons of an upgrade as opposed to a complete replacement of the vehicle, beginning with the options for the video core systems and continuing through all of the audio, communications, structural, electrical, air conditioning and various other subsystems, each of which can cause many sleepless nights when deciding if/how/what to upgrade, what to reuse and what to replace.

For the remainder of this article, HD will refer to a high-definition digital signal, namely 1080i, 720p and all the various permutations thereof. SD will refer to a standard-definition digital signal, or plain old 601. Aspect ratio of 16:9 is, of course, assumed.

First things first

You have come to the conclusion that you simply must offer HD production to your clients. One of the initial decisions you will face is whether to upgrade one of your existing trucks, or start from scratch and build an entirely new vehicle. Because this article is about upgrading, we will focus on this concept. There are many individual and intertwined steps that have led you to the conclusion that upgrading your existing truck is the way to go. A thorough analysis of your existing vehicle will be the first step in the process, from both the physical/technical perspective and, of course, the always-present financial considerations.

HD is here to stay, and you are being driven by market forces to provide this service. If you don't, you'll be left behind by those who do.

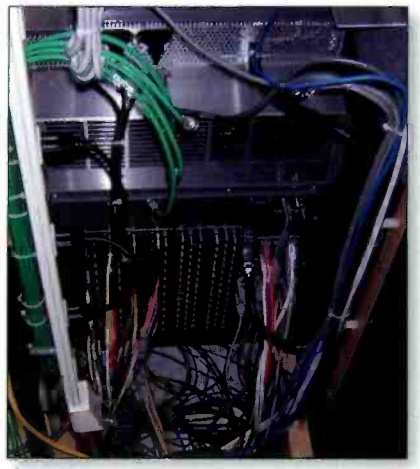
You must simultaneously determine if your existing trailer will suffice to house your new HD video system and if the remainder of the systems (audio, communications, room layout, etc.) are also sufficient for the new truck concept. You also must consider the cost of both in terms of new equipment purchase and lost revenue from downtime while the conversion is being accomplished. This latter point is important to consider.

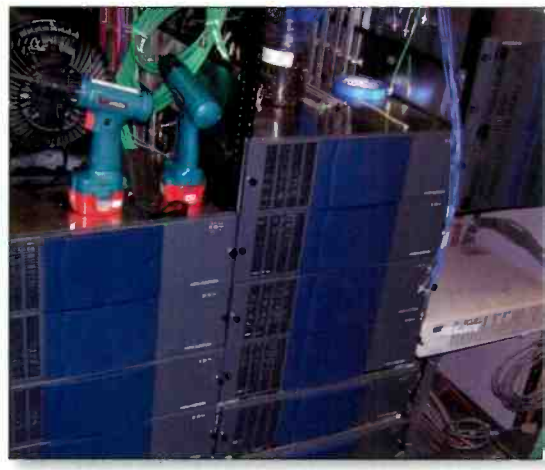
Consider whether the downtime required to accomplish your conversion may cost you an amount equal to or greater than that of building an entirely new vehicle from scratch. Careful planning can make the upgrade significantly more cost-effective than building an entirely new truck. Some of the more obvious factors that must be thought out in advance are timely equipment delivery, advance engineering and prefabrication of some or all of the wiring, and picking an appropriate spot on the calendar during which your vehicle's being off-road would least impact your production income projections.

If it is a straight truck as opposed to an expando, is it adequate in size and layout to attract and/or keep the clients that will be needed to pay for all the shiny new equipment? If the answer to this question is no, or you determine that you also require a complete audio system replacement, then you will likely be considering a new trailer as opposed to upgrading this existing one, and you have passed beyond the scope of this article. Overcoming these two issues would require completely gutting the old truck, modifying whatever structure is inadequate in the old layout and then essentially building a new truck within the old remodeled box. The downtime alone for a project of this magnitude will probably place this approach to an upgrade beyond consideration in terms of cost effectiveness. I wish you well with your entirely new truck build!

If, on the other hand, your existing trailer is physically adequate in both

space and layout, and your remaining technical and mechanical systems are up to par, then it is likely that upgrading only the video systems will add your truck to the HD-for-hire fleet. You may wish to take this opportunity to evaluate and upgrade, or repair if necessary, the mechanical systems of the truck. This would include air conditioning, power, running gear, frame and expando mechanisms. If any of these areas need attention, the time for correcting these issues would be now, by employing careful time management of your upgrade project. Otherwise, you will probably be facing the prospect of pulling the truck off the road again in the near future to address such issues.





The old system (left) has been removed, and installation of the new HD video core system (right) has begun. Seen through the racks of the new system are coils of green wire, which is all that is left of the old system in this particular rack. The colored bundle in the back of the rack is the new wiring beginning to go in.

Nuts and bolts

Careful examination of these points have led you to the decision that you will be upgrading an existing truck by converting the SD or NTSC video system to HD. The next decision facing the truck owner and system designer is whether to completely remove and replace the video system, which includes all the cabling, patching, distribution and production equipment and wiring, or attempt to reuse some of the installed gear and cabling.

Experience has shown that the latter course of action is generally the only way to accomplish this upgrade without incurring an extraordinary amount of downtime and labor in an attempt

As an upgrade, a flat-screen monitor wall makes an impression on clients. There is little that can compare in sheer visual impact to a monitor wall with high-resolution plasma displays.

to salvage a relatively small portion of the existing video substructure. This question is more or less equivalent to deciding whether to upgrade or replace a computer. At the time you built it, it looked like a good idea to future-proof it somewhat by designing an apparently simple upgrade path. What has occurred in the meantime, however, is that the equipment manufacturers have by no means been standing still. Newer, and in almost all cases better, and vastly more capable equipment has been constantly introduced, and your planned "just replace the DAs and router" idea has most likely fallen completely off course. Unless your labor is free, complete replacement of the video system will make the most sense in almost all cases.

At the same time you are converting your SD or analog truck to HD, you must still consider that this truck will, for some time into the future, still need to have some multiformat capability. Exactly how much capability is the tricky part.

Are all sources required to be available in all formats at all times? If so, your truck will be a lot more complex than a pure HD truck that may have SD and/or analog available as only a final output format. You may be able to have the best of both worlds here by using the non-HD outputs from equipment that does supply these signals and including a bank of routable format converters to handle the unforeseen needs.

My own experience would seem to indicate that pure HD is becoming more and more of a trend in, at least, the core design of the vehicles. SD, interestingly, appears to be falling aside in favor of a design that is less costly in wiring, patching and conversion overhead. If you can go with HD monitoring throughout the truck, this is definitely worth considering. In this event, you would simply need to provide NTSC outputs for field monitoring and the occasional piece of legacy equipment (i.e. the always present VHS deck).

Fortunately, there exist some relatively simple and elegant solutions to this monitoring issue. Of course, with such elegance comes a price.

Seeing the big picture

One of the first decisions you will be confronted with in designing your upgrade will be that of monitoring. You presumably have a truck full of 9in tube monitors. Perhaps they have SD inputs as well as analog. In any event, you will have to decide whether you are keeping your existing monitors or moving on to a flat-screen solution. If you elect to keep the existing monitoring in the truck, you have yet another decision to make. Do you want these monitors to be displaying NTSC, SD or HD? I would hope you could rule out the NTSC approach.

And, of course, there is the consideration of 16:9 vs. 4:3. This issue branches quickly into a truly dazzling array of possible solutions. If your tube monitors are not already 16:9 switchable, I would recommend you jump down to the flat-screen options below. If you have 16:9 monitors with SD inputs, you will need to do some soul searching to decide if you want to keep them and use them in SD mode, or switch over to one of the HD flat-screen solutions. Hopefully, as this is now a pure HD truck, you have made the decision to jump into HD monitoring.

Fortunately, there exist some relatively simple and elegant solutions to this monitoring issue. Of course, with such elegance comes a price. It's expensive. But, when you factor in all the costs of conversion and complexity in the truck's technical core, the cost in dollars may not be that much additional, particularly for the benefit gained. At this point in your design process, it may offer you both a solution to the complexity of trying to use your analog tube monitors in an HD environment and a large step into the future, where tubes have all given way to flat-screen display. I say "future" with the full awareness that this future has already arrived. You, however, must weigh the actual costs involved in this decision.

So, what are these avenues of monitoring? First of all, you can simply replace the tube monitors with individual flat screens, now available with all types of input and panel resolution options. A quick aside on flat-screen technology: If you are expecting to see the best pictures on your displays, you will want to make sure that the display can handle native resolution of whatever HD signal you intend to have as your primary truck signals. I suppose you could make the argument that when viewed on a small monitor, native HD resolution will

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not be particularly discernable from any other. However, make sure that any of the larger displays can handle your signals in native mode.

The second monitoring solution is, of course, one of the multidisplay engines that have now come of age in the HD world. There is little that can compare, in sheer visual impact, to a monitor wall consisting of a handful of 50in high-resolution plasma displays, chopped up into whatever mix of 16:9, 4:3, small, large, bordered, tallied and UMD-displayed viewing areas that your clients may desire. The only drawback is the aforementioned cost in dollars. The benefits are many. Not to be overlooked is a huge savings in weight and heat. Because this is an upgrade, you may not realize the space savings available with this solution unless you have the downtime and budget to rework your racks and floor plan as well as replace the technical equipment.

An added benefit to the multiscreen display engine approach to your design is that this system acts as a monitoring router at the same time. The one twist is that any areas of the truck that do not use a large panel display driven off the multiscreen engine will require either router feeds or discreet patching. Don't overlook the designer's quandry that once you start routing your monitors, by whatever means, it becomes rather messy from a design standpoint to not have all of the monitors routed. Essentially, it creates the need for a lot of extra DA outputs to feed whatever number of discreet monitors are scattered around the truck.

Sounds like HD

Of course, no upgrade to HD video is as simple as it seems. One of the areas that generally rears its ugly head late in the planning stages, or perhaps early in the actual build itself, is the question of audio. Because we have already determined that your audio system is adequate (or we would be building from scratch), what makes audio a special consideration? Well, two things really. One is delay, and the second is transmission.

On the subject of delay, this in and of itself can be a rather involved matter to attend to. Consider the virtual monitor wall solution mentioned above: Not only do you have the usual amount of digital video processing delay relative to audio to deal with, but you now have an additional frame, two, or even three to consider that has delayed your HD video with reference to program audio in the production areas of the truck. This can be a lot more involved than may at first appear. You can have noticeable and perhaps even distracting lip sync errors on your pristine HD

monitor wall. Easily corrected? For your main room program feed, yes. But you also must consider the other sources of audio in the production room. Will you have to individually delay every input to every Wohler monitor? While this question must be considered sometime during the design, it is usually left until the testing phase to determine what delay, if any is required. Make sure you factor it into your plans as an item that must be dealt with eventually.

Part two of audio for HD is the transmission system. You can pretty much solve this with the proper selection of a final TX processor. If it does embedding, disembedding, delay and all the magic tricks that the better units today do, you are done with this issue. Do not overlook the possibility of AES inputs to the processor as well, which may add a small digital audio level to your existing analog system.

You may wish to avoid the expense of this final output device. Most likely, however, the costs of using discrete devices to accomplish the same task will equal or exceed the proc, and you will probably not get the same level of functionality.

In summary

The issues facing the designer, operator and banker involved in upgrading a truck to HD are many, varied and rather complex. Start at the beginning, and work out a solution to the problem before just jumping in. At the end of the upgrade, you will have saved yourself the cost of a new trailer, audio system, support systems and, of course, a lot of downtime. As we discussed at the beginning of this article, several factors must point to an upgrade being a possible path to HD as opposed to building a new truck from scratch. Hopefully, you can save 30 to 50 percent of the cost of a new truck by pursuing the upgrade path. Happy motoring! BE

Barry Bennett is president of Bennett Systems, a specialist in truck systems integration and design in Columbus, OH.

AUDIO MONITORING FOR TV:

BEYOND MONITORS AND METERS

BY MIKE RICHARDSON

Numerous articles have been written about our industry's migration to digital and its impact on both the broadcaster and the home viewer. In general, emphasis has been placed on visual elements, such as compression technologies, emerging formats and conversion strategies. However, the impact of the audio elements is equally important — and merits discussion.

The simple days of the all-analog facility are gone and have been replaced with a complex, multichannel digital audio environment that poses several workflow challenges. Not only does the broadcaster need to design and configure a flexible audio infrastructure, but also a comprehensive and effective audio monitoring capability must be readily accessible to

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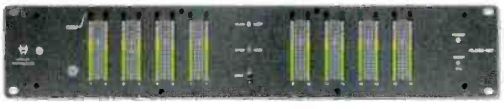

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Figure 1. TVM-950HD display showing comprehensive embedded Dolby metadata monitoring table

Figure 2. This display shows an example of the Nordic scale, a commonly used regional scale.

ensure the highest possible audio quality to complement the visuals.

Monitoring in the midst of complexity

Because most facilities deal with a complicated mix of multichannel formats, there is no single way to transport and monitor the audio. At different points within the ingest-to-transmission workflow, the audio signal may reside in one or more of the following formats: analog, AES, embedded AES, Dolby D, Dolby E and embedded Dolby. Each of these formats has its own set of monitoring challenges.

Even if a broadcast facility attempts to standardize with one particular schema, operators should still be prepared to handle multiple formats at the point of ingest. Because of this, equipment manufacturers (particularly those that design servers, routers and master control switchers) are now building more flexible audio capabilities into their devices in an attempt to satisfy all combinations of possible audio workflows.

If the facility desires to fully monitor audio signals in order to identify and prevent problems, traditional speakers and meters are simply not sufficient in today's digital environment. Problems can arise that are not readily evident — particularly in a noisy master control or machine room situation. Phase errors, for example, can cause audible distortions. And non-synchronous conditions at the clock level (especially with embedded formats) can cause audio pops, clicks and dropouts. The number of possible HD video formats also complicates this situation.

However, with an advanced audio monitoring tool online — one that goes beyond monitors and meters — the broadcaster can locate problems, prevent them and ensure that the highest-quality signal is provided to transmission.

Yes, metadata can be monitored

The monitoring challenge is compounded because new digital formats carry both sound and metadata, the digital information that describes the audio's inherent characteristics. (See Figure 1.) Audio metadata exists in both compressed and uncompressed formats, and it should be monitored as diligently as the audio itself.

If the choice is made not to monitor audio metadata (or to ignore it), be prepared to face a host of potential traps. For example, the improper setting of certain flags, such as the validity bit, in the AES stream can prevent the audio itself from being converted to analog. Or, if the resolution is set improperly (e.g., treating a 20-bit stream as 24 bits), unwanted distortions can arise.

The engineering departments at most facilities are comfortable with the use of audio metadata and have invested in compatible equipment, the required procedures and the proper training. However, many facilities nationwide remain novices at metadata implementation. Without the proper audio test, measurement and monitoring equipment in-house, the phone will ring in master control if audio problems find their way to the home consumer.

The home QC station

Home theater sales are increasing, and most purchases include a 16:9 display with a compatible surround-sound system. To the viewer, the brilliant HD image is not nearly as impressive when the accompanying audio has phase distortion, audible clicks or a restricted dynamic range. Consumers do not typically understand sample rates and metadata; however, they do know the difference between superb and degraded sound.

Arguably, in a multichannel home environment, the audio is as important to the viewer as the video, regardless of the consumer's level of expertise. If the broadcast facility's monitoring is thorough, the resulting quality reaches the home receiver. The market-inspired demand for multichannel audio has forced broadcasters to increase their use of metadata. With compressed formats, consumers now can use metadata to alter numerous audio characteristics.

By design, the same audio stream can provide multiple listening experiences. Two examples that affect the viewer directly are dialnorm and dynamic range control (DRC).

Dialnorm is a metadata function within the Dolby Digital (AC-3) elementary bit stream that provides a means to ensure consistent loudness. When properly set, audio levels remain fairly constant as channels are changed. If volume changes dramatically, dialnorm is either set improperly or simply

Figure 3. This audio display shows a spatially mapped set of level meters for multichannel monitoring.

Figure 4. TVM-950HD multi-pane display including audio alarm log and level alert message

not present in the audio stream.

DRC is a metadata function that allows consumers with stereo and 5.1 surround-sound systems to choose the desired amount of compression. With DRC properly enabled at the facility, consumers can intentionally compress the dynamic range using various DRC profiles, such as speech, music light and film standard. When DRC is set improperly, the function is deactivated (and those loud car crashes can wake the family when you're watching midnight movies). In each case, comprehensive metadata monitoring can spot potential problems — provided that the right tools are in place.

Don't ignore the basics

Traditional audio monitoring remains important, including the ability to hear each program's sound on reference monitors and see a graphical representation on high-quality meters. Unfortunately, graphic metering itself has become more complex with the advent of digital (and the arrival of meters that are easily customized). For example, true peak metering uses an extremely quick responding ballistic, while loudness metering is extremely slow — yet both are quite useful in the right applications.

An additional complication is the proliferation of unique regional audio scales. For facilities performing international work, the localization of the scale itself can be a challenge. (See Figure 2 on page 60.) This too can be solved with a comprehensive monitoring tool that provides a library of scales.

Even though analog monitoring is second nature, the facility still needs the proper D/A conversion equipment to turn digital to analog, along with a decoder for the proper monitoring of Dolby formats.

In terms of the responsibility factor, large facilities, such as satellite providers, have dedicated personnel at dedicated consoles assigned to monitoring tasks, but smaller facilities can't

afford that luxury. At the local level, at a minimum, two crucial points should be fully monitored by trained staff: ingest (to guarantee the quality of all audio placed on the server) and master control (to ensure consistent and flawless output quality).

Monitoring checklist

With full knowledge of the complexity, ensure that your facility's monitoring, master control or quality control station is equipped with the proper audio test and measurement tools. You need to:

- Provide the necessary speakers and amplifiers to monitor dual and multichannel audio configurations with easy ways to select individual or mixdown channel combinations.
- Provide a CRT or LCD display that enables audio phase monitoring, using either Lissajous or phase correlation methods.
- Provide a way to graphically represent audio levels, peaks and reference scales.
- Select a monitoring configuration for surround sound that uses an intuitive design — one that, in effect, mimics the spatial relationships of all speakers.
- Consider an audio monitoring tool that offers automatic or visual alarm capability. Particularly in unattended monitoring configurations, conditions (e.g., clipping) can be set to automatically generate alarms and alert engineering via GPI, Ethernet or SNMP traps. (See Figure 4.)
- Remember that monitoring metadata is as critical today as monitoring the audio itself. Ensure that you can monitor both Dolby and non-Dolby metadata, including equalization settings, sample rates, timecode and the validity bit. With both AES and embedded streams, choose a method that enables you to see and easily understand each representative value in a tabular display — rather than in a cryptic format.
- If budget is an issue, design a migration path that starts with the monitoring basics and adds functionality as required. This includes choosing a manufacturer that offers both firmware and hardware updates and the proper hooks for emerging formats.

Finally, trust your ears. The human ear is still the last receiver in the signal path. With proper amplification and superb speakers, this all-important evaluation step won't be overlooked.

If your facility is not monitoring the full range of audio parameters, you're simply not getting the full picture. There are significant advantages to doing it properly, both within the broadcast facility and for the home consumer. **BE**

Mike Richardson is director of product technologies for Leitch's Videotek line.

SPECIAL REPORT:

HD/SD playout:

It's not just about the video

PBS station KLCS-TV employs a 28-channel Omneon Spectrum media server system to provide near-video-on-demand to 1 million students and teachers in Los Angeles.

BY PAUL TURNER

HD playout is probably the hottest topic in the broadcast industry right now. It is especially of interest to buyers and manufacturers of video server technology. This interest is fuelled in large part by the accelerated adoption of new HD technology in the United States, Australia and Japan. And now the upcoming soccer World Cup and winter Olympic games have become the catalysts driving consideration of HD playout in the European market as big sporting events tend to drive technology changes.

While many view the adoption of HD as inevitable, we are clearly entering a transition period in which broadcasters of all kinds have to face the fact that they must produce programming for new HD-capable receivers, while simultaneously maintaining their existing SD revenue streams. After all, it will be some time before the majority of TV sets are HD. This type of transition has occurred before; the industry faced the same

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issues during the transition from black and white to full color.

The need for simultaneous HD and SD playout

Business realities dictate that broadcasters have to offer programming in SD. They need to maintain their current revenue stream while also offering HD programming in order to future-proof that same revenue stream. That's the first point.

The second point is that there is a vast library of legacy material in vaults worldwide that was captured in SD, and these libraries will still have great value as we move toward the HD world. Both of these points lead to the simple conclusion that HD output will need to be created from material that was originated in SD.

As we move through the transition period, it is foolish to arbitrarily limit our SD output to material that originated in the past in SD; the ability to generate SD output from new HD material is a clear need. And so there is a real necessity to crossconvert SD and HD material as we navigate our way through the transition period and beyond. No one is going to convert all their legacy material to HD all at once; it will be a process that continues for some time.

Two Omneon Spectrum media servers support production and playout tasks at WCPO-TV.

Thus, we find that many manufacturers are now offering the ability to mix SD material and HD material on the same timeline (i.e., the same server output channel), under the control of a single channel of automation. While most offer this capability via internal up-/downconversion, some offer the additional ability to use external equipment for this function. In any case, up-/downconversion is a reality in the current business model. (See Figure 1.) But simply solving the frame/line structure issue is not enough. We have to consider the question of aspect ratio.

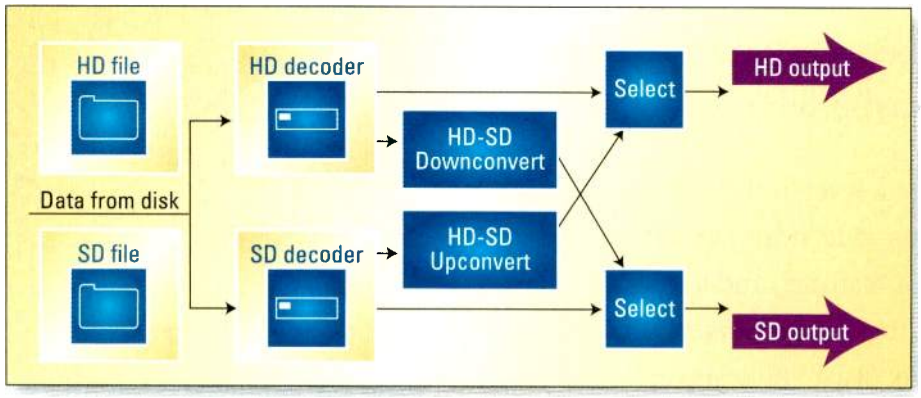

Figure 1. Generating simultaneous HD and SD content

Aspect ratio conversion

Almost all HD material originates in widescreen 16:9 format, and almost all SD material is 4:3. Because letterboxing doesn't happen by itself, this is the first point of consideration when up-/downconverting material.

The simplest and most tempting approach is to set the crossconversion once and leave it. In the broadcast world, however, there are always exceptions that have to be taken into account. For instance, while *most* SD material is indeed 4:3, there are many regions where SD has been shot in 16:9. SD can even be shot 14:9, a compromise standard used in Europe, which minimizes the black bars when projected on to a 16:9 screen, while losing the minimal amount of picture information when projected onto a 4:3 screen. Or consider an anamorphic squeeze, where the aspect ratio of the actual pixels is altered in order to easily fit 16:9 into 4:3 to pass through legacy equipment.

These exceptions to the rule force alternate approaches, such as the idea of having clip-dependent aspect ratio conversion (ARC) as a requirement. There may be no control over the aspect ratio of the material received, but it can still be converted to be presented in the best way to the viewers. Clip-dependent ARC will probably successfully address most of the issues a facility will face, but the topic is laced with additional complexities.

Consider the following scenario: A piece of material originates as HDV (16:9) and, in some external process, is letterboxed for SD projection. Finally, it arrives at a facility, where an ARC is performed to produce an HD output.

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Unless the original aspect ratio of the material is taken into account, the letterboxed material will be pillarboxed, resulting in reduced active picture area.

There are ways to resolve this problem, basically requiring that a history of the ARC previously applied to the material be encapsulated with the clip itself. Within the server infrastructure, the easiest way to do this is in the metadata included as part of the file structure of the clip. However, external to the server infrastructure, the information probably needs to be carried in the video stream itself.

Closed captioning

Just like the aspect ratio issue, closed captioning needs to be taken into account. In SD, EIA 608 is the standard for the inclusion of closed captioning in a digital signal. In the HD domain, there is the EIA 708 standard. As part of the real-time conversion process, the closed captioning information needs to be crossconverted, and most servers accommodate that functionality within their I/O channels.

In Europe, though, the situation is not so straightforward. There is no ratified standard for carrying closed captioning and subtitles in the HD signal. This will need to be dealt with quickly, and users and manufacturers will no doubt unite in bringing this to conclusion within the next year.

We sidestep the issue, treating a pair of frames as if it's a pair of fields and trick the automation by presenting 30fps timecode.

Control/timecode

Finally, consider the idea of automation and the timecode implications of progressive material. Automation systems use the frame rate information — 29.97fps in the United States and 25fps in Europe — to calculate the duration of a specific clip. But now in this transition period, we introduce the intermingling of HD and SD material on the same timeline, which isn't a problem until we consider the issues of progressive material, running at 50fps or 59.94fps. (See Figure 2.) We can have slower frame rates in progressive, but the motion tends to be jerky.

The problem is how to describe the timecode. How do we represent 60fps (rounded up, of course) to an automation system that's expecting 30fps? The answer is that in most cases, we sidestep the issue, treating a pair of

frames as if it's a pair of fields and trick the automation by presenting 30fps timecode. It is a trick, but it works. We've been dealing with an accuracy of 1/30th of a second for years, so nothing is lost. However, it must be taken into account if counting frames through an API, and most servers offer an API for partners to exercise greater control over their operation. None of this is insurmountable, nor does it necessarily cause any problems, but the user should be aware of the issue so as to ask the right questions of vendors as they migrate to the HD world.

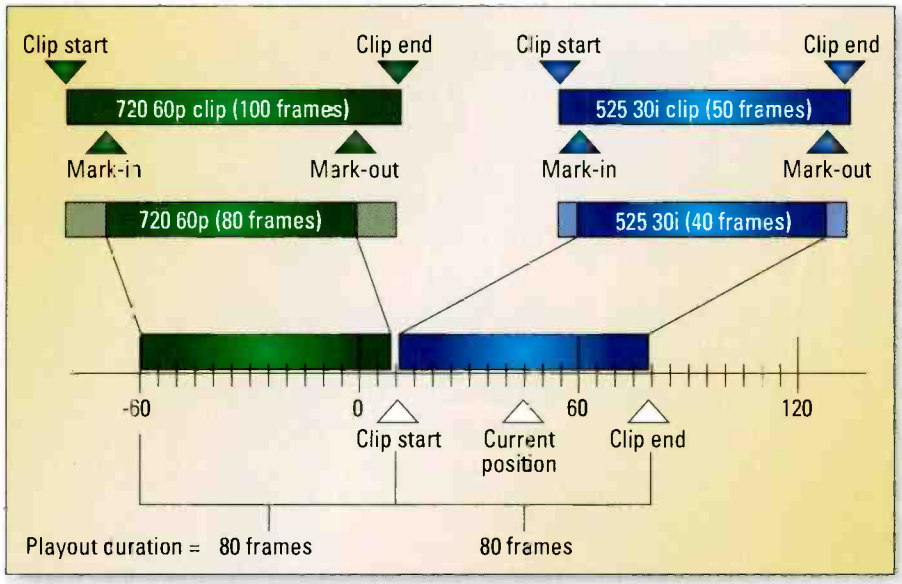


Figure 2. Intermingling 30fps and 60fps material on the same timeline

Conclusion

There's more to think about in the playout of HD and SD in a server infrastructure than just the video. The good news is that these issues are well understood by vendors, and compromise solutions are in place to deal with the corner cases. These issues will be with us for some time, so it certainly makes sense to consider the pros and cons of each approach as you make your own plans to adopt HD in your environment. BE

Paul Turner is vice president of product marketing for Omneon Video Networks.

SPECIAL REPORT

HDTV LENS DESIGN:

A NEW INNOVATION FOR THE STUDIO

BY LARRY THORPE AND GORDON TUBBS

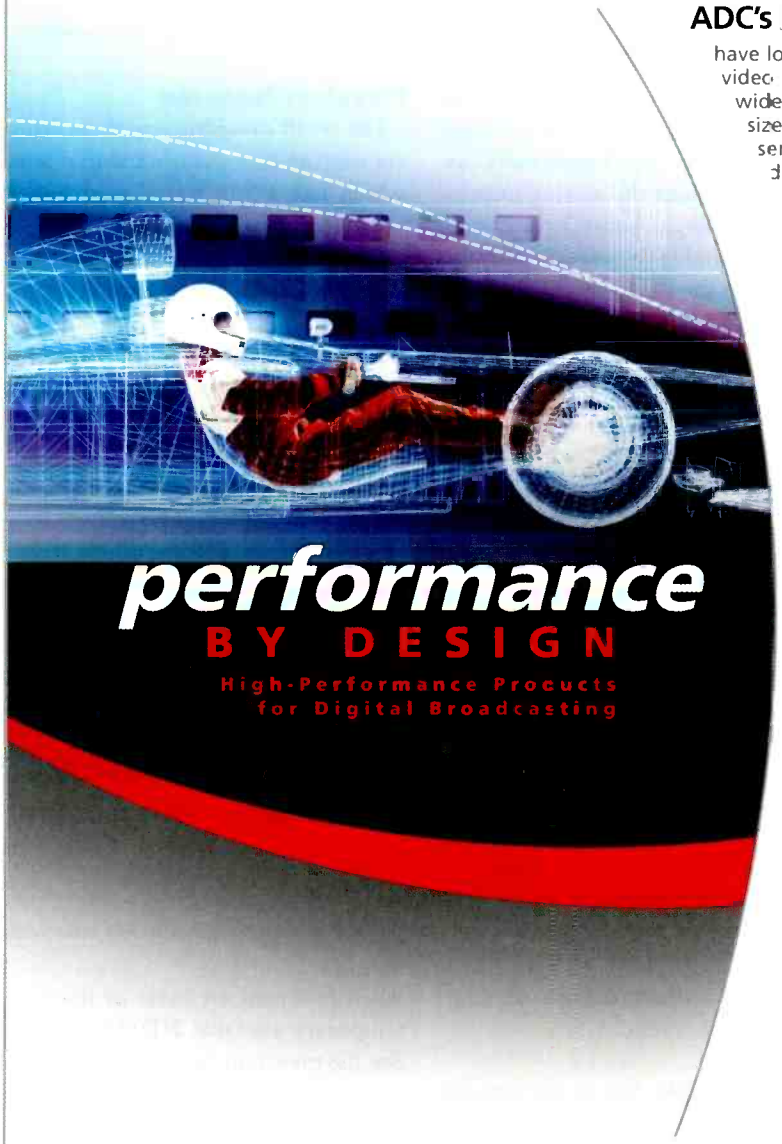
The traditional studio lens has long been considered the flagship among the various lens categories in terms of measuring ultimate performance. The high-aperture optics of such lenses are the basis of how they achieve high optical sensitivity, but this requires larger glass elements, which adds weight.

The television studio lens has evolved to quite a sizeable package over the past 60 years, a consequence of an unceasing quest for wider angles of view, longer zoom ratios and ever-escalating performance aspirations. Today, that means optimizing these lenses for HDTV, which is no mean feat. Although advances in camera and recording technologies move much more quickly than those in optics, impressive optical advances have been made during the past decade. A good example is the miniaturized HDTV studio lens for direct mounting to a portable production camera.

HDTV studio performance expectations

As the standard used to measure ultimate performance, contemporary studio lenses are the most closely scrutinized in formal technical evaluations by television organizations all over the world. In terms of specific image-performance parameters, the following are generally agreed to be the key design priorities for studio lenses:

- *achievement of a maximum relative aperture* to ensure HD image capture with a high signal-to-noise in low scene illumination
- *maximization of contrast performance* by minimization of flare and veiling glare at the black extremity and ghosting and highlight-related



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Physical attributes	XJ22 x 7.3 compact studio	HJ22 x 7.6B EFP portable
Optical port diameter	150mm	105mm
Overall glass length	316mm	222mm
Weight	13.4lbs	6.03lbs

Table 1. A comparison of the physical aspects of the new compact studio HD lens with a current EFP portable HD lens of equivalent focal range

optical interferences due to strong light sources

- *optimization of relative light distribution* from picture center to the outer image extremes
- *a high Modulation Transfer Function (MTF) characteristic* at picture center as well as the outer regions of the picture plane (with as even an MTF characteristic as possible across the image plane)
- *minimization of curvature of field* — one of the classic optical aberrations that contribute to corner defocusing
- *careful control of spherical and comatic aberrations* — defocusing impairments that impair MTF across the image plane
- *minimization of astigmatism* — another defocusing impairment that negatively affects MTF
- *minimization of lateral chromatic aberrations* that blur and color detail transitions (especially at the extremities of the image plane), which in turn directly impairs lens MTF
- *elimination of geometric distortion* to the degree possible, especially at the wider angles of view.

Developments in portable camera designs

Slowly and inexorably, many portable cameras have achieved the picture performance, operational flexibilities and systemization that larger studio cameras have been known for. Today, many of these portable cameras — both SDTV and HDTV — are virtually indistinguishable from the larger companion studio cameras in performance and creative flexibilities.

Only the desire for the highest performance lenses (necessitating a lens that is large in size), enhanced operational considerations and better system facilities and interfaces sustains the popularity of the large hard studio camera. To many, these are still important.

A sizeable number of end users feel that the performance of current portable cameras meets many studio needs. The use of a build-up system (called a *support cradle* by some) that can facilitate rapid reconfiguration of a portable handheld into a traditional studio system using a large box lens is operationally important for some forms of program origination. For others, the use of the build-up kit is not attractive, or it is not necessary for their needs. The lens-camera system cost remains the driving imperative. Accordingly, some have chosen to use a portable camera and portable EFP lens in the studio on the basis that it is good enough for the application.

Canon believes that there is a growing constituency — aspiring to the highest quality studio performance (for prime-time drama production and flagship news studios, for example) — seeking a better compromise. This conviction warranted an investment in developing a miniaturized full-performance studio lens intended to directly couple to all of the major HDTV and SDTV 2/3in portable cameras — without the use of a complex support cradle.

Physical attributes	Large studio lens 25xs	Compact studio lens 22xs
Size	558mm x 250mm x 255mm	336mm x 165mm x 17mm
Weight	47lbs	13.4lbs

Table 2. A comparison of the size and weight of the compact studio HD lens with that of a traditional studio box lens

Design goals for a compact studio lens

In undertaking to develop such a lens, classic design criteria for studio lenses were applied. A summary of the general design goals for the compact lens were as follows:

- significantly smaller in total volume than a traditional studio box lens (by one third the total volume of that larger lens)
- weight approximately equal to that of contemporary portable cameras
- target full HDTV studio performance to the highest degree possible
- no compromise in operational capabilities as measured by the precision, repeatability and speed of operation of the zoom, focus and iris controls
- all contemporary interfaces (robotic, virtual studio) to be built-in
- creative digital controls that match those of high-end studio lens systems.

Physical features

The result of addressing these criteria was the new compact studio lens, which has a 20x zoom ratio and a wide-angle setting at 7.3mm.

A decision on a 150mm diameter was chosen following initial computer simulation. The preservation of full studio configuration of optical elements quickly dictated the overall length of the optical path. (See Table 1.) There is quite a striking increase in glass compared to the portable EFP lens.

This difference, however, must now be put into perspective with the physical attributes of the full-bodied studio box lens described earlier. (See Table 2.) The aesthetics of the lens design is exemplified by how it looks when mounted on some of the contemporary portable HDTV cameras. See the photo on page 76 for an illustration of how small the XJ22 lens is compared to a typical HD studio lens.

Performance of the compact lens

The desired wide angle of view and the zoom ratio go hand in hand (in terms of a basic manageable optical design), and the lens' designers also chose that the compact studio HD lens would have a 7.3mm wide angle extremity and

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Image composition	XJ22 x 7.3B
Object image format	2/3in 16:9 aspect ratio
Object image size *(Presented to camera imagers)*	9.59mm (H) x 5.39mm (V)
Zoom ratio	22x
Focal length range	7.3mm — 161mm
with extender	14.6mm — 322mm
Angular field of view	
At 7.3mm	66.7mm x 40.6mm
At 161mm	3.4mm x 1.9mm
With extender	
At 14.6mm	36.4mm x 21.0mm
At 322mm	1.7mm x 1.0mm

Table 3. The specific angles achieved in a compact studio HD lens

a 22x zoom ratio — both being operational parameters comfortably consistent with most studio needs. (See Table 3.) This wide of an angle of view posed technical challenges to achieving a low geometric distortion — but the lens design successfully achieved a contemporary performance level.

Optical performance	Large studio lens 25xs	Compact studio lens 22xs
Max relative aperture	1:1.5 at 6.8mm to 122mm 1:2.1mm at 170mm	1:1.8 at 7.3mm to 111.5mm 1:2.6 at 161mm
MOD	0.6m	0.8m
Field of view (degrees)	70.4mm x 43.3mm 3.23mm x 1.82mm	66.7mm x 40.6mm 3.4mm x 1.9mm

Table 4. A comparison of the performance of the compact studio HD lens with that of a larger studio lens

The new compact lens was able to achieve a maximum relative aperture of 1:1.8, which holds up over a zoom ratio of almost 16:1. (See Table 4.) This will address a great deal of normal studio needs. This specification means that if the lens is used with a portable HDTV camera with an *f* 10 sensitivity specification (2000 lux of 3200-degree scene illumination), then the lens-camera system can make full 100 IRE luminance video level at maximum aperture with approximately 75 lux of scene illumination (less than 7.5ft candles).

MTF performance of the compact studio lens

The design imperative of this new compact studio HD lens still retained some constraints (in size and weight) compared to its larger traditional counterpart — and this posed some special challenges. (See Figure 1.) The picture center MTF is about 82 percent (compared with the 84 percent of the larger lens) at the optical reference frequency of 56 LP/mm (or approximately 600 TVL/Ph for the 1080-line system). The center-to-corner results are particularly impressive at full wide-angle focal length.

Color reproduction

The spectral transmittance characteristic of the lens has the first cut at predetermining the overall colorimetry of the camera system. The shape of that spectral transmittance curve (especially at the critical blue and red end of the visual spectrum) must concatenate with both the RGB spectral separation of the digital camera beam-splitting system and the spectral characteristics of its image sensors to implement the final digital camera system colorimetry. This light-transmission system must anticipate meeting the colorimetry specified in the SMPTE 274M/296M (and in the international ITU R BT 709) HDTV production standards when the camera operational controls are set to their detent position.

The subsequent creative control of the digital camera over color reproduction — to meet production aspirations — must also be taken into account. Here, the ability to digitally alter the prescribed nonlinear transfer characteristic and the color matricing from the camera video operational panel to successfully manipulate chosen colors (in brightness, hue and saturation) does anticipate as wide a color gamut as possible from the lens/beam-splitter/sensor combination. The role of the lens within this combination is sometimes underestimated.

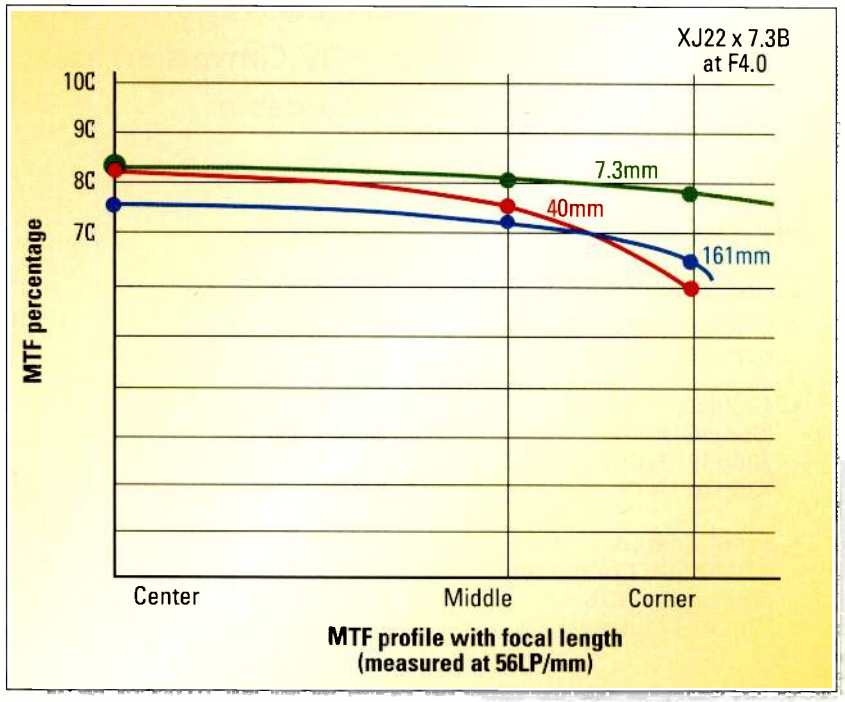

Figure 1. Shows the MTF profile across the image plane for different focal lengths of the compact studio HD lens

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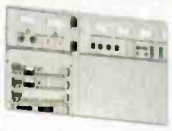

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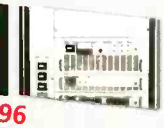

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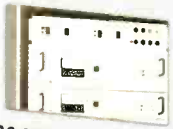

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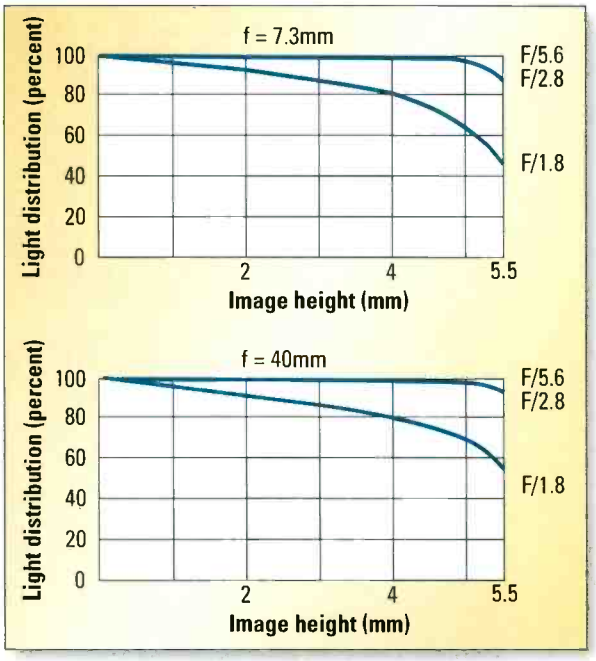


Figure 2. Shows the relative light distribution characteristic of the compact studio HD lens

The compact studio lens has a high transmission efficiency of 82 percent — a result of the fact that it uses fewer elements than a larger box lens.

Despite that efficiency difference, the larger lens is still more sensitive because its distinctly larger optics gathers more light flux.

Relative light distribution

The quoted f-number for a given studio lens is a measure of the light transmittance of the lens at the center of the image plane. It is another of the frustrations of optical science that this light flux cannot be made perfectly uniform across that plane.

As discussed earlier in this series of lens articles, the vignetting components contribute to a fall-off in light intensity with field angle of view. This fall-off is typically specified as a curve showing that light level shortfall from picture center along a radial termed picture height. (See Figure 2.)

Photo: Comparing the compact XJ22 HD studio lens with a typical full-size HD studio lens

Digital interfaces on the compact studio lens

Today's studio lenses are expected to have the capability of interfacing with robotic systems and virtual studio systems. The new compact studio HD lens has a 20-pin connector labeled virtual, where the 16-bit digital outputs of the three optical rotary encoders are made available for direct and bidirectional digital communication with digital robotic and virtual studio

systems. Two other 20-pin connectors provide a direct communication interface with Canon's digital zoom and focus controllers.

An optional PC interface is available for the lens. This facilitates a digital communication link between the lens and a computer (using special software) for implementing lens diagnostics.

Precision control and digital display

The use of the new miniature 16-bit optical rotary encoders offers a whole new level of control precision. The combination of the controllers and the high-res lens system provides 13-bit repeatability for zoom and focus. The digital interface with a camera's digital iris control has 10-bit compatibility. The zoom servo provides an exceptionally wide dynamic range of control, from a fast zoom of 0.5 seconds to a super slow zoom of 3 minutes. The lens has a built-in informational display (mounted on the side close to the rear of the lens) that provides a great deal of information relating to the many digital operational features that are incorporated into the lens-control system.

Different zoom servo characteristics can be selected that offer wide diversity in creative shaping of the zoom movement. The lens also supports preprogramming a variety of functions, such as automatic shuttling between two chosen focal lengths, preset framing and presetting of zoom speed.

Conclusions

The design of the new compact studio HD lens (model XJ22x7.3B) responds to an increasing desire to deploy smaller and more cost-effective portable production cameras within studio shooting environments. It is an example of a broadening strategy for HDTV lenses that seeks to march in step with the developments in smaller cameras and recorders.

While the performance of various imaging parameters does not fully match those of the larger studio lenses, the shortfalls are modest. The same broad optimization strategies applied to the large studio lens were carefully maintained in this new design in terms of the emphasis on MTF over the image plane, contrast and relative light distribution, optical sensitivity and color reproduction. This new lens facilitates a more cost-effective, smaller and lighter studio lens-camera system that allows use of a smaller pedestal and is ideal for studio robotic systems. BE

Larry Thorpe is the national marketing executive and Gordon Tubbs is the assistant director of the Canon Broadcast & Communications Division. Photo on page 70 courtesy of Ascent Media; photography by John Benson.

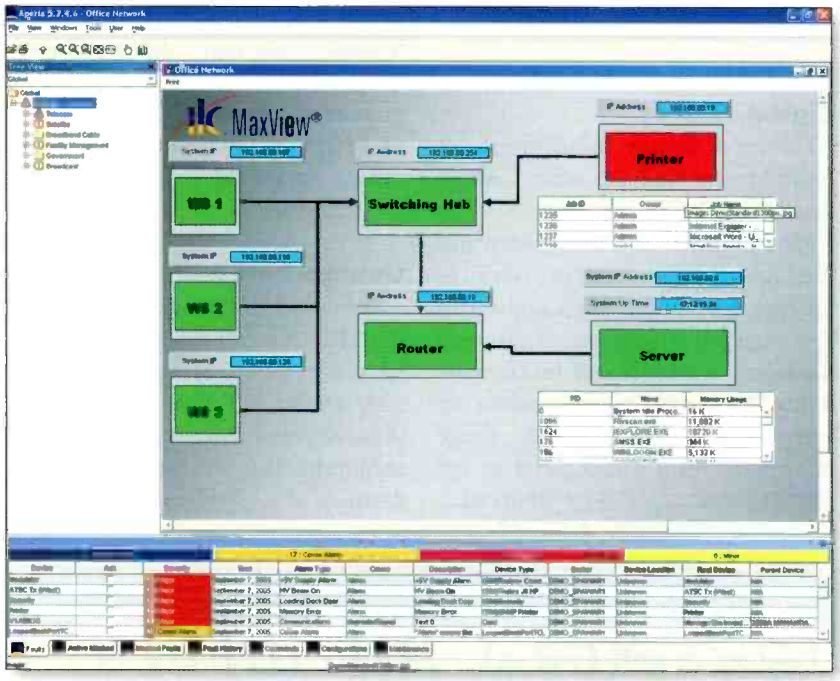
Managing
hybrid networks with ILC

BY DARREK PORTER

As broadcast networks grow to deliver video, DTV and other broadband services, managing the resulting hybrid network becomes more complex and difficult. The problem: The networks are converging, but network management products are not.

This leaves engineers and IT directors struggling with a patchwork of software systems, even as staff and resources in their broadcast operating center or network operations center are reduced. Adding pressure to an already difficult situation, the consequences of network downtime are significant, costing one major broadcaster $3.3 million every minute it is off the air.

Regretfully, chief engineers and IT directors often purchase one management system after another to maintain control over the evolving parts of the broadcast chain. This chain may include a mix of broadcast, satellite, cable, fiber, wireless, microwave, transmitter, IT, building and security systems, and equipment. The separate management systems installed to control this hybrid network often are not integrated and cannot speak to one another. This forces operators to contend with multiple graphical user interfaces and the resulting network blind spots that allow critical problems to fester.



The Office Network window offers simple visualization of IT equipment in an office environment, such as workstations, servers, switches and routers.

Controlling divergent systems

The remedy is a powerful, yet easy-to-use, platform-agnostic system that can monitor and control all the devices in your network, regardless of technology type. ILC's solution is the MaxView broadband network management system. This software integrates technology and third-party management systems into one network management console, allowing network operators to fully automate control of next-generation networks and services. The system also allows further control, such as correlation of network faults, automation, service provisioning and scheduling.

The management system allows users to choose the level of control they require, ranging from basic monitor, control and reporting for disparate devices to consolidated control of existing vendor-specific management, master and control or automation systems. The drag-and-drop device integration functionality allows even non-programmers to add new devices into the system fast and easily. This eliminates dependence on device manufacturers to update drivers and frees technology experts to concentrate on critical projects that impact the organization's bottom line.

Consolidate and standardize

The broadband network management strategy starts with consolidation. Rather than operating with separate network management silos, operators using this system have a unified management environment with one worldview from which they manage all devices, systems and third-party applications in the network.

The system also standardizes network operations to promote quicker problem resolution, which leads to lower training costs and a staff empowered to optimize network operations. This standardization is achieved by:

- creating uniform views of multivendor equipment to allow staff to monitor devices without special training;
- depicting services that run across hybrid networks with simple icons to allow non-expert personnel to monitor

and control service availability;
• and enabling distributed or central-casting models with full access from anyplace with a network connection.

Using the system

Taking advantage of network-wide consolidation and standardization, the broadband network management system offers bi-directional data flow, enabling operators to exert command and control over the actions of specific devices to automate daily and event-specific operations, including:
• outage recovery to provide uninterrupted programming during a catastrophic failure;
• fault and configuration management, detecting failures and switching traffic to broadcast via an alternate channel or from a backup facility;
• and event scheduling, carrier monitoring and service provisioning and activation to maximize bandwidth use by automating program collection and distribution.

In addition, the system offers *manager of managers* capability, eliminating network operators' common practice of swivel chair management — the constant turning from one graphical user interface to another as they manage the hybrid network. They can consolidate their control of the network by unifying these systems into a universal view of the entire network.

With consolidated, standardized and automated control of the entire hybrid network, operators have the power to easily perform advanced management functions within one software suite, including proactive network management, equipment control, automation and circuit provisioning, video quality of service monitoring, and carrier and spectrum monitoring.

Rolling all these capabilities into one system simplifies broadband network management, enabling the reliable and more profitable delivery of video and other broadband services.

MaxView's unique benefits include:
• the ability to do end-to-end provisioning that spans an entire network or group of networks;
• the cost savings and availability afforded through automation
• a distributed architecture that allows unlimited scaling so that network management systems are guaranteed to grow alongside your network;
• and the ability to identify service impact due to network problems and take corrective action.

This amounts to reduced operational costs, greater service assurance and greater speed in deploying new services. At the end of the day, this is a broadcast organization's bottom line. BE

Darrek Porter is director of corporate communications and marketing for ILC.

Luma Pictures streamlines workflow with Small Tree Communications

BY CHRIS SAGE

The mission if you choose to accept it: Produce six 15-second television commercial spots for Nike using limited stock footage manipulated with complicated visual effects sequences. Oh, and do all of this in five-and-a-half weeks.

That was the charge given to us at Luma Pictures, a visual effects studio based in Santa Monica, CA, by production company Notorious 24/7. Crazy as it sounds, we accepted the mission, I mean project, and successfully completed the task.

Known primarily for our visual effects work on major motion pictures such as "Underworld," "Sky Captain and the World of Tomorrow" and "The Cave," we were eager to tackle this challenging project.

From fantasy to reality

The "Nike vs. Nature" campaign, created by Wieden + Kennedy, compares top-flight NBA players with forces of nature. Out of a tornado viciously spinning across land comes Phoenix Suns' guard Steve Nash using a spin move to leave a defender in his wake. As fire winds its way through the paint, hot-headed Detroit Pistons' forward Rasheed Wallace fires a monster dunk home. From the plains of Africa, a lion steps onto the court and hurls into the lane, picking up speed, leaping as the Cleveland Cavaliers' forward Lebron James sends in a tomahawk jam.

Because we couldn't set the court on fire, bottle a tornado and unleash it on the court or take the time to train a lion to run down the court and leap at the appropriate point, we were directed to mold the real with the unreal ... and fast. With less than a month and a half to complete the spots, we needed every ounce of bandwidth necessary so that multiple members of the team could work on the spots simultaneously.

We are an all-Mac facility, working on off-the-shelf Apple G5 workstations and Xserves. These are ideal for producing creative content, but they're limiting with regard to supplying the throughput needed for this project. The solution was the installation of multi-port Gigabit Ethernet (GbE) cards and an 802.3ad link aggregation system, both of which were provided by Small Tree Communications.

Gearing up

Small Tree's multi-port cards support jumbo frames, which offer higher data transfer rates. The dual-, quad- and six-port Gigabit over copper Ethernet adapters are 64-bit/133MHz PCI-X network interface cards containing two, four or six independent 10/100/1000 megabit ports on one PCI-X adapter. When used in conjunction with Small Tree's 802.3ad link aggregation, which bonds multiple Ethernet ports into one virtual interface, bandwidth levels increased to provide a more streamlined workflow, enabling Luma to meet the tight deadline. With the Small Tree gear, we often times reach 15 percent to 20 percent beyond what we were previously achieving.

Our biggest challenges were the time frame and finding and manipulating the footage. When you're on such a tight schedule, tasks have to occur simultaneously. Therefore, people are working on the elements as they're being composed at the same time. As artists continue to refine the elements, everybody moves in tandem in a parallel, nonlinear way. All the sequences run in parallel as well. We scheduled the more difficult sequences towards the end of the delivery, in order to give them the greatest amount of development time.

Luma Pictures produced six 15-second television commercial spots for Nike using limited stock footage manipulated with complicated visual effects sequences. To meet the tight deadline and increase server throughput, the company used multi-port Gigabit Ethernet cards and an 802.3ad link aggregation system from Small Tree Communications.

The GbE adapters eased network congestion, simplified network management and provided increased server throughput available while minimizing CPU use. The cards offered an instant performance boost over Cat-5 UTP copper cabling and are ideal for implementing multiple network segment environments within high-performance servers.

By installing the GbE cards and 802.3ad link aggregation, we were able to meet the client's deadline. Without them, it would have been extremely difficult. Our options would been limited and cost-prohibitive. We probably would have had to hire additional staff, increasing our budget and turnaround time to the point where our client would have explored other options. BE

Chris Sage is vice president of operations for Luma Pictures.

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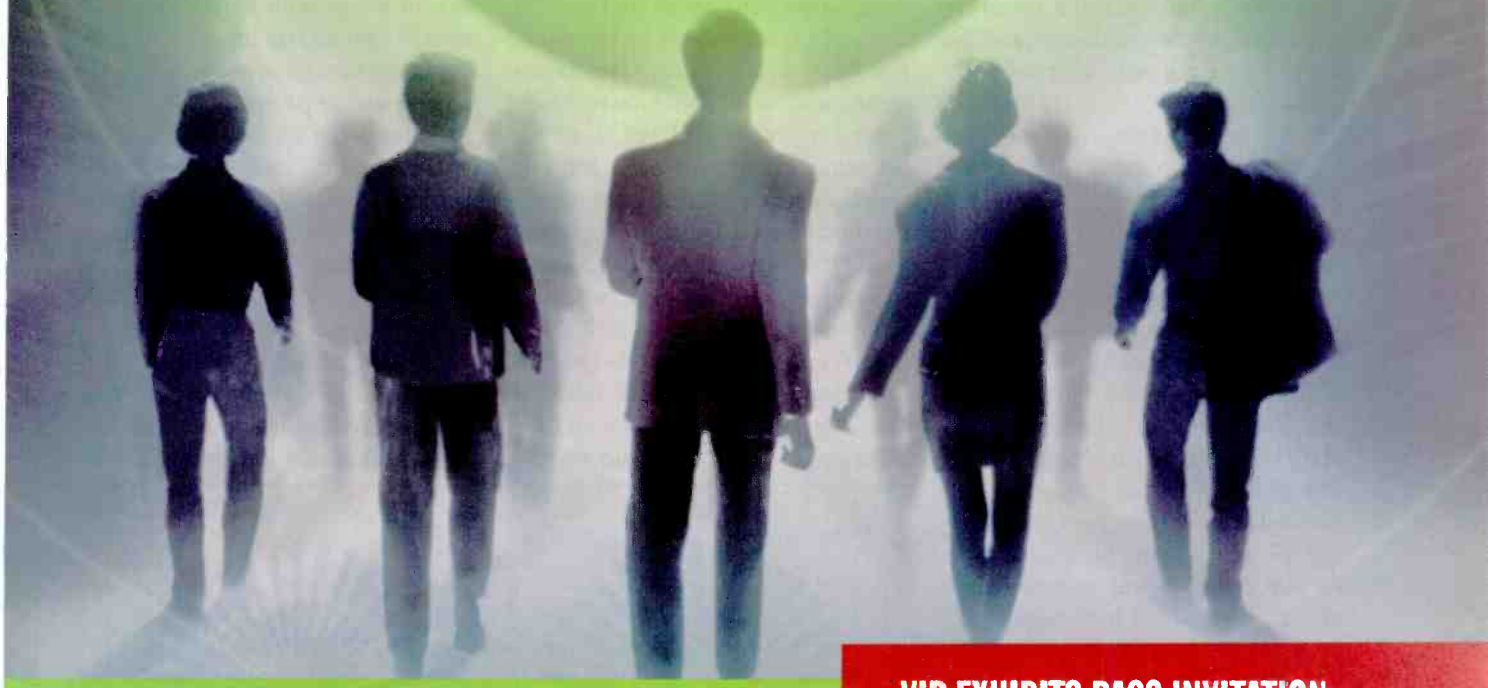

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SD/HD conversion

BY JOHN LUFF

An often forgotten fact about Sir Isaac Newton is that he was an alchemist. *Dictionary.com* defines alchemy as:

1. A medieval chemical science and speculative philosophy aiming to achieve the transmutation of the base metals into gold, the discovery of a universal cure for disease, and the discovery of a means of indefinitely prolonging life;
2. A power or process of transforming something common into something special;
3. An inexplicable or mysterious transmuting.

While Newton was interested in the first definition, today we are more interested in the last two. You might find the second definition similar to the conversion of SD pictures into HDTV images, which is not at all unlike alchemy. Those "wizards" who succeed at finding ways of transmuting SD into HD are no less valuable in our technological industry than an alchemist would have been to the economy of Newton's time. The grail we seek would allow us to repurpose images acquired in a simpler time and deliver high-quality images from those golden assets.

Which leads us to the third definition. It is hard to understand how we might actually achieve such a mysterious transmutation of a low-resolution image into one with more information content. On the surface, it would be inexplicable. But in reality, there are effective techniques that take low-res images and infer deeper content that might not be obvious. In still photography, we have all seen miraculous processing of blurry images from spacecraft that end up with stunning clarity. Amateur astronomers now routinely take photos with Webcams that, when stacked with hundreds of others and processed to death, look like Hubble took them. Why not in our business as well?

Limiting factors

There are complicating factors. One factor is the interlace nature of most image acquisition today, and another is motion (complicated by interlace). If we could use still image techniques alone, and wait for non-real-time processing, we would get those astounding transmutations. But we seek instant gratification and insist on moving images. So approximations and best effort approaches abound.

There are other limiting factors as well. Starting from an NTSC image makes upconversion pretty ineffective, like transmuting lead into tin. The bandwidth limitations on the color channels in NTSC and the fact that they are modulated into one composite channel severely limits the usefulness of NTSC for upconversion input. By definition, NTSC has unequal bandwidths of only 4.2MHz for luminance, and 1.5MHz and .5MHz for I and Q. In practice, however, both I and Q are equal in many contemporary implementations. In addition, if done poorly, the decoding process leaves the luminance with well below the color subcarrier of 3.579MHz in effective bandwidth. Trying to convert an image with barely 3MHz of content into an HD image where native luminance bandwidth is 27MHz is a real science project.

It is far better to start with a component picture. The luminance bandwidth of SMPTE 259 signals is a true 5MHz, and the color difference signals half of that.

The information content of an SDI image is about two to three times more dense, and it also does not suffer from cross luminance and cross color artifacts, which do not help upconversion at all. (See Figure 1.)

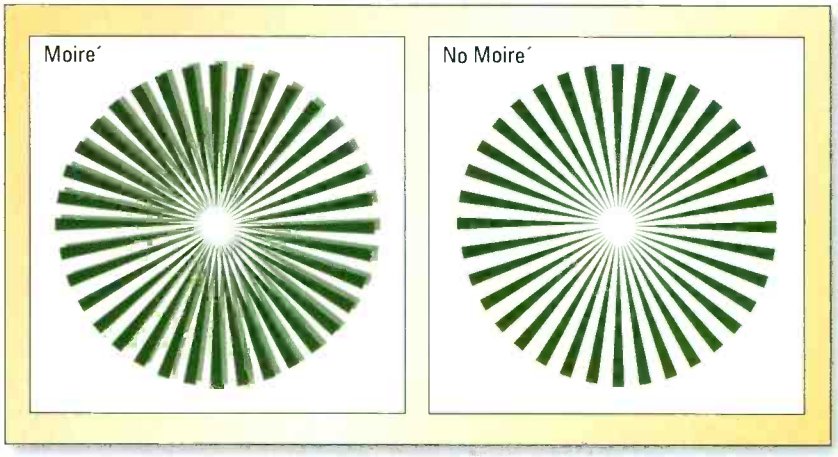


Figure 1. Moiré is a distortion or pattern of an image caused by conflicting frequencies from two or more different resolutions overlapping each other. A common moiré video effect is seen when someone wears a cloth containing a vertical weave or pattern, which conflicts with the horizontal scan of the camera. The resulting moving moiré can be quite annoying to the viewer.

When an SDI image is interpolated into a higher-resolution image map, the results can be quite pleasing, though clearly a native HD image will always be superior. Even the pictures converted from 720p acquisition

must be interpolated when crossconverting to 1080i or 1080p format. This conversion is nearly transparent, and because consumers do not receive a full 1920 x 1080 image, the results are quite good at the consumer receiver.

A number of conversions

Consider how many conversions an image might go through. Let's assume a consumer is watching an HD NFL sports highlight show on a DBS service. Some of those images come from SD sources, some from 720p productions and some from 1080i productions. Commercials come in as letterboxed SD and 4:3. The output of the control room is 720p, so right away, there are conversions happening.

The letterboxed SD commercials are upconverted with no aspect ratio change, but because they started as less than full image height, they are effectively reduced in vertical resolution compared to 4:3 content. The 1080i (1920 x 1080) material is de-interlaced and re-sampled to 720x1280. The production contains HDV images that were re-sampled from 1080i (limited to 1440 pixels).

In homes, the image is displayed on a plasma screen with 1388 x 768 pixels, but the output of the set-top box is 1080i only. So right there, another progressive to interlace conversion and scaling is required. How many conversions? No less than four and perhaps as many as six. If analog-to-digital conversion was also required, it would leave a pretty tattered signal. The net result is that without high-quality conversion and attention to detail, modern production techniques would not be rational, or as our third definition of alchemy says, only a mysterious process would achieve usable results.

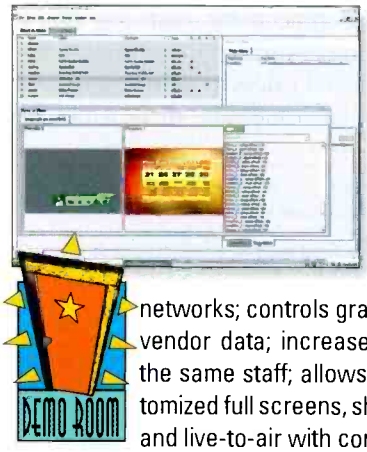
Today's composite devices

Today many of the composite devices used in transmuting signals are based on remarkable silicon implementations. This is especially prevalent in consumer equipment, which can produce credible results for all formats. Given the manufacturing cost and volume equation, it is obvious why some of the silicon has found its way into the professional realm.

As our industry moves further away from its SD past and into the HD future, content conversion will be more important. With nearly 50 years of color SD content on the shelf and a voracious appetite for reuse, you can expect the conversion to continue to improve and prices to slide downwards. Not a bad time to be an alchemist. **BE**

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

SEND Send questions and comments to: john_luff@prismb2b.com



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Inscriber Inca AutoCG: A network graphics solution that connects to automation and news vendor systems; manages graphics across networks; controls graphic output; ingests news vendor data; increases existing workflow with the same staff; allows users to drive more customized full screens, shoulder graphics, banners and live-to-air with control.

519-570-9111; *www.inscriber.com*

HD CAMERA

Panasonic AG-HVX200: Handheld HD solid-state storage camcorder; includes two 4GB P2 cards; captures video in 21 video formats; uses two of Panasonic's new 8GB P2 cards; provides 64 minutes of record time in DVCPRO or DV, 40 minutes in 720p, 32 minutes in DVCPRO50, and 16 minutes in 1080/60 and 720/60.

201-348-5300; *www.panasonic.com/broadcast*

VTR

Grass Valley Turbo iDDR: Version 2.2 of the Intelligent Digital Disk Recorder lets users load HDV-2 material via FireWire from Sony HDV camcorders and VTRs or HDV files from NLE systems; imports QuickTime H.264-encoded HD content; uses the Advanced Media Protocol over the new Ethernet socket interface.

503-526-8200; *www.grassvalley.com*

NETWORKING PLATFORM

Harris NetVX: Multi-service video-networking system supports triple-play services; is contained in one chassis; includes a low bit rate SD encoder; HD functionality includes picture quality improvements at lower bit rates, and enhanced HD audio ports for Dolby 5.1/Dolby E carriage; IP-over-ASI functionality enables bidirectional IP transport over service providers' existing ASI loops.

800-442-7747; *www.harris.com*

AUTOMATION SOFTWARE

ViewCast Niagara SchedulStream: Schedules and manages Windows Media and RealNetworks RealVideo encoding sessions; is an upgrade to ViewCast's Niagara SCX software; automates encoding schedules; stores content locally as well as through network locations; uses streaming templates established for specific applications, allowing users to optimize scheduling workflows.

972-488-7200; *www.viewcast.com*

VIDEO QUALITY EVALUATION SYSTEM

K-WILL VP21P: Double-stimulus video quality evaluation system; performs detailed, pixel-by-pixel measurement, compares a reference and copies videos; analyzes the 720p HD format and resolutions of 1280 x 720 pixels in progressive scan on a fully automated and real-time basis; features debugging encoder/decoder operations, automatic dubbing, DVD authoring and DVD playback.

310-512-6910; *www.kwillcorporation.com*

DISK RECORDER

Focus Enhancements FireStore FS-100: Portable HD disk recorder; can be used with Panasonic's AG-HVX200 DVCPRO HD P2 handheld camera-recorder; includes 90 minutes of extended hard disk recording time; accepts DVCPRO HD 100Mb/s and DVCPRO 50 SD streams from the AG-HVX200 handheld camera-recorder; imports clips to an NLE's timeline and edits immediately.

408-866-8300; *www.focusinfo.com*

MULTIVIEWER

Zandar Technologies Predator HD8: 1RU HDTV video and audio monitoring multiviewer; has eight auto sensing inputs allowing HDTV 720p and 1080i formats and legacy SDI signals to be used together; can display eight images on one ultra-high-resolution display or mode-switched to display images across two displays; input source auto-detection, embedded audio monitoring, GPI inputs and outputs and user configurable alarms are included as standard.

321-939-0457; *www.zandar.com*

ON-DEMAND CAPTURE SYSTEM

SeaChange Ingest Blade: Video capture system simultaneously ingests hundreds of TV programs for immediate access by on-demand subscribers; processes content on-board at hundreds of Mb/s; eliminates typical Ethernet, operating system and CPU path bottlenecks, enabling operators to add hours of video programming to servers.

978-897-0100; *www.schange.com*

POST-PRODUCTION CONSOLES

AMS Neve MMC 300 and MMC 400: Post-production consoles feature a new central panel, giving users control over monitoring, source and surround mixing; have eight assignable faders that can be used as group, stem, aux or master faders, or additional input channel faders; MMC 400 is fitted with conventional channel strips; MMC 300 uses a knob per function assignable channel.

212-965-1400; *www.ams-neve.com*

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408-954-4500; *www.canopus.com*

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Eyeheight Playout Application Suite: Software enables Eyeheight's playout master control switcher, bugEyes logo generator and SQ-2E image-squeeze processor to be configured and managed from a standard PC running Windows; performs health checks on new and existing installations; automatically repairs wrongly set parameters; connects via a single RS-232 cable and incorporates 1024 x 768 pixel GUI.

866-469-2729; *www.eyeheight.com*

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954-943-2026; *www.pixelpower.com*

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LOCATION: Clearfield Transmitter, Penn State Public Broadcasting.

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Employment & Compensation Division
Job #: L-21027
The Pennsylvania State University
120 S. Burrowes St.
University Park, PA 16801
or fax to 814-865-3750

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Help Wanted

MSNBC

BROADCAST SYSTEMS ENGINEER

Electronic Maintenance/Engineering professional needed to support the Engineering and Information Technology Groups in meeting their objectives in long and short term projects as well as overall technical support for MSNBC.

Primary responsibilities are to provide front line Engineering support to the production of live programming, non-linear editing, graphics, and satellite earth station support. The Engineer position calls for a highly self-motivated individual with broad expertise in all areas of Broadcast and Tele-Production technologies as well as a complementary Information Technologies skill set. Systems design and Project Management experience is required.

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Send cover letter and resume to:
Rick Stolpe, Nexstar Broadcasting, Inc.
62 South Franklin St.
Wilkes-Barre, PA 18702
EOE

Help Wanted

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Please send resume to:
Mission Broadcasting, Inc.
5956 Smith Hill Road
Utica, NY 13503
Attn: Diane Siembab or email:
DianeSiembab@utica.tv. EOE.

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BROADCAST ENGINEERING, ISSN 0007-1994, is published monthly (except semi-monthly in June and December) by Prism Business Media Inc., 9800 Metcalf Ave., Overland Park, KS 66212 (prismb2b.com). Current and back issues and additional resources, including subscription request forms and an editorial calendar, are available on the World Wide Web at broadcastengineering.com

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January 2006, Vol. 48, No. 1 (ISSN 0007-1994) is published monthly and mailed free to qualified persons by Prism Business Media, 9800 Metcalf Ave., Overland Park, KS 66212-2216. Periodicals postage paid at Shawnee Mission, KS, and additional mailing offices. Canadian Post Publications Mail Agreement No. 40597023. Canada return address: DHL Global Mail, 7496 Bath Road, Unit 2, Mississauga, ON L4T 1L2. POSTMASTER: Send address changes to Broadcast Engineering, P.O. Box 2100, Skokie, IL 60076-7800 USA. CORRESPONDENCE: Editorial and Advertising: 9800 Metcalf, Overland Park, KS 66212-2216 Phone: 913-341-1300; Edit. fax: 913-967-1905, Advert. fax: 913-967-1904.

Too much information

BY PAUL MCGOLDRICK

Those of us in the television industry who remember the advent of color TV can easily recall some of the early panics, illusions and general silliness.

Color television came when the British had almost persuaded the United States to abandon the vidicon pickup tube in favor of the image orthicon, which came in both 3in and 4.5in sizes. But a color camera fitted with even three 3in tubes was one heavy beast and was not the kind of object that you moved around the set; the set came to it. If you watch some of the surviving golden oldies from that period, such as the Mary Martin version of "Peter Pan," you'll notice that the actors came to the camera and not the other way around.

The invention of the plumbicon pickup tube by Philips put an end to the tank-sized cameras, but there were other issues. We were sure, for example, that viewers would not enjoy the new color service if differential phase and gain exceeded an arbitrary 10° and 10 percent, respectively. And for a while, we were required to switch in a color filter if we recorded such readings from measurements on the vertical-interval test signal. The only occasion when I had to do this was when a home viewer complained. (That home viewer happened to be my boss, who was watching TV in his BBC-provided house on his BBC-provided color TV.)

But the most fun was in the actual program production. In monochrome productions, you could get away with a lot. Studio floor marks would disappear using duct tape, the luminance value of hideous color choices hid the real facts, lighting was chosen for mood, and makeup was arbitrary.

Lo and behold, with color and the different gamma of the shadowmask tube, directors painted the studio floors to look like carpet or hardwood flooring in order to match the set. Color choices were made carefully with non-reflective paints. Lighting was uniform to the CIE standard Illuminant D65 for correct color balance. Makeup became critical.

There were other new effects as well: the beat frequency of the color subcarrier with some striped ties and other clothing; the dreadful color keying (using blue) around a woman's hair when she had used hairspray; and the impossibility of getting any kind of match between studio shots and material inserted from color film scenes produced outdoors.

Of all those, makeup was the most affected. The basic makeup techniques that were used in the theater for generations and had transferred to television were abandoned. New techniques evolved that not only eliminated the shiny nose or the red eye from those lunch martinis, but also got flesh tones to look real under the unforgiving studio lights. Under normal house lighting, the makeup looked kind of ridiculous, but in the studio, with a camera's eye, it looked right.

With HD, things have gone full circle again. In Europe, with resolutions less than doubling for the services that are rolling out this month, makeup issues aren't going to be visibly different. But here in the United States, more than doubling resolution for a real HDTV production will cause things to be a little different. Up until now, makeup hasn't been an issue because most HD productions have been in the sporting world. But now that more programming is commonly being shot in HD, actresses in particular are panicking about the prospects of exposing every facial blemish to their adoring public. Even the color and texture graduation between makeup at the edges of the face, around the eyes, at the neck and below the ears is going to look savage if not applied correctly. And the talent of the current makeup artists is not yet honed for this work.

Now that more programming is commonly being shot in HD, actresses in particular are panicking about the prospects of exposing every facial blemish to their adoring public.

There are stories that the offices of plastic surgeons in Southern California are being swamped by actresses who want to remove the tiny blemishes that a splodge of makeup hid before — as if that resulting tiny scar is going to be any less visible.

Yes, way too much information. BE

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

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