Omneon Makes HD Easy PAGE 9

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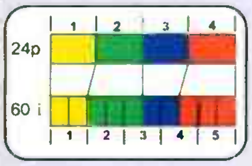

More DTV Drama

Senators grill parade of witnesses

by Deborah D. McAdams

WASHINGTON

The big news at the first Senate Commerce committee hearing on DTV this session was not the broadcast lobby accepting a hard analog shutoff date, although that did indeed occur. A most unusual revelation was that a lawmaker actually remembered what started the whole process in the first place.

Responding to one of her colleagues, who questioned the government's interest in doing anything beyond just shutting down the analog system, Sen. Olympia Snowe (R-Maine) said, "Obviously there is government interest, because the government initiated the digital transition."

Snowe was among the committee members who appeared to be Friends of Broadcast. She was joined by Sens. George Allen (R- Va.), David Vitter (R-La.) and of course, Conrad Burns (R-Mont.), the former broadcaster who single-handedly shot down the DTV deadline bill that reached the Senate floor last year.

During a side-by-side demonstration of analog and digital TV reception, Burns even took a swipe at cable. Pointing to the video noise on the analog set, he said, "I've got cable. I've

DRAMA, PAGE 22

Digital Cinema Gains Ground

Recent alliance announcements, completed standard signal progress

by Jay Ankeney

HOLLYWOOD

Digital cinema may be coming to a multiplex near you sooner than you might think. Since June, a rush of announcements about new digital cinema alliances and installations signal that the the motion picture industry may have finally overcome the bottleneck of which technology to use and who will finance its implementation.

The fuse for this explosion has been the success of digital cinema presentations of the last episode of George Lucas' "Star Wars: Episode III, Revenge of the Sith," both domestically and overseas. U. S. box office figures for digital cinema theaters are not available, but by its May 18 premiere in Germany, 93 percent of all ticket sales at the CineCitta multiplex in Nuremberg were for the premium-priced digital presentation of the movie.

Digital theaters in Berlin, Paris and Tokyo enjoyed similar moviegoer interest and the New York and Los Angeles premieres of the last episode of the "Star Wars" prequel trilogy were presented through digital projection.

So despite Hollywood's current box office slump, there has been progress on the technology side that brings a ray of hope to those who believe in the digital cinema future.

ACCESS CHRISTIE

Currently, the only digital cinema projectors with a proven track record for cost-effective theatrical installation are based on DLP (Digital Light Processing) technology from Texas Instruments. In a three-chip configuration, DLP projectors provide 2K resolution from digital files fed off of servers, an image quality considered by many—but not all—to rival the projection

D-CINEMA, PAGE 19

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Let There Be Lighting

Dimming is a dirty business. Ever since we gave up using resistance dimmers because they were big, heavy, expensive, inefficient, hot and very difficult to remotely control (and in the case of salt-water variety, also smelly and toxic) we have been playing ... PAGE 23

Doug Lung

RF Technology

DTV test equipment is dropping in price, as I noted in my June column, but for some stations, or for engineers who want to do their own observations, commercial test equipment may still be too costly. This month I'll provide a detailed look a Rod Hewitt's TS Reader ... PAGE 26

Karl Paulsen

Media Server Technology

Storage is now the name of the game and the wake-up call to address it has already happened. Postponing decisions related to long-term digital media storage is not just an option. By its very nature, storage must and will evolve to meet the needs of continuous growth ... PAGE 32

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Editorial fax: (703) 820-3245
e-mail: tvtech@imaspub.com
Online: www.tvtechnology.com

FROM THE EDITOR

Moving Foward

Another summer in Washington, another Congressional hearing on DTV. These annual events would be quite entertaining if the situation was not so dire. But as we get closer to an actual proposed analog shutoff date, I'm not that optimistic that we're any closer to resolving this transition.

In advance of a DTV bill expected to surface this fall, the Senate Commerce committee hearing last month provided the usual fireworks and the usual politicking from all sides. Senators did their usual best to wrap their minds around the complex issues surrounding the transition, and the special interests did their part in attempting to sway legislators to their positions. Yes, I know that's how things are done in Washington, but at this late stage of the game and with so much at stake, maybe it's time to reassess things.

Perhaps the most significant development to come out of the hearing was NAB's commitment to a 2009 analog shutoff date. If Congress agrees with the broadcasters' proposal, it would render the 85 percent rule moot and the analog spectrum could be returned to the federal government. But of course, things are never that easy. Although the NAB never specifically mentioned it, the inherent implication in the proposal was that broadcasters would agree to the 2009 date only if Congress would move forward on revising the must-carry laws to require cable operators to carry all broadcasters' digital signals. Broadcasters have every right to petition Congress to change the FCC's decision in February to deny digital must-carry, but using the carrot-and-stick approach right now may not be the best route.

The NAB and the NCTA should seriously consider FCC Chairman Kevin Martin's proposal for an "either/or" must-carry rule that would give broadcasters the right to choose whether local cable operators carry their analog channels or digital channels. The proposal was floated as a trial balloon in June and the FCC was expected to address it at its July meeting, but the issue was dropped at the last minute. Hopefully we've not heard the last of this proposal; it's a compromise that deserves a fair hearing.

Likewise, the consumer electronics industry could stand to alter some of its positions on the transition. The CEA should drop its opposition to warning labels on analog sets, regardless of whether or not a hard shutoff date for analog has been determined. While some retailers have improved the technical knowhow of their sales staff, there's still far too much misinformation being given to consumers when it comes to purchasing their next TV set. Consumers need to be better informed of the coming changes.

Finally, Hollywood needs to do a better job of getting on the HDTV bandwagon. Too many of the studios are still refusing to allow the networks to show theatrical releases in HD. We're seven years into the DTV transition and it's too bad that some networks still refuse to financially support the transfer of films to HD in order to broadcast them in primetime.

Tom Butts
Editor
tbutts@imaspub.com

LETTERS

Send to Editor, TV Technology at e-mail *tvtech@imaspub.com*

Refreshing

Dear Mario:

Having been around the block a few times, I found your June 22 article ("Blind Faith at NAB") uncommonly refreshing.

Nice work.

Bob Mueller
Exec. VP, COO
JVC Professional Products Company
Wayne, NJ

Making a Point

Dear Editor:

Randy Hoffner's column on 24p vs. film ("Is Film Becoming an Endangered Species?" July 6, 2005) was generally correct in its conclusions, but there are a couple of glaring errors in the details.

First, although not an error of fact, the New York Times reporter's Canon digital SLR didn't supplant a Graflex press camera. She probably has never seen one except in a museum. Reporters stopped using them in the '50s. Her digital SLR replaced a 35mm film SLR, which in turn had replaced a roll film camera, such as the Rollei; kind of like saying that 24p has replaced 2-inch quad!

He also states that "Irises are not continuously adjustable, but are adjustable to specific diameters that we know as *f*-stops. This is incorrect—all lens irises are infinitely adjustable between their limits and can be set at any *f*-value. They are marked only in standard whole *f*-numbers, but can be set anywhere in between.

More confusing is his statement, "Even if a standard 35 millimeter lens is used, the smaller image dimensions [of the sensor] cause this lens to have a shorter effective focal length than would be the case if 35mm film were used. This in turn results in greater depth-of-field." Just the opposite is true. If a standard 35mm lens is used, it will have a longer effective focal length because the smaller sensor crops the image. He should have stated that the smaller dimensions of the sensor require the use of a shorter focal length lens to obtain a similar angular field of view, thus delivering more depth-of-field.

Incidentally, one of the more curious methods of dealing with this effect of sharper backgrounds is to place a special diffusing screen behind the actor to soften the focus of the background.

Wade K. Ramsey, DP
Dept. of Cinema & Video Production
Bob Jones University
Greenville, SC

Randy responds:

My reference to the Graflex versus the digital SLR was not meant to be a historical record—it was to make a point. I have not come across a camera since the 1960s that had a continuously adjustable iris (except for an auto-adjusting iris, that is). Every one I have had any experience with since then has had click stops. I probably made it sound like there might not be any way to adjust between stops—there are clicks at intervals between stops.

That sentence probably conveyed the wrong idea. And you are right about focal length and image size. I inadvertently got it backwards. Thanks for pointing that out.

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CBS to Launch Broadband News Network

NEW YORK

In an effort to target what it considers to be the fastest growing media distribution service—broadband—CBS News announced last month that it would expand its Internet portal, CBSNews.com by ramping up on-demand streaming audio and video newsclips and adding several new interactive features.

As a result, CBS News will evolve from a television and radio news-based operation to a 24-hour, multiplatform, on-demand news service, according to CBS News executives.

At a press conference announcing the plans, Larry Kramer, president, CBS Digital Media, referred to the new Web expansion as a "cable news bypass" where users can see and hear a "constant drumbeat" of breaking news, as opposed to having to wait for key times during the day to catch the news.

"The beauty of the Internet is that it's not singing the linear blues in a nonlinear age," he said. If a viewer misses the live broadcast of a real-time event, he can click it moments later to get caught up, according to Kramer.

Some of the new interactive features on the site include a blog called "Public Eye," designed to provide greater transparency into the newsgathering process and allow the public and CBS News journalists to have an online dialogue with viewers, listeners and readers about news events and how they are reported. "Public Eye" will debut by late summer.

Kramer said he hopes the blog will remove some of the mystery about the newsgathering process by opening up CBS to the public. With the interactivity of the Internet, the news is more of a conversation; it's no longer one way with blogs, e-mail and other interactive features, he said.

CBS also has launched a new homepage featuring "The Eye Box"—a video player showcasing free broadband video from CBSNews.com, including more than 25,000 clips as well as video yet to be broadcast on the network. The new design allows for cross-promotion of other CBS news programming.

RSS feeds of news and Podcasts will also be available on the Web site.

Andrew Hayward, president of CBS News, said the network is expanding its commitment to free video, as opposed to a subscription-based model, and believes that an advertising-backed Web site would be more successful than one requiring subscriptions.

In addition, CBS is bringing its TV broadcasts online. CBS Evening News anchor Bob Schieffer will host a daily online version of his nightly news broadcast and CBS News White House correspondents will produce features for the site.

Betsy Morgan—who managed the site for the news division since 2001 as vice president of business development for CBS News—will serve as senior vice president and general manager of the new Digital Media division.

Broadband

Curious, Metro Team on Graphics

LONDON & NEW YORK

Curious Software partnered with Metro Networks—a Westwood One company—to integrate traffic information with high-end graphics.

Metro Networks real-time traffic database, that provides traffic and transportation information for more than 100 U.S. cities, will drive the London-based Curious Traffic Flow System.

This integration will enable television stations to better inform viewers about daily traffic conditions, according to Halid Hatic, president of Curious Software.

Metro Networks has hundreds of camera images and mobile units on hand to visually confirm the traffic information before it is reported, increasing accuracy of the information presented to the public.

First launched in 2000, Curious World Maps—a software package that creates digital maps for broadcast TV news, documentaries, video/film production and post production—are compatible on Windows or Mac systems.

Graphics

Percentage of Minorities in TV Steady

WASHINGTON

The percentage of minorities working in local television news has not changed much since last year, according to a recent survey published by the Radio-Television News Directors Association (RTNDA) and Ball State University.

Minorities comprised 21.2 percent of local TV news staffs in 2004, down slightly from 21.8 percent in 2003.

Minorities represented 12 percent of TV news directors, compared with 12.5 percent in last year's survey.

In addition, the percentage of women in the TV news workforce remained steady at 39.3 percent in 2004 versus 39.1 percent in 2003.

Numbers for women in radio increased from 27.5 in 2004, compared to 22.4 percent for last year's survey.

RTNDA published the survey in the July/August issue of Communicator, the association's monthly magazine.

Survey results are available at *www.rtnda.org/research/2005diversity.pdf*.

Research

Cameron Bids Farewell to Titanic

SILVER SPRING, MD.

James Cameron, writer/director/producer of "Titanic" bid a final farewell to the ship on the "Last Mysteries of the Titanic" on the Discovery Channel.

The program—which premiered July 24—takes viewers down to the depths of the ship's interior, some areas not seen since the fateful voyage in 1912.

Remotely operated vehicles explored some of the better-preserved areas of the ship including the Turkish Baths, the crew's quarters called Scotland Road, the first class cabins which contain personal artifacts of the ship's wealthy passengers and the boiler room and cargo holds.

Cameron added to the drama of the program with reenactments, archival footage and results of two new Titanic dives with live updates.

Cameron directed "Last Mysteries of the Titanic" and Andrew Wright produced it. David McKillop from Discovery Channel served as executive producer. TotalRF in Bensalem, Pa. provided radio frequency support for the project.

Programming

FCC Launches Closed-Captioning Review, Adopts New VRS Rules

WASHINGTON

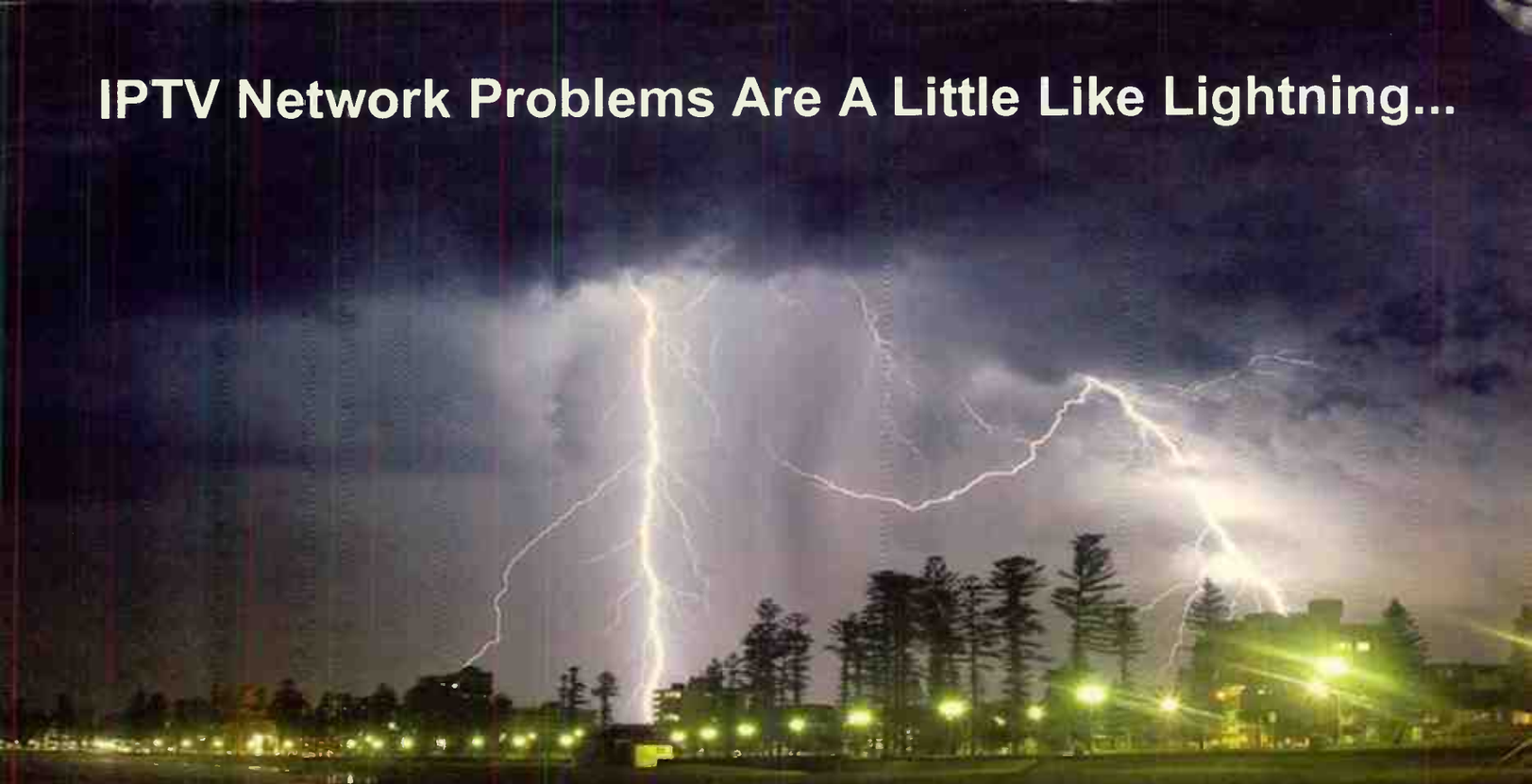
The FCC last month opened a proceeding to assess how its closed-captioning rules are working. The inquiry seeks comments on compliance and quality issues raised in a petition filed by several advocacy organizations for the deaf.

A few of those issues include adopting standards for transcription accuracy; creating additional procedures for addressing technical problems; standardizing monitoring mechanisms; changing the compliance process; instituting fines for noncompliance; requiring compliance reports; and banning the use of electronic newsroom captioning as a substitute for closed captioning beyond the top 25 markets.

The commission also adopted new rules for video relay services (VRS), which provide communications in sign language via a communications assistant and a video link. The new rules establish mandatory speed-of-answer; require VRS to be offered 24/7, and permit VRS providers to be compensated for providing VRS mail. Round-the-clock service will be mandatory for providers to receive compensation from the Interstate telecommunications relay service fund.

Federal Frequency

IPTV Network Problems Are A Little Like Lightning...



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HD Joining List of Hotel Creature Comforts

LCD flat screens coming to high-end properties

by John Merli

SIOUX FALLS, S.D.

It appears likely, and perhaps ironic, that the first place a lot of people may have their first close personal encounter with HD and flat-screen television is in the privacy of their hotel room. After several years in development, satellite-delivered premium HD programming will be captured on-site and transcoded on existing coaxial cable to thousands of flat-screens in Marriott and other hotel rooms in a gradual deployment now underway.

The on-site distribution of HD and other digital content at hotel properties will use transcoder technology developed specifically for the lodging industry by LG Electronics. DirecTV recently approved the LG transponder for converting its premium non-terrestrial HD content securely.

The DBS firm will work in tandem with LodgeNet Entertainment, a well-established Sioux Falls, S.D.-based telecom company within the lodging industry that already provides "the final mile" in disbursing TV content to about a million rooms at nearly 6,000 hotel properties in North America. DirecTV's Spaceway F1 satellite was successfully launched in April, and Spaceway F2 was scheduled for launch this summer. Both birds will be used to handle additional HD capacity for DirecTV, which says it's going after HD (local broadcast and premium) in a big way. For its part, LodgeNet also knows a thing or two about DBS.

NO SET-TOPS

"Our business for 25 years has been delivering satellite TV content to hotel rooms," said Peter Klebanoff, LodgeNet vice president of sales and industry relations.

"We did it as a distributor as pay-per-view emerged, then we evolved into digital VOD, and now we're into HD and digital file servers to store content."

Klebanoff said his company was the first to rid hotels of the costly responsibility of maintaining set-top boxes in its rooms (hardware and software), replacing the boxes with coded card inserts that are today's hotel standard.

Beyond establishing close ties with hotel chains, Klebanoff said LodgeNet has a long history with Hollywood programmers themselves, whose chief concern with HD content remains the possible high-quality piracy of their expensively produced content.

"We knew first and foremost, we needed to address the security issue head-on," Klebanoff said.

Soon, LodgeNet was also talking with manufacturers including LG, which hired a professional cryptologist, and that led to devising the security protocol Pro:Idiom. LG developed this digital platform from scratch (or as LG says, "From a clean sheet of paper") specifically for the hospitality market and licenses it to competitors without charge.

Pro:Idiom employs a DRM (digital rights management system that blocks access to all unencrypted HD-SD content until it's actually prompted and presumably, paid for by the end-user in the hotel room.

"Even we at LodgeNet don't have access to the actual HD content," Klebanoff said.

The LG transcoder, which taps into the firm's own Pro:Idiom technology, receives HD feeds from DirecTV and reformats them to meet the ATSC standard for distribution through a hotel's existing coaxial cable system (thus, saving the hotel huge amounts of money for not having to rewire its infrastructure).

A screen grab of the LodgeNet menu

LodgeNet's considerable storage capacity is widely distributed—namely because each hotel property has its own server which can hold up to a terabyte of digital content for VOD services. The servers are typically refreshed with new content on a monthly basis by DirecTV feeds. Each hotel server can retain about 125 movie titles (depending on the content and fewer, if HD) and several dozen syndicated TV programs at any given time.

"Clearly the popularity of HDTV is growing quickly among consumers," said John Wolf, senior director of media relations for Marriott International. "Much like Marriott stayed ahead of the game in installing high-speed Internet access a number of years ago, we want to ensure that we meet our customers' expectations in terms of 'must-have' technology. We feel the introduction of HDTV will set us apart from our competition and give us a competitive advantage."

Marriott plans to gradually install LGE 32-inch LCD flat screens in its hotel rooms.

"We knew first and foremost, we needed to address the security issue head on."

—Peter Klebanoff, LodgeNet Entertainment

(Hilton, Ritz-Carlton, Hard Rock, Radisson, Hyatt Regency and other high-end chains are also planning gradual HD rollouts.)

Wolf said the property-by-property introduction of HD will be part of Marriott's regular renovation cycle. At the Cleveland Marriott Downtown, HD will be available in every room. Similar plans are underway for the Baltimore Marriott Waterfront near Inner Harbor. (Hotel renovation cycles vary widely, but most full-service properties undergo upgrades every several years, and some, only once per decade.)

KEEP IT SIMPLE

Like LodgeNet's Klebanoff, Wolf also underscored the importance of keeping the technical end of things simple for hotel consumers. "The real differentiator with this rollout is the connectivity panel, which will enable guests to connect nearly any digital device into the HDTV [set]. For instance, a tiny PDA screen suddenly becomes 32 inches big, making it easier to read e-mails and view attachments.

"Guests of Marriott will be able to split their screens so they can work on a presentation on their laptop and watch TV at the same time. For entertainment, MP3 players, iPOD-type devices, videogames—including networked games over the Internet—and camcorders can be routed to the HDTV, as well," Wolf said.

LG-USA Senior Vice President Richard Lewis said the HD rollout makes sense for both industries.

"While hoteliers looked for new and creative ways to differentiate their rooms, LG was establishing itself as a leader in flat-panel plasma and LCD TVs. At the same time, HDTV was taking hold in the consumer market and content was becoming more widely available. The convergence of all these forces is now happening in a big way," he said.

LG initially will roll out its 32-inch LCD flat screens for Marriott. Each unit will be fitted with two 15 watt speakers. (5.1 surround sound would require complicated, costly wiring configurations.)

"We have three 32-inch LCD models and one version of our 42-inch plasma with built-in digital rights management, plus a wide range of other sizes that work with our add-on module that will handle the [VOD] interface," Lewis said. Some flat-screens likely will appear under the brand name of Zenith, an LG subsidiary. And LG 42-inch plasma displays will be used at some properties, including the Chicago Hard Rock Hotel and the Beverly Hills Hilton in Los Angeles.

Yet beyond all the fancy hardware, Lewis emphasizes that content security and DRM remain paramount issues.

"The main challenge is to educate people on the need for digital rights management and how this can affect their access to new high-definition content. This was the main driver for creating Pro:Idiom content protection, and remains a key area of concentration for LG," he said. ■

"We had an aggressive strategy to create a tapeless, high-bandwidth, mission critical environment that also needed to support multiple file formats and be user friendly. We chose Omneon."

Alan Popkin
Director of TV Engineering
and Technical Operations
KLCS-TV/DT, Los Angeles

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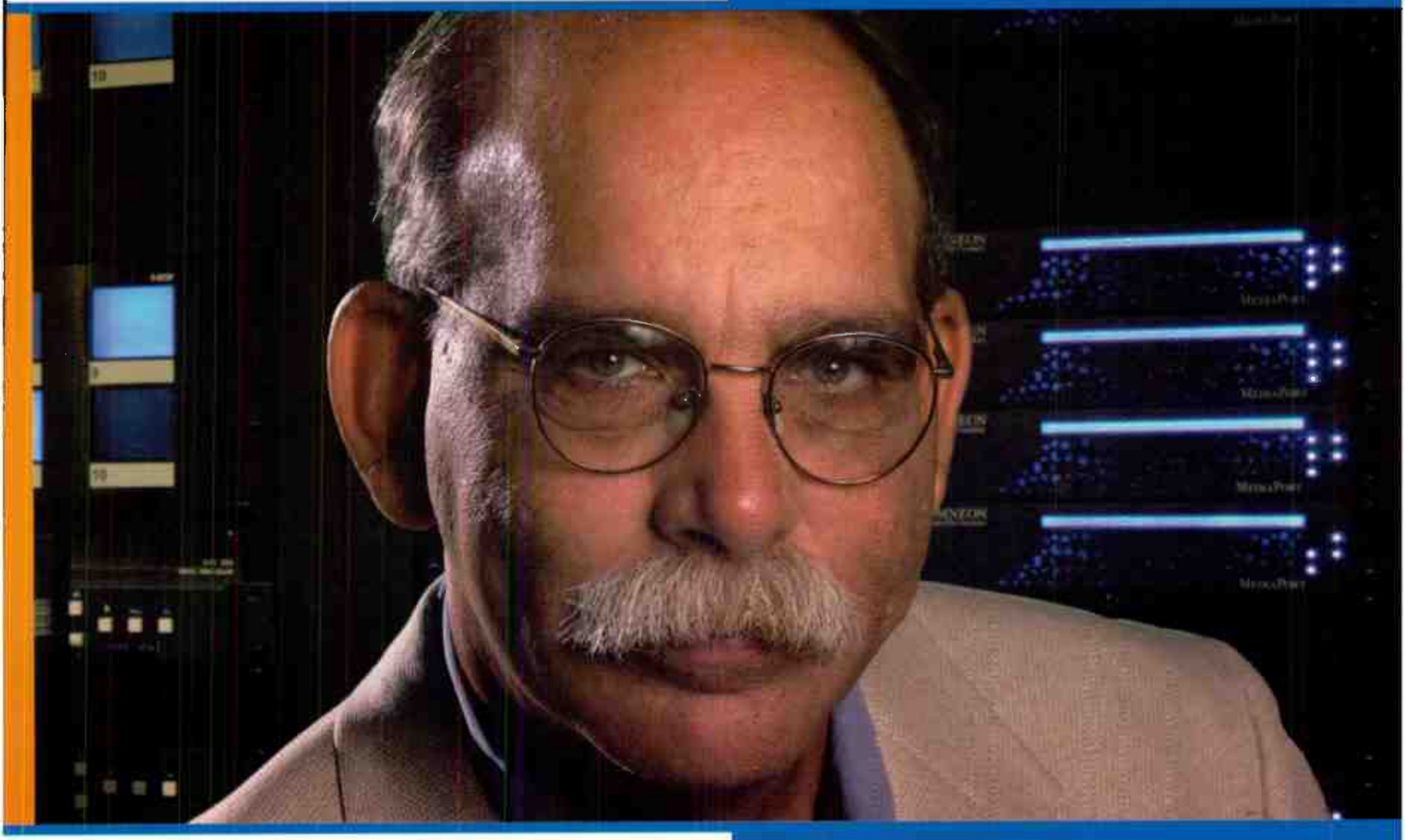

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On the 'Cutting' Edge of MPEG-2

MPEG-2 splicing offers operational efficiency by keeping signals in the digital domain

by Claudia Kienzle

HAMILTON, N.J.

With all the recent advancements in encoding technology, manufacturers say that MPEG-2 has evolved into a highly efficient standard for compressing DTV signals. Now broadcasters are poised to move to the next level, using DPI (digital program insertion), logo insertion, and other products designed to "splice" into the MPEG-2-encoded network feed. After inserting their local ads, they can now rejoin the network feed without ever leaving the MPEG-2 domain.

PBS was among the pioneers of MPEG-2 splicing, using technology from Agilevision (now owned by Leitch Technology). Currently the only commercial network to have actually implemented MPEG-2 splicing is Fox, which incorporated technology from Grass Valley, Harris, Terayon and others to enable its "Fox Splicer" system.

With the Fox Splicer, the network can send an MPEG-2 encoded (720p HD) bitstream to its affiliates, which can pass it along without decoding it to HD-SDI baseband to insert local breaks.

"As HD goes mainstream, we must seek out sustainable methods for HD production and distribution. The application of splicing in distribution delivers material bandwidth efficiencies and equipment savings while simultaneously ensuring the highest picture quality for the viewer," said Andy Setos, president of engineering of Fox Entertainment Group, when the plan was first announced in January 2004.

BREAKING NEW GROUND

In September 2004, the Terayon BP5100 was deployed by the Fox Network at 170 O&Os and affiliate stations nationwide for MPEG-2 bitstream splicing and rate shaping for more efficient use of the 19.39 Mbps DTV channel, especially when multicasting HD and SD signals, according to Andrew Steele, vice president of marketing and corporate development, Terayon Communication Systems, Inc. in Santa Clara, Calif.

"We're about 90 percent of the way towards realizing our goal of installing our BP5100 at all of the Fox stations," he said.

Among the first to deploy MPEG-2 splicing technology in 1999, Terayon has been marketing its DM-6400 CherryPicker platform for MPEG-2 splicing and digital ad insertion to the cable industry. Recently, the same proven fourth generation technology in the DM6400 has been modified slightly to meet the specific needs of broadcasters and is now marketed as the BP5100.

"The BP5100 allows Fox to perform MPEG-2 splicing and digital ad insertion, as well as 'switching' from network to local feeds without having to first decode the signal back to baseband," Steele said. "Fox is also using the BP5100 for channel branding, for example, inserting the local station's logo bug over the national logo bug without leaving the MPEG-2 domain."

Terayon worked with Grass Valley in customizing its BP-5100 for the Fox application.

"The Grass Valley professional services team assumed the role of primary technology partner for the systemization and deployment of the BP5100, and will continue to work with Terayon for further capabilities. The [Fox Splicer] has been on air for a year, and we will continue to work with Fox on future developments as they roll this project out," said a Grass Valley spokesperson.

INCREASED EFFICIENCY

Harris Broadcast Communications Division also contributed a wide array of MPEG-2 gear from its Intelligent Transport Solution and NetVX product lines to Fox. At NAB2005, Harris introduced a new MPEG-2 transport stream splicer and transrating offering to its NetVX product line.

"Fox is the only network doing splicing in the MPEG domain. Everyone else is still decoding the network feed, rolling local breaks from their master control as they have always done, then recompressing the signal for delivery," said John DeLay, director of strategic management for networking solutions for Harris. "There might even be a cross-fade, white fade, or fade to black to smooth the transition. With splicing into the transport stream, insertion is based on the GOP [Group of Pictures] structure of the MPEG-2 stream, so it is a hard cut, but acceptable to viewers."

To illustrate how fast MPEG-2 technology has advanced, DeLay said that since 1997, compression efficiency for the transport stream has gone from approximately 17.5 Mbps down to about 12 Mbps for an HD image. And, "we've gone from six cards in a 10-frame chassis down to a single chip on a standard PCI bus card to compress HD," DeLay said. "Encoded SD pictures have gone from 7 Mbps down to about 2 Mbps, with comparable picture quality results."

NEW PARADIGM

DPI takes the place of the old DTMF (dual tone multifrequency) analog cue tones, according to Howard Barouxis,

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MPEG-2 Gear Gains in Performance Over the Last Decade

Since 1996, MPEG-2 has steadily advanced in terms of bit-rate efficiency and the amount of hardware needed to support it. This increased efficiency translates into a greater number of DTV channels that can be delivered in the 19.39 Mbps pipe, which potentially increases revenue for stations.

INCREMENTAL IMPROVEMENTS

"In 1996, encoding a SD signal at 6 Mbps using MPEG-2 was considered a major breakthrough," said Shahar Bar, manager of broadcast and satellite solutions marketing for Harmonic, in Sunnyvale, Calif. "By 1999, bit-rates had dropped to the 3-to-5 Mbps level as a result of innovations such as 'Look Ahead' and statistical multiplexing. Today, with advanced filtering and pre-processing technologies, high-performance MPEG-2 encoders can breach the 2.0 Mbps barrier when encoding complex material."

Bar adds that from 1996 to 2005 the industry has seen, on average, a 10 percent reduction in bit-rate every year. "This increased efficiency makes it possible for broadcasters to increase the number and types of SD and HD services they provide," he said.

Harmonic offers the DiviCom MV 100 ultra-low bit-rate MPEG-2 encoder, which is highly bandwidth efficient as well as software upgradeable to advanced codecs like MPEG-4 AVC (H.264) and SMPTE VC-1.

ENHANCED PROCESSING

The MPEG-2 standard allowed for enhancements that were not adopted initially due to their complexity, according to David Brooks, vice president, new media systems, Snell & Wilcox.

"As Moore's Law took over, additional features could be added to increase compression efficiency without changing the standard. The key improvement areas were in motion estimation, pre-processing, rate control algorithms and statistical multiplexing systems."

When MPEG-2 was developed in the early 1990s, the encoding system was not specified; only the bitstream and decoder were standardized. "This foresight has given MPEG-2 the headroom to develop and improve over the last 10 years," Brooks said. "As MPEG-2 became widely adopted, many new techniques evolved to meet the needs of the market such as bitstream splicing in order to inset local advertising into an existing stream and the addition of user features from the simple program guide to interactive programming incorporating, for example, multiple camera views of a soccer game."

In addition to its Memphis MPEG-2 HD/SD encoder, Snell & Wilcox offers the HD Prefix CPP1000 among other compression pre-processing products. Prefix eliminates unwanted artifacts, such as noise, so that only relevant picture information is encoded for more efficient use of bandwidth.

FACILITATING MPEG-2

Being able to playout all the different flavors and bit-rates of MPEG-2 from a video server is critical, says Adolfo Rodriguez, product manager at Omneon Video Networks, in Sunnyvale, Calif.

"We make MPEG-2 work seamlessly within our servers by offering hardware and software that facilitates ingest and decoding," he said.

Peripheral to the Omneon Spectrum HD media server is a family of Omneon MultiPort and MediaPort devices. The MediaPort family provides a single bidirectional channel per box. The MultiPort family provides two to six play-out only channels (of SD and HD) per box. This modular approach lets users configure MultiPort or MediaPort devices with the server to handle whatever MPEG-2 SD and HD bitrates they need.

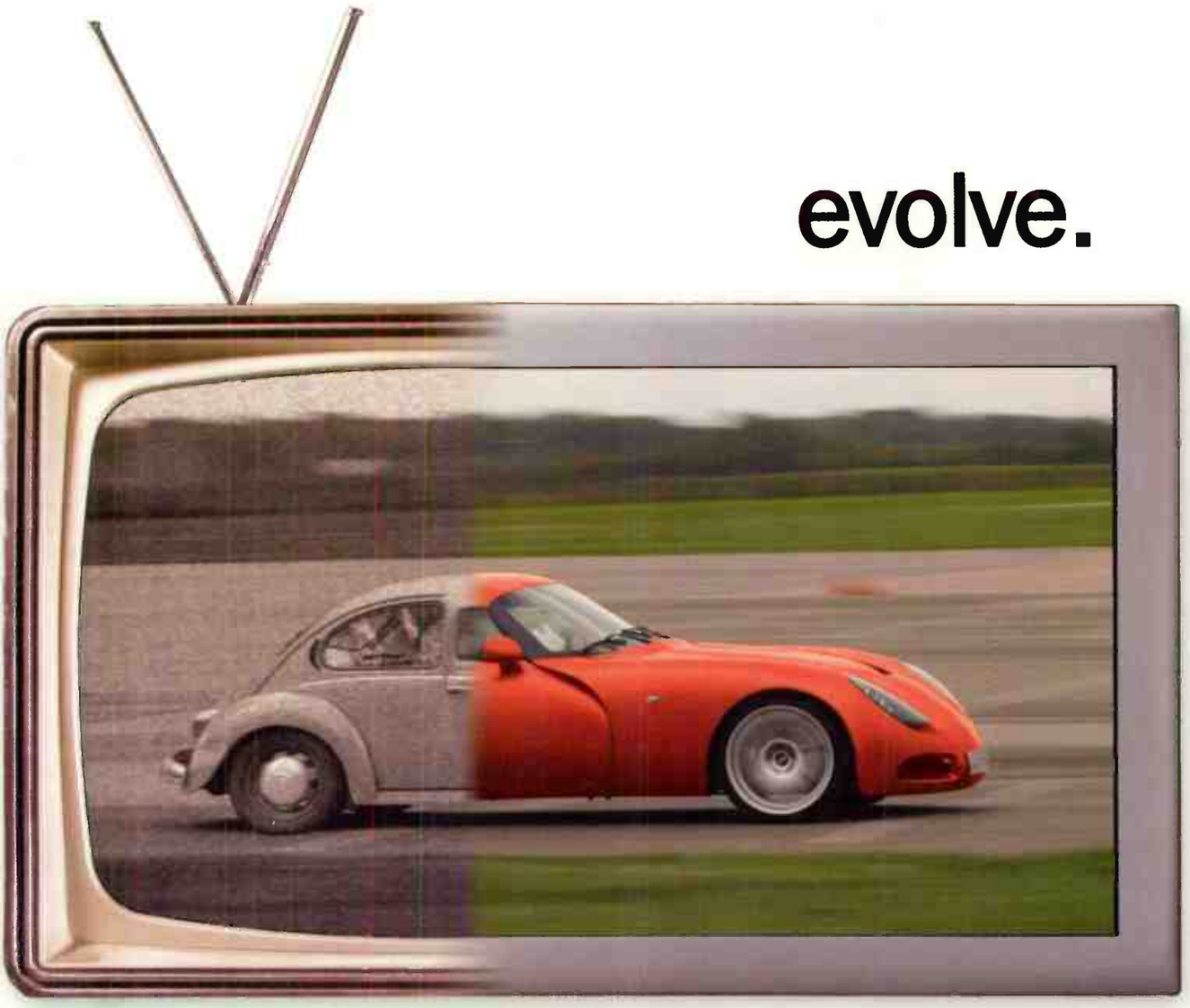
NEAT TRICKS

The Leitch DTP (Digital Turnaround Processor) all MPEG-2 stream manipulation product allows broadcasters to inexpensively overlay motion graphics and logos on pre-compressed HD/SD streams. Broadcasters can add overlay logos, text crawls, time/temperature, stock index, local weather or news elements to remotely encoded DTV signals, enabling them to localize national content.

DTP customers include HDNet, (a 24-hour 1080i HDTV cable and satellite entertainment network), which installed the DTP at its Network Operations Center in Denver, Colo.

"The DTP enables us to extend the capability of our all-MPEG-2 HD master control," said Philip Garvin, general manager and COO of HDNet. "Now, we can key-in branding and graphic messages without decoding and re-encoding. "This further ensures the highest quality of HD programming to HDNet's customers." The DTP leverages years of development on Leitch's AgileVision product line.

Claudia Kienzle



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Small Boutique Handles Big Project

Making multiple PSAs for NAB requires marathon skills

by Deborah D. McAdams

WASHINGTON

Shooting 400 TV spots in nine days takes more than a small amount of coordination. Rosemary Reed has done it, and she repeats it like a mantra:

"These were all shot in nine days."

Watching a reel of the spots run at the event where they were unveiled, she states the fact as if she herself is unconvinced.

Reed, president of Double R Productions in Washington, D.C., produced the 30-second spots for the National Association of Broadcasters' Congressional Families PSAs program.

"We used to work in the studio with family members for 12 days," she said. "Now we did it in nine days. Sometimes we did 20 women per day. We tried to crank them through in about a half-hour."

Since 1985, NAB has invited the families of senators and Congress members to participate in public service announcements about issues such as breast cancer and literacy.

Reed had just gone freelance in 1985 when she landed the job, along with her partner, Mike Hurdlebrink, vice president of Double R. There were 20 spouses that first year. They showed up on the Mall, and with the Capitol in the background, did a straight 30-second read, which was captured on 3/4-inch videotape. The spots were not particularly compelling, Reed said. They needed a creative infusion.

In the years that followed, family members were brought into a studio where they got the full make-up and wardrobe treatment. A set of 15-second vignettes was developed to open the spots. A five-second NAB logo bumper was attached to the end.

FILM IS NOT DEAD

The opening vignettes are shot on film, since film remains a cheaper proposition than high-definition video, especially for a boutique like Double R. The masters are sent to Colorlab in Rockville, Md. for telecine transfer onto Beta SP.

The little 15-second films are illustrative of the given issues, which are selected by NAB. This year's PSAs covered breast cancer, bullying, child safety, diabetes, emergency preparedness, literacy, physical fitness and volunteer service. Some are straightforward productions with paid actors, like the emergency preparedness piece. In it, a small group of people is out backpacking when the weather turns threatening and one hiker asks if anyone has a tent or a flashlight. Instead, a woman pulls a kitten-heeled mule and a swimsuit top out of her backpack. A voiceover intones, "Emergencies are no joke," and to "be prepared."

Hadassah Lieberman, spouse of Sen. Joseph Lieberman (D-Conn.), taped PSAs for emergency preparedness and physical fitness.

For the breast cancer PSA, Reed hired a freelancer to create a 3D graphic in which a hundred or so headshots fall into a collage of a U.S. map and a pink survivor ribbon forms over the top.

Some vignettes are recycled from previous years, while new ones are created for fresh issues or those that remain consistently high profile, like breast cancer. Double R does all the creative planning once NAB has determined the topics. The scripts and vignettes are mapped out and submitted to NAB, and to the partnering agencies (Homeland Security, Health & Human Services, the American Diabetes Association, etc.), for approval. NAB invites the Congressional spouses to the shoots and sends them the scripts. Those who accept choose their causes and get a timeslot in the studio, where Reed shows them demo spots featuring her in the role of Congressional spouse.

Double R booked nine days in May at Reuters Studios in Washington, D.C., one of the few facilities left in the District that meets the parameters of the project. Two Sony DXCD-34WS cameras were used; one close-up and one wide. In all, 112 family members participated, many of them doing multiple spots, said Dennis Wharton, NAB senior vice president of corporate communications.

The tapes from the shoots were whisked back to Double R, where Michael Gionis edited them into the bumpers on an Avid Adrenaline system.

In many ways, the edit bay is the workhorse of the Double R. The house has several small cameras—a Sony VX1000 MiniDV and a Canon GL2 MiniDV—for smaller shoots; say "if someone's doggie graduates from doggie training school," Reed joked. Contractors are hired to shoot larger projects.

The Adrenaline system is configured with four Avid 36 GHz hard drives on a dual-processor, 2 GHz Power Mac G5 running Panther OS. The edit suite is equipped with two 20-inch NEC monitors, a Sony Betacam UVW-1800 recording deck and a Tascam CD-A500 cassette/CD combo deck.

Double R bought the Adrenaline late last year to replace its Avid Media Composer 1000XL, but the old system remains in an adjacent edit bay. There are times when a second system comes in handy, Reed said.

A 933 MHz Power Mac G4 running Jaguar OS powers the 1000XL. Mitsubishi monitors, a Sony UVW-1600 and a dub rack with a Sony U-matic VTR, VHS duplicator, PAL/SECAM VHS player/recorder, DVD recorder and 13-inch monitor round out the bay.

The U-matic is more than just a sentimental relic. Double R still gets the occasional request for something on 3/4-inch tape, including the previous round of PSAs. The majority of hard copy requests are for S-VHS or Beta SP.

For the most part, stations pick them up via satellite. NAB distributed the latest batch of PSAs June 17, 24 and 30 from noon to 3 p.m. ET on C-band, Galaxy 3, Transponder 7 at 3840 MHz. The spots go out by state, so stations can tape the families of their respective lawmakers.

The audio is stripped out for radio stations; it can be downloaded as an MP3 file from the NAB Web site, or stations can request a CD. NAB also made the spots available to non-member stations for the first time this year, Wharton said.

"It's left to individual broadcasters; but feedback indicates they're prominently played in these communities," he said. "That's why we get such a good return."

A week after the unveiling—at NAB's 7th Annual Service to America Summit June 13—Reed was in her offices at Double R, where the staff was making a "blooper" DVD for all the participants. When those go out, she'll get a few more requests for copies of the PSAs, because Congressional spouses will call stations and ask to have them run. Because, Reed said, "They see them and realize, 'hey, I look pretty good.'" ■

MPEG

CONTINUED FROM PAGE 10

director of multimedia sales for Thales Broadcast and Multimedia in Southwick, Mass.

"According to a standard developed by the SCTE, analog cue tones have been replaced by SCTE35 messages inserted into the transport stream to denote where a program or ad is to be inserted, and to tell local stations when to rejoin the network," Barouxis said.

The Thales Crystal DTV Logo Inserter

The Thales end-to-end DPI solution includes four components: the Amber Remux, capable of inserting SCTE35 messages into the transport stream; the Sapphire transport stream server, which uses another part of the SCTE standard, SCTE30 messages, to send ads to a splicing device, such as Amber, or any statistical multiplexer/rate shaping device supporting SCTE35 messages; the DVS525 adapter, which talks to automation systems (with a GPI interface) to send messages to SCTE35 insertion devices that create the SCTE35 messages; and a DPI monitor, that monitors the transport stream before it's sent out via satellite or IP network to local broadcast affiliates or cable headends, to insure SCTE35 messages have been received.

(Thales also offers Crystal, which inserts animated logos, text crawls, voiceovers, and more on SD/HD programs in an MPEG-2 multiplex without first returning to baseband video.)

"With DPI and logo insertion, networks can move from a linear, real-time video model to a non real-time, file-based distribution model for more efficient use of satellite bandwidth," Barouxis said. "And switching and branding can be kept entirely in the compressed domain, saving the station on operating costs." ■

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LIVE 8 Tests Limits of TV Production

The ABCs of televising the world's biggest concert event

by Craig Johnston

PHILADELPHIA

Preparations for televised coverage of the Live 8 concerts on July 2 turned into a crash course in last minute logistics.

"This was put together very, very quickly on a worldwide scale," said Bob Muller, a freelancer hired as tech manager for Greg Sills Productions, a Los Angeles-based independent production company which produced the U.S. Live 8 venue in Philadelphia.

"As new people, new venues, new groups joined the effort, they had to be folded into the production."

STANDARDS GALORE

One group that felt the whipsaw of these changes was All Mobile Video, which handled the remote pickup and transmission of the Philadelphia venue and edited ABC's two-hour highlight show at the end of the evening.

AMV's Resolution multi-format production truck was used to cover Live 8.

Mixing was done on the Sony Oxford R3 digital console.

"We had a very short time to do what was a very complicated production," said Lee Blanco, AMV's director of engineering. AMV had 12 cameras feeding its Resolution remote truck, plus two more dedicated to a BBC production.

Muller noted that the multitude of standards involved complicated the production. "We had to originate the concert footage in the 1080i format because we recorded the switched output plus four ISO cameras for the Live 8 DVD that will be coming out." But it was downconverted for transmission to London to be integrated into a world feed, and for ABC's recap program airing that evening.

"The reason for [working in SD] is that a lot of the broadcasters in foreign countries were 4:3 only, so the decision was made by the organizers in London that 4:3 would be the format for the world feed."

A number of other venues throughout the world were shot in 16:9 or 14:9 aspect ratio, but all directors agreed to protect a 4:3 center-cut for the world feed.

The charity nature of the event caused a number of headaches for the technical crew.

> ***"We had a very short time to do what was a very complicated production."***
> ***Lee Blanco, AMV***

"On test-day they gave us only an hour and didn't give us any [performers] playing during that hour," said Lenny Laxer, AMV's vice president of operations. "Usually we'll get a four or five hour test, with performers rehearsing."

Among the challenges was maintaining audio/video sync. "Lip syncing issues were huge," said Blanco, "a lot of issues of how things were being routed and in what direction.

"One good thing about it is they were not a moving target. Once a path is a path, do the math. Once they're set, they're set."

Donated satellite time was an issue as well. "The satellite space they got was international space at a very low look angle, 30-degrees. For us to find 30-degrees anywhere is always tough with tree-lines and such," said Laxer. On their first site survey, they were unable to see the satellite at all.

"Then we had to switch the LNBs [low noise block] on the truck because of the frequency we got; the satellite space was in the extended frequency range. So we got up on the roof and changed the LNBs and installed new Tandberg encoders in the truck."

"You just learn to adapt, which is something we're pretty good at," said Blanco. "And our shop isn't all that far from Philly, so you could keep running equipment back and forth."

Scheduled long before the July 2 Live 8 concert at the Philadelphia Art Museum venue was an annual July 4th concert, featuring Elton John, (who performed at the Live 8 concert in London). "A lot of the facilities, the stage and so forth, were built and put in place and were to be reused for the 4th of July concert," said Muller. "One of the challenges was for all the groups to kind of integrate the facilities so they could, as much as possible, serve a dual purpose."

Big screens set up along the venue mall were one example of equipment serving both concerts. For Live 8, they were fed from a switcher at the back bench of Resolution's control room. During Philadelphia band changes, concert programming was shown from a separate feed from London.

Another unique request kept both video and IT engineers up nights: when viewers joined a petition and text-messaged their names in, Live 8 promoters wanted their names to scroll across a zipper screen over the Philadelphia stage.

"[We] pulled all the right people together talking on the phone, got them running tests, and they showed up in Philadelphia and put the thing together," said Muller.

LAST MINUTE SQUEEZE

A last minute snafu was averted by some quick footwork on a separate 16:9 feed from London that was anamorphically squeezed to 4:3 for transmission.

"We were told the show was coming in 4:3, and now it's

showtime, and MTV is saying 'That's not what we were promised,'" said Blanco. "Thankfully they had the equipment [a Miranda ARC-101 card to decompress the anamorphic squeeze] on-site to install, because if they'd had to go back to Jersey to get it, it would have never made it."

Output of the Philadelphia concert mix, the four ISOs and the two feeds from London were captured on an EVS server and 17 Sony Digital Betacam VTRs in AMV's Cinetour mobile post production van.

"The content was spread out over such a long period of time, about 14 hours," said AMV Senior Editor Mike Shore. "Then the trick becomes managing. You've got all this stuff stored on disk and how do you find it? What went where?"

Though the finished material for ABC's 8 p.m. replay program was edited to tape, Shore credited AMV's two hybrid edit rooms in the van—using Grass Valley Editware controllers that can both access material on the EVS server at the same time—with allowing quick editing of the tight turnaround project.

There was a game plan put together by ABC's producers the night before, detailing which songs by which bands would be included in the show. But they had to be flexible. "The whole object is to capture those 'magic moments,' that the producers always are looking for," said Shore. Editor Bill Miller and Shore planned to edit alternating segments of ABC's show. "That was our original goal: you do the odds, I'll do the evens. It worked out that when certain acts came in and segments were complete on paper, we could begin them, so that fell by the wayside quickly.

"Audio sync was a moving target throughout the day," he said. "There was some latency inherent in [the London] feeds, and as they turned around feeds from other parts of the world there was some additional latency added. We did our best to wrestle it to the ground.

"Nothing came in that was so bad as to be unusable," Muller said. "Everything that came in was aspect ratio-converted and format- and standards-converted. Were there motion artifacts in long pan shots? Absolutely. Could I see the standards conversion? Absolutely. Was it unusable? Absolutely not."

Shore and Miller were editing ABC's show, set to air from 8-10 p.m. EDT. The final Philadelphia act, Stevie Wonder, was scheduled to end at 6 p.m.

"Come on, it's rock and roll," said Shore. "When they first told me they'd be done locally at six, I'm like, yeah, you're joking." Wonder finished his set at about 7:30 p.m.

Fortunately they were able to begin editing off the server as soon as Wonder began performing the song producers selected.

Late as it was then, there would be one more bump in the road. While they were cutting the Wonder song originally chosen for the show, producers were watching the performer give what they felt was a better performance of a later song. They now wanted that song instead.

At this point, the ABC program was already on the air. But the two the editors were able to accommodate the change.

GSP's Muller gave high marks to the professionalism of those involved in the Live 8 production. "It was like most big shows where it was just a huge challenge to pull it all together. On most shows you have a little more planning time on it. You learn to appreciate planning time, and how important it can be."

U2 performs at Live 8 concert for Africa in Hyde Park, London on July 2, 2005.

Photo credit:
Z.Tomaszewski/WENN/Landov

Pete Townsend and company perform at Live 8 in London.

Meanwhile in London...

With London serving as the "homebase" of the series of Live 8 events held worldwide, the BBC demonstrated that it was up to the challenge of broadcasting the flagship concert.

The sheer scale of the event was evident from the 250-strong production crew BBC used to cover the concert. The crew was supplied by BBC Outside Broadcast (part of BBC Resources, which won a contract to provide supporting services) with reinforcements brought in from U.K.-based OB company Bowtie Television. Despite their numbers, the production staff still had to work around the clock to ensure seamless coverage for audiences across the U.K. and around the world.

Bowtie provided SD feeds for the BBC's TV coverage, while BBC Outside Broadcast covered the live presentations onstage as well as provided feeds from the on-site studio and hospitality area where acts such as Coldplay, The Who and U2 waited before taking the stage.

A 12-camera, seven-OB truck setup was used to deliver the coverage for BBC1, BBC2, digital coverage on BBC3, as well as international feeds for the U.S., Europe and Africa. Live feeds also were delivered for the BBC's interactive coverage of the event.

Siemens Business Services (formerly BBC Technology) delivered satellite services from the Live 8 concerts to both Live 8 Productions and to the BBC.

The company provided connectivity between the five major concert sites, as well as additional international events, and BBC Television Centre via a combination of uplink services and satellite space capacity on Intelsat 905. Atlantic Bird 1 was used to provide downlink to the remote sites. Siemens also was involved in transmitting the Hyde Park concert to the U.S., transmitting the world feed to Telstar 12 for European broadcasters and providing a feed to Arqiva (formerly NTL Broadcast) for transmission via PanamSat to audiences in Asia-Pacific.

In all, Siemens Business Services provided around 160 MHz of satellite bandwidth, as well as extensive transmit and receive facilities to support live broadcast services to audiences worldwide. An estimated two billion viewers watched the television coverage, with an additional one billion listening to live recordings of the event on the radio.

Live 8 also proved to be a testbed for live HD production, including the BBC.

"The premise of HD was to future-proof the event," said Chris Bretnall, who oversaw the event on behalf of the BBC. "The DVD from [1985's] Live Aid has only just been released and the picture quality is terrible. The [Live Aid] Trust was keen not to repeat this."

As a freelance consultant, Bretnall—formerly with BBC Resources—only became involved shortly before the event itself when a lot of the equipment and planning was already in place. However, Bretnall made the decision to replace the SD gear with HD equipment to ensure a future-proof acquisition format from the events in the U.S., Berlin, Paris and Hyde Park. As he explains however, although the possibility of HD distribution of the coverage was investigated, the lack of HD infrastructure prevented them from broadcasting in high-definition.

Nevertheless the BBC used the event to publicly demonstrate HDTV, displaying live HD coverage of the event on a 17-foot, 1920x1080 pixel, screen in Cardiff. All feeds coming into London were upconverted and transmitted via an Intelsat uplink to Cardiff.

At the other end, BT Media & Broadcast (BTM&B) provided a satellite downlinking service, free of charge, which was relayed to the audience at Cardiff Castle. The trial relay was in 1080i at 50fps.

HD was also used for a DVD recording of the London event using an 18-camera setup. "Until we have HD DVD/Blu-ray, the EDL and the material that was acquired is there in HD," says Bretnall.

In the meantime, the Live 8 DVD is being produced in SD.

Farah Jifri

BACKGROUND:
Aerial shot of the Live 8 concert in Philadelphia.

Photo credit:
EPA/GEORGE WIDMAN/POOL /Landov

NY Yankees in 5.1? YES!

Sports network uses extensive mic placement to bring the excitement home

by Mary C. Gruszka

NEW YORK

The Yankees Entertainment & Sports Network, (aka the YES Network) continues to score big with viewers with the 2005 season launch of YES-HD.

As the most-watched regional sports network in the U.S. and in New York, the YES Network broadcasts 130 regular season games of the New York Yankees baseball team, Yankee-themed programs like "Yankeeography," "Kids on Deck," "Yankees Magazine" and "Yankees Classics," plus the 79 regular season games of the New Jersey Nets basketball team, and a lot more.

All home games plus the Boston Red Sox and New York Mets away games are produced in HD, according to John McKenna, chief engineer, YES Network. HD production actually started in July 2004, after the All Star Game break. "YES spent the last part of the 2004 season perfecting our HD telecasts and launched the HD service with this year's home opener," McKenna said.

From the beginning, the HD games were broadcast with 5.1 surround sound audio.

"What's unique about baseball is that so much of the action happens at one position in space—home plate—so you optimize for that small space," said Greg Curry, audio engineer for the Yankees games for YES Network, as well as the New York Mets for WB11 (WPIX-TV, New York) and Fox Sports New York.

For Yankees game coverage, the YES Network uses mobile production trucks from Game Creek Video, primarily Yankee Clipper, but also Patriot and the new Freedom. These were built to meet the combined specs of the YES Network, ESPN, and Game Creek, according to McKenna.

The heart of the audio system on Yankee Clipper is a Calrec Alpha 100 digital audio surround sound console with 128 mic/line inputs and 64 line inputs.

"My setup is relatively simple," Curry said. "I mix from the perspective of a fan behind home plate in the next section back, where the overhang begins in Yankee Stadium."

Yankees Centerfielder Bernie Williams

MIC PLACEMENT

For mic placement, "it's all about where they let you put the mics that determines how much you can get," Curry said. "It's not always in an ideal location."

For home plate coverage, Curry relies on two parabola mics with AKG C 480 B cardioids positioned at either corner of the screen, focused about waist high behind home plate. He'd prefer placing a dish mic dead center behind the screen as he does at Shea Stadium for the Mets, but isn't allowed to in Yankee Stadium.

Curry augments home plate coverage with a beyerdynamic MC 837 shotgun behind home plate just above the backstop.

Four other MC 837 shotguns are used at first and third base, 70 feet from home plate. There are two mics on each side, located in the camera box area and mounted on fixed aimed mounts focused in different directions. One set, the "bat mics" are aimed from the base toward home plate. The second set, the "pick mics" are pointed at the inside corner of first and third base respectively. "Their aiming angles meet somewhere behind second base," Curry said.

"I don't use outfield mics, although a lot of people do," Curry said. "It's a perspective thing. The normal observer isn't going to hear the ball hit the wall. I'm also not a big fan of putting mics in the bases, but I am interested in people putting a wireless stereo pair in second base. There could be a stereo perspective for the outfield, but at this point I'm not doing it."

For crowd mics, Curry hangs a Shure VP88 M-S stereo mic from the press booth level and dead center behind home plate. This mic is aimed at the front facing crowd.

Facing the rear crowd are two AKG C 451 B cardioid mics mounted in ORTF placement, angled about 110 degrees to each other and spaced just under seven inches apart. This produces a fairly wide stereo image.

5.1 MIX

Curry produces a simultaneous 5.1 mix for the HD feed, analog stereo mix for the NTSC feed, plus a digital stereo effects mix (pre-fader mix of natural or international sound from the console) for channel 7 and 8 for the Dolby E stream. The stereo mix is "straight stereo" as Curry said, with no Lt/Rt encoding.

Dolby E is used to send the signal to the YES Network's Stamford, Conn. network origination center, but more on that later.

For the front channels, the announcers are always placed in the center, and the first and third base bat mics are panned full right and full left respectively. The parabola mics are also panned fully with the first base dish fully left and the third base dish to the right. The crowd surround mics are placed exclusively in the two rear channels.

The stereo effects mix is comprised of the effects field mics without the surround mics. In addition to channels 7 and 8 of the E-stream, this mix is sent to one of the two stereo pairs for each channel of the EVS LSM ("Elvis") XT four-channel HD disk recorders (the other stereo pair is used for program) and also any VTRs that may be used.

Currently "Elvis" playback is in stereo. Curry said that there is no time to derive a center channel during the live show.

For taped pieces played at the beginning of the show, Curry has time for pre-production before the show to produce a left, center, right mix with the announcers in the center, but not without some manipulation at the console.

Music is played back in stereo, and Curry adds some music to the rear channels. For the low frequency channel, he mixes in special effects, replay wipes effects, and a small amount of crowd noise. Replay wipes are currently stereo.

SIGNAL PROCESSING

Creative signal processing lets the crack of the bat be heard over the roar of the crowd.

The home plate mics, in addition to

entering the console straight, go through a parallel path through Drawmer DS201 dual noise gates. The shotgun mic, which is closer to home plate than the dish mics, is used as a sort of a "look-ahead" to pick up the transient sound of the ball making contact with the bat or the catcher's mitt. This signal is then used to key the gates on when the transients occur and Curry brings them into the mix as needed.

This gives an extra punch to the sound or as Curry said, "that extra feel" especially when the crowd gets too loud.

The stadium PA also presents a challenge. First of all, it's loud, and its central loudspeaker cluster is easily picked up by the home plate mics.

When announcements or other audio comes over the PA system, Curry sets up the DS201s to "duck" (drop the level) of the feeds from the front plate mics. This is done using a delayed PA direct feed as the key input of the DS201 gates used in "ducking" mode. The dish mics are fed to one DS201 and controlled as a stereo pair, with one delay setting on the PA key signal. The center home plate shotgun mic is fed into its own DS201, with a different delay setting on its key signal.

Curry uses Rane AVA22 stereo digital delays included with the outboard gear package on the truck.

Another issue with the PA system is that it takes sound time to travel from the PA cluster to the mics, while the direct feed from the PA takes virtually no time at all.

To time the PA direct feed with the mic pickup, Curry puts a delay on the PA direct feed. The only exception to this is when a live singer lip syncs to the music played over the PA system.

TRANSMISSION

The 5.1 audio is encoded into a Dolby E data stream in the remote truck and then multiplexed into the HD-SDI video stream as AES-1 and sent back to the Stamford Broadcast Center, according to McKenna. There the YES Network integrates the game with commercials and interstitials before uplinking the feed to affiliates.

The incoming AES-1 stream is extracted and two copies are generated, McKenna said. The first copy is sent to a Leitch embedder (along with video) that subsequently feeds the master control switcher.

The second copy is sent to a Dolby DP572 Dolby E decoder that produces the six channels of 5.1 audio on three AES pairs which are then fed to a Dolby 569 digital encoder to derive the Lt/Rt matrixed stereo signal. One copy of Lt/Rt feeds the Leitch embedder.

The fourth AES pair from the DP572 (stereo natural sound on channel 7/8) is sent to distribution, accompanied by a second copy of Lt/Rt, McKenna said.

After going through the master control switcher and other elements in the chain, the embedded audio is again de-embedded. The AES audio signals are sent to another Dolby E decoder along with Lt/Rt (PCM input) and ultimately (after passing through a Nielsen encoder), wind up at a Dolby 569 Dolby Digital (AC-3) encoder.

"The job of the second [Dolby E] decoder is to determine if the program material has a Dolby E or Lt/Rt audio signal and decode the output to match," McKenna said. "It also passes the appropriate metadata over to the AC-3 encoder so that the home sets know if they are to decode Dolby Digital 5.1 surround audio or not."

Another audio pathway puts the Spanish play-by-play feed from AM radio station WRDM onto a second Dolby 569 AC-3 encoder for the SAP channel in the HD broadcast stream.

As technology evolves, so will the ease of producing in 5.1. Curry expects software updates from Calrec will allow him to more easily manipulate the discrete channels. The LVS machines are capable of more audio channels, which will allow surround sound playback sometime in the future, but for now, will remain four channels.

Curry also hopes to try the newly released Drawmer multichannel surround processor. "This is one area where the digital manufacturing community is very slow in producing products that support what some may call a 'secondary' area of dynamic processing—ducking and multiband keyable processing," he said.■

The Next Leap for STLs is HD

The 2 GHz migration affects many fixed broadcast links

by Deborah D. McAdams

WASHINGTON

The evolution of studio-to-transmitter links reflects the digital television transition as a whole. Systems have typically followed a path from analog, to hybrid analog/digital, and more recently, to all digital. With STLs, the hybrid part of the evolution is pretty much in the can because the majority of stations simultaneously transmit analog and digital signals. Some stations use a dual-carrier system; others may encode and decode the digital signal for transmission on an analog STL.

Either way, many are now considering what's necessary to handle hi-def.

"If they're converting from analog and going to digital, they can still handle SD with no problem," said John Payne, president of Nucomm in Hackettstown, N.J. "What people are becoming more concerned and interested in is, how are they going to go to HD."

HD OVER ANALOG

One option available from Nucomm is the fourth-generation of the Analog Coder, an 8-VSB product line that works with existing analog microwave links.

The Analog Coder II handles data rates up to 30 Mbps and has been employed to transmit HD signals over a 24-hop repeater system without degradation, according to the company. Nucomm also supplies an encoder that's upgradeable to HD, the HE4000, which, at 19 inches of rack space, is a far cry from early STL encoders.

The DAR Plus, from MRC

"Five years ago, an HD encoder was a pretty big piece of equipment that had to sit on the floor; it took a crane to pick it up," he said. "Once you have a box that requires two or three rack units, size is no longer important. Then it becomes an issue of features," such as latency, data rates and cost.

Cost speaks for itself. Engineers continue to work on latency, the delay that comes into play when a digital signals is converted to analog (as with an analog microwave link), and then back to digital. As for data rate, that's a feature spawned by the fact that digital STLs can be used for more than just sending the studio A/V signal to the transmitter.

DIGITAL STLS

Dan McIntyre, vice president of Microwave Radio Communications in Billerica, Mass., said stations are running all types of data through STLs.

"We see customers using their digital links to do other things now," he said. "Once you have a digital link, it's really a digital pipe. You can put as much through it as the bandwidth and modulation scheme will allow. You can send any types of files back and forth."

McIntyre said that the customers doing STL modifications now are "gradually transitioning to primarily digital systems."

The TwinStream has been a big seller for MRC since it was introduced seven years ago. The QAM-based, dual-carrier NTSC/ATSC microwave system—convertible to all-digital—has been installed in more than 1,000 facilities around the world.

MRC also makes the DAR Plus system that, when used with the MRC variable rate modem, can handle four user-selected IF carriers multiplexed onto a single data stream of up to 120 Mbps.

"Now that the major part of the transition has occurred, we're selling more DAR Plus systems," McIntyre said.

Sunil Naik, director of engineering at Moseley Broadcast in Santa Barbara, Calif., said smaller stations appear to be adopting all-digital STLs more than the big guys.

"There have been a number of smaller stations going to all-digital," he said. "We just did a three-station group that's putting up three HDTV channels, all with their own Ethernet and T-1 connections."

Moseley makes the DTV Link STl, configurable to QPSK, 8PSK, 16- 32- or 64 QAM with an ASI data rate up to 80 Mbps. Moseley provides DTV links for the various STL bandwidths.

STLs IN THE 2 GHz BAND

Estimates of the number of stations with fixed operations in the 2 GHz band range from 100 to nearly 500. At the very least, these stations will have to modify STL loads from a total of 17 MHz to 12 MHz, according to the FCC's agreement with Nextel.

> "Once you have a digital link, it's really a digital pipe. You can put as much through it as the bandwidth will accept."
>
> —Dan McIntyre, MRC

"The transition in the 2 GHz band is just starting to happen," McIntyre said.

For fixed links in the 2 GHz band, such as ENG operations, stations compile an equipment list with cost estimates that is then submitted to Nextel.

"It's having a very big impact on business," McIntyre said. "We started ramping up production last year."

Most of the business is expected to come in the ENG space, but fixed links will certainly come into play.

"We anticipate first customer orders will start coming in this month," McIntyre said in July.

John Dulaney, director of sales and marketing for Nucomm, said his company anticipated plenty of business in the 2 GHz space.

"Two GHz in either 17 or 12 MHz will not accommodate a dual-carrier system, which requires the 25 MHz bandwidth available in the 7 or 13 GHz bands. Since they can't use a dual-carrier in that limited bandwidth, they will have to go all digital."

Naik said the Moseley DTV Link is configurable to the 2 GHz space.

"In that 12 MHz, I can give them 40 Mbps using 32 QAM," he said. "They can still do their hi-def at 19.39 and their analog at 15 and leave the rest for whatever they want to do."

Naik predicted that the STL space would eventually resemble the home broadband space.

"Everybody's going to be asking for more data rate," he said. ■

STL Modifications Require New Frequency Coordination Study

Stations modifying microwave links or moving a studio must undertake a frequency coordination study for its studio-to-transmitter link, according to Dane Ericksen, a senior engineer at Hammett & Edison in San Francisco. The process, now under the aegis of Part 101 of the FCC's formalized frequency coordination protocols, involves filing a Prior Coordination Notice (PCN) along with Form 601, the Radio Service Authorization application.

The PCN contains data on all adjacent stations within a keyhole pattern; a circle around the transmit coordinate of 200 kilometers, plus a zone around the beam 400 kilometers in length and 5 degrees on either side. PCNs are typically supplied by microwave frequency coordinating firms, a list of which is available at http://wireless.fcc.gov/microwave/coordinators.html.

PCNs rely heavily on FCC data, which is not complete in some cases. When stations started upgrading STLs to carry digital signals, about 28 percent of receive-site coordinates for fixed links were missing in the FCC's Universal Licensing System database, Ericksen said. Either that, or those coordinates are identical to the transmit coordinates.

About 24 percent of those receive-site coordinates remain missing. One reason for the missing data is that it was not collected before such information was converted to the ULS database.

Ericksen said coordinate data may be available elsewhere, typically in one of two databases: NAB 27 North American data from 1927 using a spheroid model of the earth, and NAB 83, based on the Geodetic Reference System from 1980. But coordinate data alone is not adequate for STL modifications.

"Let's assume that it's a single hop," Ericksen said. "I can convert NAB 27 data to NAB 83, but it doesn't tell me the make and model of dish, the height and other information. It might be a six-foot standard performance Category B dish, or a 10-foot shrouded Category A disk. That's a lot of difference. These are all details missing from the ULS, and if you're going to do a frequency coordination study, you need those details."

Deborah D. McAdams

D-Cinema

CONTINUED FROM PAGE 1

standard set by celluloid prints.

Three projector manufacturers have licensed DLP technology: Christie, Barco and NEC. In June, the first of these, Christie Digital Systems, announced it had entered into a preliminary agreement with Access Integrated Technologies, Inc., a Morristown, N.J.-based provider of managed storage and electronic delivery of digital content to movie theaters, to create the movie industry's first digital cinema funding framework.

"Our goal is to install Christie CP2000 DLP Cinema projectors, media players and central server equipment in up to 2,500 screens within two years," said Craig Sholder, vice president for Entertainment Solutions at Christie Digital Systems, USA Inc., in Cypress, Calif. "We'll be using JPEG2000 files on CineStore central library management servers in each theater for ingest and distribution with individual playout servers dedicated to the projection heads. As much as possible, our systems will comply with the specifications of the Digital Cinema Initiative, most specifically the security requirements to maintain the integrity of our digital files."

The Digital Cinema Initiative, or DCI, is a joint venture by Disney, Fox, MGM, Paramount, Sony Pictures Entertainment, Universal and Warner Bros. Studios to formulate the requirements for successful digital cinema presentation. Although the final version was not completed by press time, the DCI System Spec 5.2 released in March 2005 included both 2K and 4K resolutions.

BARCO-KODAK

Also in June, Barco, a second DLP licensee, announced an alliance with Eastman Kodak Co. to sell and support complete integrated digital cinema solutions. As part of the agreement, Barco will use Kodak color science and image management technology to expand the capability and performance of its own cinema projectors.

"We thought this would be a good marriage between the core competencies of our two organizations," said Scott Spector, executive vice president and general manager for Barco Digital Cinema. "Kodak is already the largest independent provider of digital preshow content in North America, so they already have a networked infrastructure that can be readily scaled up to digital cinema use. We'll be able to deliver the actual MPEG-2 files on hard drives, via satellite and over fiber as different markets require."

Although Barco did not provide specific deployment goals for the new alliance, the new initiative will employ a combination of the Barco D-Cine Premiere DP100 projector and Kodak's proprietary 2k CineServer, a 80 GB MXF-compliant server.

The Barco D-Cine Premiere DP100 projector

"We have been approached by a number of Wall Street financial firms with capital available to invest in digital cinema systems," Spector said. "What is missing is a compelling business model and industry partners to manage its roll-out. That is a key factor behind the Barco and Kodak alliance."

NEC, a third digital projector manufacturer to license DLP technology has been working since May with Ballantyne of Omaha to distribute all components of the NEC STARUS digital cinema system for pre-show projection and lobby display systems. That includes the full line of NEC STARBeam iS8, iS15 and iS25 digital cinema projectors, STAR*Cor central multiplex servers, and STAR*Show screen servers.

DISNEY DOLBY DEAL

All of these alliances hope to exhibit product from any major studio that wants to release its films in digital cinema. But at the end of June, Dolby Laboratories announced a collaboration specifically with Disney Studios to install its Dolby Digital Cinema systems in approximately 100 high-profile theaters in 25 top markets. The installations should be in place for the Nov. 4 premiere of Disney's first all-CGI animated feature, "Chicken Little," rendered in 3D by LucasFilm's Industrial Light & Magic to play on Dolby Digital Cinema servers at selected theatres.

"Dolby Digital Cinema is actually a server system combined with mastering services in our Burbank office for the encoding of the feature films," said Tom Daily, marketing director for the Dolby Professional Division. "The MPEG-2 content will arrive fully encrypted in MXF-compliant files to be presented through any of the commercially available digital cinema projection systems. Most importantly, however, the Disney/Dolby arrangement will be the first studio-supported deployment of digital cinema in the world." ■

Cordillera Automates the Big Sky

Harris, Leitch ramp up small-market capabilities

by Sanjay Talwani

BUTTE, MONT.

Cordillera Communications Chief Engineer Andy Suk looks ahead to the future of automation at his company's six far-flung Montana stations and marvels at the special challenges.

KRTV in Great Falls broadcasts to an area the size of Pennsylvania but with only 64,000 households. KTVQ in Billings spreads its signal over the prairies with 62 translators. The stations are on Mountain time, so all network ingest has to be delayed an hour. And with fewer than 1 million residents in the entire state, revenue is always tight.

To make the best of limited manpower, keep costs down and provide local content, Cordillera runs four Montana stations from a master control at KXLF-TV in Butte with automated ingest, local inserts and metadata. Suk figures the system, driven by Harris ADC-100 automation equipment and Leitch Nexio servers, could eventually automate all six stations in the state.

The technology allows Cordillera to send programming exactly where it's needed, with a minimum of labor required. Local news and spots from Bozeman, Helena and Butte are sent to Butte to be centralized in with other content and sent back for local transmission, or repurposed in another location—with metadata intact.

Cordillera's automation and centralization move is made easier by the fact that all the stations are CBS affiliates, with network and syndicated media coming in on a Pathfire system.

Prior acquiring the Harris Automation system, Cordillera ingested spot streams and other content manually.

"But if there was any variation in the program content, it became real labor-intensive," Suk said. "What we've done by throwing in the Harris automation system is not only automate the spot insertion but automate all of the programming content, and whether or not we're making switches from the studios in Bozeman or the studios in Great Falls or the studios in Butte to service the various stations, that's all just timed events and it all just happens automatically and pretty much transparent to virtually everybody."

COASTAL CONVERSION

In the Cordillera cluster of San Luis Obispo, Santa Barbara and Santa Maria, Calif., Leitch Nexio servers and the Harris Automation system replaced a manual distribution system in a network of mixed analog and digital legacy equipment.

The three California stations are linked by a new digital microwave system fed by the Harris NetVX high-speed networking platform, and Cordillera is considering using that flexible distribution system in Montana as well. NetVX can trade files throughout the network and work across nearly all formats and standards, connecting in streaming packets or with an ASI feed. With its flexible architecture and ability to bundle video and other data into a single pipe, it can be used a huge variety of applications, Harris said.

The Nexios and other digital equipment are also steps to a greater goal. "I hate it when the sales guys use the word, 'solutions,' but that's really what it is," Suk said.

Using the Harris and Leitch products as well as Panasonic P2 solid state gear, he's moving the California and Montana newsrooms to an all-digital workflow.

"It does all tie back into getting out of the tape environment, getting into the digital realm, by going completely tapeless," he said.

The IT-friendly, scalable and flexible Nexios are also at the center of some massive facilities such as the newsroom at India's Sahara channel, with some 40 online editors, said Tim Slate, director of product marketing for the Leitch server division.

"The architecture of the server is such that we can ingest content into shared storage, we can get it into our high-res news editing system, and then play it to air without ever having to transfer the content," Slate said. "Processing horsepower has gotten so great that you can do all that stuff with multiple channels and still do hundreds and hundreds of megabits [per second] of IT transfers at the same time, so that's really made the difference."

With a small group like Cordillera, which also owns and operates stations in Tucson, Ariz., Colorado Springs, Colo., Corpus Christi, Texas and Lexington, La., there are typically hardly any positions left to eliminate, so centralizing means doing more and more with the tools available—providing more local programming and finding new revenue with localized ads, and dreaming up new services.

Pat Burns, master control operator at Cordillera's KXLF in Butte, Mont. checks out the equipment.

For example, Cordillera has had a cable weather channel up for a year already in Colorado Springs, driven by the Leitch and Harris equipment. Weather is a key part of such a strategy.

"The people in San Luis Obispo want to see the weather for that area, not Santa Barbara 90 miles to the south," Suk said. "With the new weather systems that are out there and the skilled meteorologists that we've got, we can go ahead and create those program feeds and provide those feeds to those various markets without any trouble at all."

Harris said the ADC-100's reliability, scalability and quick installation—not to mention the increasingly distributed functionality—have helped the company make inroads to small and mid-sized station markets. Suk also cited the excellent track records of Harris and Leitch for solid follow-up service.

"What we're able to do with ADC is provide a turnkey-type automated system that's proven over many years to a small station like that, make a delivery, and get a system online in a matter of days," said Harris Automation Solutions Senior Product Manager Ben Peake.

The Harris products also integrate with the variety of old and new analog and digital equipment in small newsrooms around the country.

"Harris Automation solutions have been around long enough that we've built up one of the largest legacy driver libraries on the market," Peake said.

"Broadcasters are actually becoming comfortable with the technology," he said. "And the capability of these systems is now in a place where they can trust it." ■

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Senate

CONTINUED FROM PAGE 1

got the same lines on my set as you got right there. I pay $47 for that."

Allen opened by saying his goal was to get wireless broadband into rural areas, but he followed up with a softball to Eddie Fritts, chief of the broadcast lobby, about how many TVs were not hooked up to cable or DBS. The party line is 70 million, which Fritts enthusiastically offered up. Allen was also the only lawmaker who seemed to be aware that mid-summer might be a better time to turn off the analog system than the day before the Tournament of Roses.

"If you want an uproar, have people's TVs go off," Allen said.

Vitter, whose bayou state has a substantial amount of over-the-air reliance, said broadcast TV was "essential for public safety" in the hurricane-ridden Gulf area, and that shutting down the analog system deserved more than a "throw-away response."

Then there were the definite non-FoBs, chief among them Sen. John McCain (R-Ariz.), who got the ball rolling by saying "the most disgraceful chapter in the history of this committee is the way the National Association of Broadcasters has blocked" a hard date.

He later bulldogged witness Manuel Abud, vice president and general manager of Telemundo affiliate KVEA-TV, to say he was ready to give up the station's analog spectrum "tomorrow." Abud tried to reassert the conditions he'd like to see met before a shutoff—e.g., complete cable carriage of all broadcast signals—but McCain wasn't interested.

Sen. Jim DeMint (R-S.C.) didn't seem particularly favorable toward the broadcast cause célèbre of multicast must-carry, instead suggesting the widespread use of A/B switches.

Sen. John Sununu, (R-N.H.) unleashed a bit of a scolding over what he saw as the use of scare tactics to delay the deadline.

"Yes, when we go into the digital world, there will be TVs manufactured in the '70s, '80s, '90s and even the 2000s that won't work," he said. "But we need to stop using consumers as scapegoats... it's disingenuous to argue that consumers won't be able to handle this. Everyone is using the specter of consumer confusion to delay this transition."

But alas, consumers were already writ large into witness testimony.

John Lawson, president and CEO of the Association of Public Television Stations invoked the specter, urging lawmakers to educate the public lest they have a "consumer train wreck on our hands."

Gene Kimmelman, senior director of public policy for the Consumers Union, boldly combined the words "consumer" and "tax" with regard to $50 converter boxes that Congress is counting upon to exist when they hit the analog kill switch. No such item is available today.

"Why should anyone have to pay to keep their television working?" Kimmelman said. "Households with two sets would be subject to a $100 consumer tax."

In his written testimony, Kimmelman also noted that the impact of a $50 box is a 25 percent premium on a $200 TV.

The chairman himself, Sen. Ted Stevens (R-Alaska) revealed his own ability as a consumer to "handle" the transition.

"I was led to believe the set I bought last year was digital. It was analog. I don't want consumers to go through that," he said, getting a rise out of the packed room.

Stevens, who has made repeated comments about foreign TV makers flooding the U.S. market with analog sets, grilled Gary Shapiro, president and CEO of the Consumer Electronics Association about the whole issue of where TVs come from. Shapiro had mentioned a couple of CRT factories in the United States.

"I've been told that there are no TVs completely produced in the U.S.," Stevens said to Shapiro. "Aren't you talking about components?"

Shapiro said there are TVs that are fully manufactured in the United States, but he named no specific makers. He also said that digital sets are outselling analog sets, although by the CEA's own figures, analog sets continue to outsell digital sets (defined as those with a display that can at least do 480p, but not necessarily capable of receiving or displaying digital TV signals) by about 4-to-1. Add plasma and direct-view LCD products to the mix, and the ratio is about 3-to-1.

The paucity of functional digital receivers in the market has been the primary concern of the broadcast industry in setting a shutoff date. The broadcast lobby nonetheless said it would go with 2009.

"Broadcasters accept, *accept*, that Congress will implement a 2009 hard date for the end of analog broadcasts," said Eddie Fritts, president and CEO of the National Association of Broadcasters.

He went on to say that multicast cable carriage and carriage of both analog and unmolested digital signals was imperative, but he stopped short of saying it was a contingency for the lobby's cooperation on a 2009 bill.

Cable carriage is shaping up to be the grand royale of DTV politicking. The FCC kiboshed multicast and dual carriage earlier this year, but dual carriage—compulsory simultaneous cable carriage of analog and digital broadcast signals—resurfaced there last month.

Kyle McSlarrow, the relatively new president and CEO of the National Cable and Telecommunications Association, is fighting the concept tooth and nail.

At the hearing, McSlarrow reminded lawmakers that the FCC and the courts have repeatedly denied expanded must-carry privileges.

"The most plausible interpretation is that the broadcasters hope to goad the cable industry into joining them in their passive-aggressive opposition to a hard date," he said. ■

"Obviously there is government interest, because the government initiated the digital transition."

— Sen. Olympia Snowe (R-Maine)

LET THERE BE LIGHTING

Andy Ciddor

Oh, Please Give Me a Sine

Dimming is a dirty business. Ever since we gave up using resistance dimmers because they were big, heavy, expensive, inefficient, hot and very difficult to remotely control (and in the case of the saltwater variety, also smelly and toxic), we have been playing merry hell with our utility supply.

In particular, the introduction of the phase-control dimmer brought with it substantial distortion to the power supply and megawatts of radiated electromagnetic interference—a pair of remarkably antisocial side effects.

At the heart of almost every modern dimming installation, the phase-control process dims by using an electronic switching device such as a thyratron valve, a solid-state thyristor, or more recently, a power transistor to shut off a controlled portion of each power cycle.

Depending on the switching device, that shut-off can remove either the beginning or the end of each power half-cycle, while the switching process itself may be very abrupt or somewhat tapered.

While switching off as gently as possible may reduce the harmonic distortion caused to the supply, the mess made is nevertheless quite substantial.

The ETC SineWave dimmer

SWITCHMODE POWER

In the early days of phase control, the dimmer system was often the only substantial source of harmonic currents in an entire studio installation. While avoided where possible (usually by keeping lighting utility feeds well-separated from those for more sensitive equipment), it was tolerated as being a peculiarity of lighting systems that didn't do too much harm.

Since then, the almost universal adoption of switchmode power supplies, which chop up input power and thus produce harmonic distortion, has led to an imminent crisis in our power distribution systems. In some places, the solution appears to be for utility companies to throw money at the problem by what amounts to down-rating substation transformers that have to deal with substantially distorted loads.

When the incumbent transformer malfunctions, they simply replace it with a larger one and pass the cost on to the consumer. It seems that sometimes a megawatt just ain't quite what it used to be.

In the European Union, regulators decided during the early '90s it would be a good idea to reduce the conducted harmonics and conducted voltage fluctuations generated by electronic equipment, and so wrote some new standards (such as IEC/EN61000-3-2) that were scheduled to come in to force toward the end of that decade. When it turned out that no one could actually build compliant equipment, the electronics industries of the EU quietly went about getting the deadline extended until 2001.

That deadline too has passed, with very little activity on the other side of the Atlantic. Nevertheless, the problem shows few signs of going away anytime soon.

On the EMI (electromagnetic interference) front, the story is only a little different. We have ceased to see much evidence of EMI on productions, but only because we go to extraordinary lengths to keep it out. Over the past three or four decades, everyone we've worked with reluctantly came to terms with the reality that electronic dimming produces bucketloads of EMI.

BLEEDING EMI

While we may keep our load cabling in shielded containers for the majority of its journey from dimmer to luminaire, there's always that last few feet between the socket and the fixture that's going to bleed EMI.

(Unless of course, in desperation, your audio department put up the money for shielded cable tails on all your luminaires!)

What everyone else has learned to do is keep signals inside well-shielded cables to avoid receiving our EMI. Whenever confronted by a stressed audio tech, I always 'fess up: "Sure I caused the buzz in that mic channel, and I would be causing the same buzz in every mic channel if the cables also had damaged shielding."

Along with the electrical and electromagnetic side effects of phase-control dimming, there's also the acoustic effect that comes from feeding lamp filaments on a diet of chopped-up power. The sudden discontinuities in the supply cause mechanical vibrations that result in our filaments singing along at 120 Hz. Most of the time, this noise is barely noticed above the cacophony of air conditioning, power supply inductors of various kinds, cooling fans, power cabling, and by no means least of all, the noisy motors in our own robotic equipment.

However, if you need dimming in a space with strict noise requirements such as a studio for recording acoustic performances, then this factor may be important.

All of these unpleasant side effects from our otherwise ideal phase-control dimmers result from sudden current changes that arise from chopping significant chunks from the sine waves of the power supply.

One way to avoid such problems and still achieve a dimming effect is to chop a whole lot of tiny chunks from the supply. The result is still less total power getting to a lamp, but the many changes of current are each quite small. Indeed, with a little help from a simple filter circuit, the output of such a dimmer would be almost indistinguishable from a variable amplitude sine wave, and thus exhibit none of the nasty side effects of phase control.

While the concept of a sine wave output dimmer had been around for many years, it was impractical to build one using the electronic switches available until relatively recently. When the insulated gate bipolar transistor became available to switch at the required voltage, current and speed, many engineers tried their hand at building such a dimmer. The successful designs use pulse width modulation, a process in which a power cycle is divided up into several hundred fixed-sized chunks that are varied in width to achieve an overall change in current flow without changing its smooth sine wave shape.

Driving an insulated gate bipolar transistor that is performing pulse width modulation on large currents at frequencies in the 20-to-50 kHz range, turns out to be a remarkably complex juggling act of currents, times and temperatures. It usually involves many sensors and a processor chip to keep all of the balls in the air. Although many designs have been tried, only a few have made it into production.

There are full-scale commercial sine wave dimmers currently available from several manufacturers, if you have the funds available. The first to market was the Solution Sine from Bytecraft (now State Automation) in Australia, which picked up a number of industry awards at the turn of the century. These were soon followed by the iSine from IES in the Netherlands, now part of ETC, and more recently, the TrueSine from Strand Lighting.

Both the ETC and Strand dimmers are offered as modules in their popular high-density dimming systems.

Oddly enough, most of the marketing emphasis on these dimmers is on their acoustic silence rather than their negligible harmonic supply distortion or their almost total absence of EMI. I would have thought that the key selling point would be that our audio brethren could breathe easier and not have to worry about repairing their mic leads anymore!! ■

Andy Ciddor has been involved in lighting for more than three decades as a practitioner, teacher and writer. You can reach him via e-mail c/o TV Technology.

INSIDE AUDIO | Dave Moulton

LFEs and Subwoofers In Perspective

Alert readers will recall that I've gotten involved in surround sound as a music producer, mixer, and user consultant, all at once. This month, I'd like to share what I've been finding about how we are using the subwoofer and the LFE (low frequency effects) channel. In subsequent months, I'll take a look at other elements of surround-sound production.

WHY HAVE SUBWOOFERS?

Subwoofers evolved to convey serious low frequency and infrasonic (below low) sounds to movie audiences, to enhance the thrill factor of earthquakes, howitzers, car crashes and other indicators of imminent doom.

It is unreasonably expensive to simply make all the speakers in a theater array capable of generating those frequencies and sound-pressure levels.

Low frequencies at high levels require large enclosures with large drivers and *lots* of power. Further, because in reverberant spaces, low frequencies are difficult to localize, it makes sense to have a separate channel and speaker to generate those effects, distinct from the more conventional effects, music and dialogue.

As home theater evolved, this led to the use of partial-range satellite speakers for all normal channels and a single low-frequency channel, for significant cost savings. I've written about this before, and I'm optimistic that it is generally understood.

What isn't so clear is how we actually use subwoofers and the LFE channel in production, as well as how they affect the end-user playback. Because I've recently been working on both ends of the transmission chain, I thought I'd share with you some of what I've found.

I've already described the origin of LFE channels and subwoofers. That treatment and practice seems to hold generally true for DVDs sold for domestic use.

The LFE channel carries the occasional low-frequency punctuation to on-screen action. Sometimes, it is a low-frequency extension of a broadband effect, such as an explosion. Sometimes it is simply a low-frequency noise perfume, added to underscore the gravity of an on-screen situation. Very little broadband music is included in the LFE channel. I ran across one low-pitched fundamental of a string bass note included in the LFE channel in "Das Boot," for instance, during a transition from a LFE to the musical score.

LFE signal levels are quite conservative—typically 10 dB below the broadband channels. Interestingly, a great deal of low-frequency material (effects and music) is present in the main channels and occasionally in the surrounds.

As result, the LFE/subwoofer contribution to the soundtrack is typically modest.

Take a look at some real-time spectra I took from a short segment of the title sequence of "Das Boot," where sonar impressions of a ship passing overhead climax and the orchestral score begins.

Fig. 1 shows the left channel spectrum for approximately one minute of "Das Boot" titles, taken directly from the output of the DVD player, referenced to dBV. Note the low frequency peaks around 50 Hz, at -30 dBV and at energy as low as 20 Hz.

Fig. 2 shows the left-surround channel for same time segment. Note the low-frequency peak is at –25 dBV, 5 dB louder than the left-front channel. This is a function of the effects pan from front to rear as the signal grows louder. Notice also that there is significant energy down to 20 Hz.

Fig. 3 shows the LFE channel for the same time segment. Note the low-frequency peak has a different spectrum (and different sonic material), is 6 dB softer than the left channel; and 11 dB softer than left surround, with less energy at 20 Hz than either of those channels.

Interesting, eh?

The subwoofer is probably the least critical element in surround audio production and playback.

IN MUSIC

In music production, things are quite simple. The LFE generally is not used. We've learned to drop a summation of all the channels, rolled off above 100 Hz and attenuated by 10 dB, into the LFE channel just so end users will know the channel is on and working.

If the system is well-calibrated, the LFE channel will not be audible.

Again, take a look at three spectra of music from the remake of "Shaft." This is 12 seconds in the bridge of "Theme From Shaft," where a little low-frequency foley is dropped in for atmosphere.

Fig. 4 shows the left channel. Note a typical broad musical spectrum with plenty of bass extending all the way down to 32 Hz.

Fig. 5 shows the left-surround channel for the same time period. This is reverb wash from the front channels.

Fig. 6 shows the LFE channel of the same segment. This is a little low-frequency foley related to a fantasy car drive-by in the soundtrack. The point here is that the LFE material is completely submerged by the music and of minor importance.

IN THE HOME

Now that I've set up some dedicated home theater systems, I have a little more feel for how this all plays out. In a good system, a great deal of the low-frequency material is played back through the main channels. LFE means what it says.

If we set all the channels at unity gain, the LFE channel will be inaudible almost all the time, except for mild extensions during moments of high drama.

I've experimented and satisfied myself that dialing in 10 dB of gain (relative to the other channels) in the subwoofer channel is a reasonable thing to do. At that level, we can hear the effect of the subwoofer, and it sounds both dramatic and reasonable.

One final problem for the home user has to do with cheap systems where the sub is supposed to fill in up to fairly high frequencies, say 200 Hz, because the satellites are so small. Under this circumstance, we are depending on the subwoofer to carry the low-frequency portion of all the main channels, via a downmix that is invoked in the receiver by selecting "small" speakers.

The result is a crude mix of LFE, main channel and low-frequency material going to the subwoofer. Not particularly pleasing. Not under our control. Not something we should

SUBWOOFERS, PAGE 32

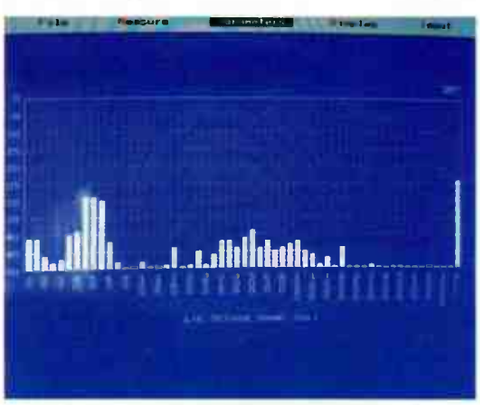

Fig. 1 shows the left channel spectrum for approximately one minute of "Das Boot" titles, taken directly from the output of a DVD player, referenced to dBV.

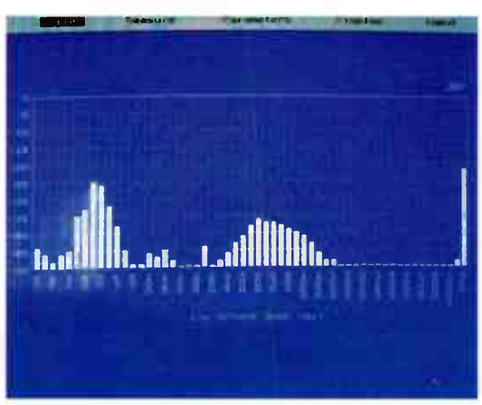

Fig. 2 shows the left-surround channel for same time segment.

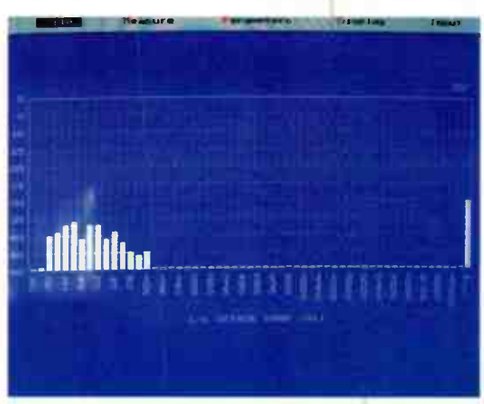

Fig. 3 shows the LFE channel for same time segment.

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RF TECHNOLOGY

Doug Lung

Check Your DTV Signal With These Low-Cost Tools

DTV test equipment is dropping in price, as I noted in my June column, but for some stations, or for engineers who want to do their own observations, commercial test equipment may still be too costly.

This month, I'll provide a more detailed look at Rod Hewitt's TSReader program. When combined with an inexpensive DTV tuner card ($260 or less) and an existing computer, TSReader will provide most of the data necessary to verify PSIP (program and system information protocol) table settings.

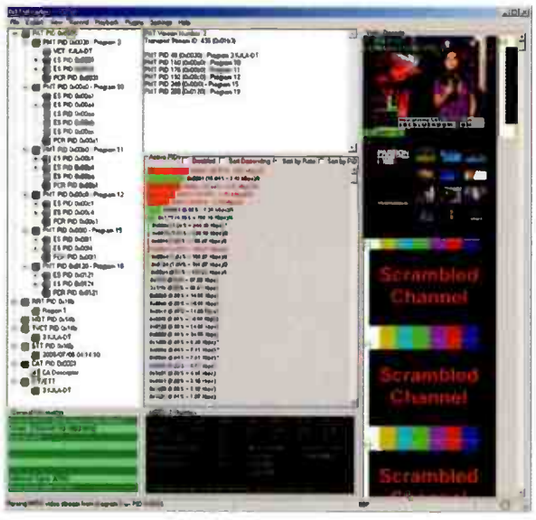

Fig. 1: TSReader showing KJLA carrying the USDTV programming on multiple scrambled channels

At the PBS Technology Conference in Las Vegas before NAB, Gary Sgrignoli of Zenith offered a simple way to verify ATSC transport stream clock stability. I combined Gary's idea with some free software and came up with a way to visually display clock frequency and phase.

Analog TV receivers are very forgiving. Even if modulations levels are too high or too low and video sync is blanking out of specification, the TV set will likely display a picture. All the tuner needs to know to find a station is a channel number. The automatic frequency control range on some receivers is so wide, even that can be off a bit.

DTV: DICIER THAN ANALOG

DTV sets aren't as forgiving. A minimum signal-to-noise ratio is needed before a channel can be decoded. Even if the signal is strong and clean enough to be decoded, if the PSIP data isn't correct, many DTV sets won't display the channel. A viewer wouldn't even know the station is on the air!

Different DTV receivers handle PSIP errors differently. Some sets may have no problem with your signal, while others won't show it. One way to identify problems would be to equip offices around your station with DTV receivers from different manufacturers. This isn't a bad idea if your station can afford it—it could help you identify problems with a particular brand. However, identifying PSIP problems at the source is the best strategy. It isn't that difficult using Rod Hewitt's TSReader software.

To monitor PSIP using TSReader, you will need the software, available at *http://www.coolstf.com/tsreader/*, and one of the supported computer cards (PCI or USB 2.0) to decode ATSC, ASI, DVB-S, or DVB-T transport streams.

TSReader cost $99 in July. A PC or laptop is required, but TSReader coexists with other programs, so a dedicated computer is not needed. If you want to view HDTV video, a 2 GHz or faster Pentium 4 computer is needed, but this isn't required for viewing transport stream data.

TSReader does not display live video. It will display thumbnail videos for each video datastream, but the maximum refresh rate is one frame per second. For viewing live video, you can use the software supplied with the PCI card or USB 2.0 receiver, or stream video from TSReader to a VLC client. VLC is available at no cost from *http://www.videolan.org/*.

A VLC server can also be configured to transcode an MPEG-2 program source to MPEG-4 for streaming video over a network connection (local or Internet).

Installing TSReader software is simple, but it takes more work to select the right source from the list of decoder drivers. Read the documentation! If you select a source that isn't available, TSReader won't start until you change it. There are some tricks for starting TSReader by overriding the selected source, or you can specify a different source using the command line interface.

Once you are receiving a transport stream, you'll see a display like the one in Fig. 1. This shows KJLA, a station in Los Angeles carrying the USDTV programming on multiple scrambled channels. If you look closely, you will see there is no TVCT data for the scrambled channels. That may keep DTV sets from wandering onto those channels and possibly crashing.

Fig. 2 shows a signal from KTLA. All required PSIP tables are present, and a "DTVCC" flag, which indicates the station is transmitting EIA708 closed-captioning data, is present. It is sending the same stream on two channels. This is a good way to keep receivers happy if the second channel is carrying different programming (or resolution) only part of the time.

Even if the signal is strong and clean enough to be decoded, if the PSIP data isn't correct, many DTV sets won't display the channel.

If you are transmitting multiple program streams, TSReader will show the data bandwidth by PID (packet identifier). Don't be surprised if you see a high number for PID 0x1ffb. Null packets are often inserted using this PID. A separate status window displays CRC, continuity and TEI errors.

When checking your DTV signal or that of your competitor, verify that all required tables are present and the data is consistent. I've noticed some stations have not changed their PIDs to comply with the requirement that all ATSC broadcast PIDs be set at hex 0x0030 or higher.

When changing a program's PID, make sure all tables that reference the program stream point to the correct PIDs. I've also found wide variations in system time table data. This table should contain the current correct time in GMT. I've seen systems that display not only the wrong time, but the wrong year! I'll cover some ways to obtain accurate time data in a future column.

There is a lot more to say about TSReader and PSIP, but I'll save that for a future column. See the online edition of this colum at *www.tvtechnology.com* for links to full size versions of the TSReader screens. More information on TSReader and more screenshots, including data from satellite MPEG streams, can be found at *www.coolstf.com/TSReader*.

Here's a situation some engineers have faced. You've checked your PSIP and it is correct. The VSB analyzer in your transmitter shows your signal to noise ratio is better than the 27 dB recommended by ATSC. Yet some DTV sets are having trouble receiving your signal. Other manufacturers' sets in the same location work fine.

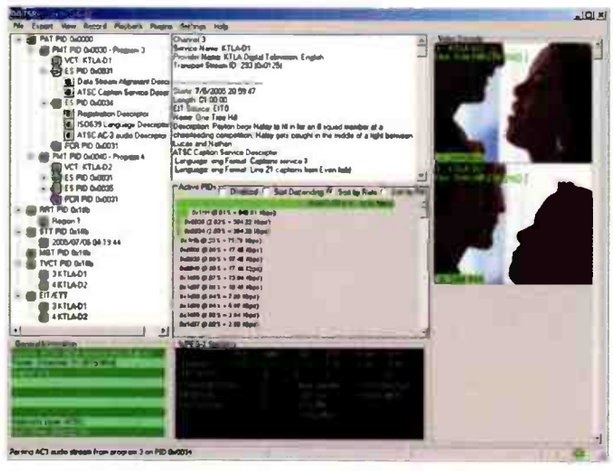

Fig. 2: TSReader showing a signal from KTLA in which all required PSIP tables are present

What's the problem?

It could be the stability of the transport stream clock. As you may recall, an offset added to the transport stream data causes the transport stream clock to appear as the pilot carrier on the 8-VSB RF signal. Compare the pilot carrier to a fixed reference and you now have a simple way to monitor the transport stream clock.

I was in a Q&A session

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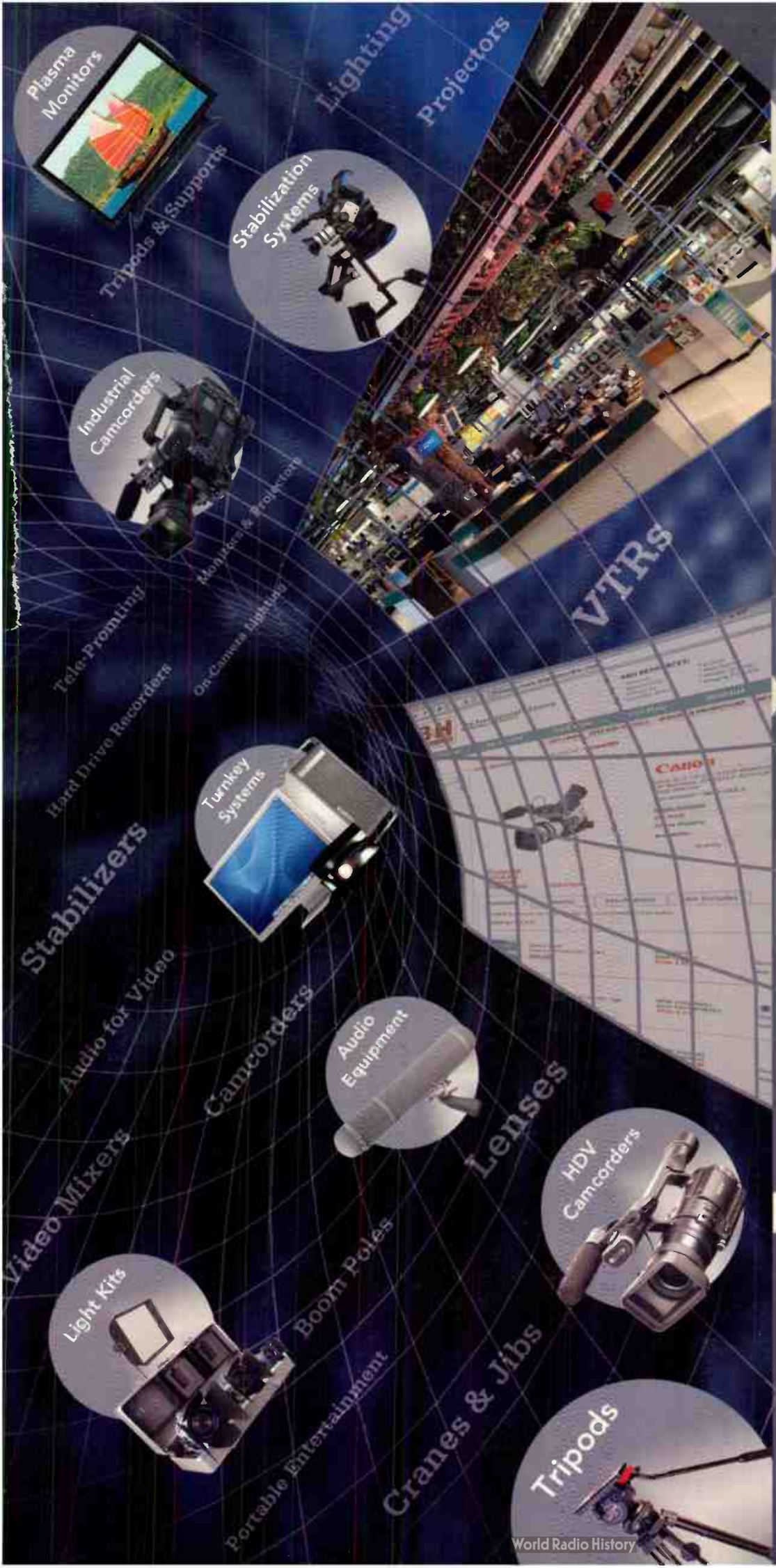

INTO THE SOURCE

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TECHNOLOGY CORNER | Randy Hoffner

A Primer on Advanced 24p

This column has discussed 24p video capture and recording in the past. We know that 24p, or 24 frame-per-second progressive scan recording, is well-suited to 24 frame film-to-video or video-to-film transfer because it establishes a one-to-one relationship between film frames and video frames. Further, the 1920 x 1080 x 24p high-definition scanning format has sufficient spatial resolution to be used as a mastering format.

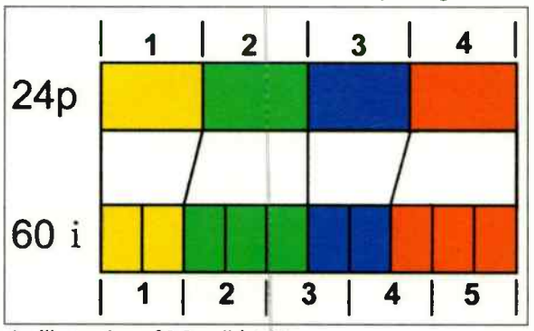
The 24 fps film format has been used on television since television began. In North America as well as other 60 Hz television countries, it must be accommodated to a frame rate of about 30 frames or 60 fields per second. This has traditionally been done by adding 2:3 pulldown, which entails repeating each film frame's image as either two or three video fields, generating a field sequence of 2, 3, 2, 3, 2, 3... ; that is, the first film frame is represented in two fields, the second in three fields, the third in two fields, and the fourth frame of the sequence in four fields.

This sequence of four film frames being converted into 10 video fields is then repeated. This generates some "blur frames;" video frames containing two fields that have been derived from separate film frames. The 2:3 repetition cadence also produces perceptual errors in spatial location, giving rise to 2:3 judder, which is either a feature or a problem depending on whose opinion is solicited.

Some standard-definition DV camcorders acquire in 24p, but record in 60i with pulldown added, because pulldown must be removed and 24p regenerated for editing, video-to-film (filmout) and television.

The desirable temporal "look" of 24 fps film may be replicated by 24p video, as discussed in last month's column, and this is one reason why it is not at all surprising that 24p capture equipment is becoming increasingly popular among television and cinema producers.

It must be noted here that 24 fps film frames and 24p video frames are functionally interchangeable with respect to their temporal characteristics, and that when we say "film frame," we may also say "24p frame." Some recent field-capture equipment uses some innovative approaches, and one of these is called "advanced 24p capture," or 24p A. Let's take a look at how it works.



An illustration of 2:3 pulldown

ADVANCED 24p

Some standard-definition DV camcorders acquire in 24p, but record in 60i with pulldown added, because pulldown must be removed and 24p regenerated for editing, video-to-film (filmout) and television. The variation is to reverse the 2:3 sequence for every other 60i frame, so that instead of 2, 3, 2, 3, 2, 3... , the sequence becomes 2, 3, 3, 2, 2, 3, 3, 2.... This is the advanced 24p sequence. It generates a subtly different kind of judder from 2:3 judder, but this material is not intended to be viewed in 24p A form, but rather, to be reduced to 24p for editing and processing.

How does 24p A simplify editing? First, let's look at how the fields are constructed in both the 2:3 and the 2:3:3:2 sequences. In the normal 2:3 pulldown sequence applied to 60-field interlaced video, four film or 24p video frames—usually designated as frames A, B, C, and D—are distributed over 10 video fields (five video frames) as follows: Film frame A is used to form fields 1 and 2. Film frame B is used to form fields 3, 4 and 5. Film frame C is used to form field 6 and 7, and film frame D forms fields 8, 9 and 10, generating the following sequence of video frames—AA BB BC CD DD.

We note that this results in three "clean" video frames, and two mixed or blurred video frames. The first, second, and fifth video frames are made up of two fields derived from the same film frame. The third video frame, however, is composed of fields derived from two different film frames (B and C), as is the fourth video frame (C and D).

Because there could be motion or a scene change between film frames, these mixed video frames are frequently blurred. If we wish to remove pulldown and restore the material to the 24p format, we further note that there are clean video frames composed of fields representing film frames A (video frame AA), B (video frame BB), and D (video frame DD). Each of these video frames is composed of two fields derived from a single film frame. Film frame C does not have such a video frame representing it; its two video fields are distributed into two separate video frames, BC and CD. This makes it impossible to remove pulldown by simply keeping track of the video field count, de-interlacing the nonmixed video frames, and discarding the mixed video frames. To regenerate 24p frame C, two video frames must be dismantled, and the proper field from each of them combined.

Finally, we note that the three-field film frames, B and D, each produce a redundant third field that is not needed to regenerate the 24-frame material—a redundancy of 20 percent.

In 2:3:3:2 pulldown, as used in advanced 24p, four 24p frames are distributed over 10 interlaced fields,

PRIMER, PAGE 30

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Primer

CONTINUED FROM PAGE 28

but every second field pair is reversed, generating a sequence of 2:3:3:2, rather than the 2:3:2:3 sequence of normal 2:3 pulldown. In this case, 24p frame A forms the first two video fields, F1 and F2, and 24p frame B forms the next three fields, F3, F4, and F5, as before. However, 24p frame C forms the next *three* fields, F6, F7, and F8, and 24p frame D forms the next *two* fields, F9 and F10. This generates interlaced video frames in the following sequence: AA BB BC CC DD. We immediately notice that this sequence generates only a single blur frame, the third video frame in the sequence. We also note that all four 24p frames have associated video frames, each containing two fields from the same film frame: AA, BB, CC, and DD. In the 2:3 sequence, the two redundant fields in each sequence of 10 are located in frames that also contained fields required to reconstruct film frame C. However, in the 2:3:3:2 sequence, the two redundant video fields are contained in a single video frame, the third one in the BC sequence. This is a more efficient method of packaging the video fields. If we wish to remove pulldown and restore 24p, we need simply discard the third video frame containing the redundant fields, and combine the fields of each of the four remaining video frames.

When normal 2:3 pulldown material is de-interlaced and reduced to 24p, sophisticated processing is required to detect and keep track of the 2:3 sequence, dismantle the video frames that contain the fields representing film or 24p frame C, discard the appropriate redundant fields, and reconstruct the fields into the 24p sequence. Because this kind of processing must operate on a video stream as opposed to a compressed bitstream, compressed video must be decoded to baseband form before it can be done.

Recovering 24p from 24p A is a simpler process. As stated above, once the 2:3:3:2 sequence is identified, pulldown removal is reduced to discarding one of each five video frames and combining the fields of those remaining.

Further, since DV compression operates within each interlaced frame and not across interlaced frame boundaries, redundant frames may be removed while the video remains in the DV-compressed domain. Pulldown can, then, be removed from compressed 24p A material as it is transferred for editing, without it ever leaving the compressed domain. This simplifies and speeds up the process, and reduces the editing storage requirement by 20 percent in the bargain.

This approach is only used in the SD world, but it is an interesting technological innovation. ■

Randy Hoffner is a manager of technology and strategic planning in New York, N.Y. Write to him c/o TV Technology.

Tools

CONTINUED FROM PAGE 26

with VSB guru Gary Sgrignoli at the PBS Technology Conference when he suggested a simple way to check the transport stream clock. Tune a signal generator within a few hundred hertz of the ATSC transport stream frequency on a SMPTE 310 signal or the over-the-air pilot frequency of a DTV station, and listen to the beat between the two on a receiver. If it is pure and clean, there shouldn't be any problems. If it shifts frequency or sounds raspy, a repair may be needed.

Common problems are caused by unlocked ASI-to-SMPTE 310 converters and early versions of a popular data modem used to add an ATSC data carrier to an analog FM video signal in the same microwave channel.

In some situations, the transmitter's 8-VSB modulator can add jitter. Ground or RF interference can also cause problems.

An alternative way to monitor the transport stream clock is to use a receiver with a beat frequency oscillator to tune in the pilot carrier. I monitored DTV stations in Los Angeles using a Yupiteru 7100 handheld communications receiver I bought many years ago. The receiver allows signal sideband reception on UHF frequencies. I didn't notice any obvious problems with the stations I monitored, although in rare cases I saw a station generate what looked like a low amplitude spur that gradually shifted away from the pilot carrier and then snapped back to it.

How did I see that? I plugged the Yupiteru into the microphone input on my T40 Thinkpad and monitored the signal with free software designed for demodulating ham radio PSK31 data! Hams use phase shift keying to transmit robust datastreams. Many of the software programs for decoding PSK31 include a "waterfall" display showing signal amplitude and frequency versus time. See Fig. 3 for an example from the KPSK program running under Linux.

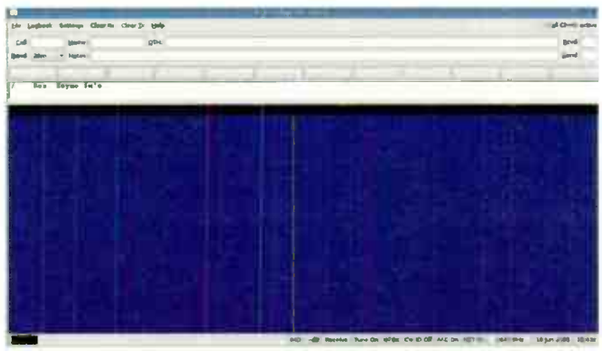

Fig. 3: An example from the KPSK program running under Linux

I found another program, GPSK31, that includes a nifty vectorscope-like display that shows phase as well as a frequency versus amplitude spectrum display. Fig. 4 shows the display from GPSK31.

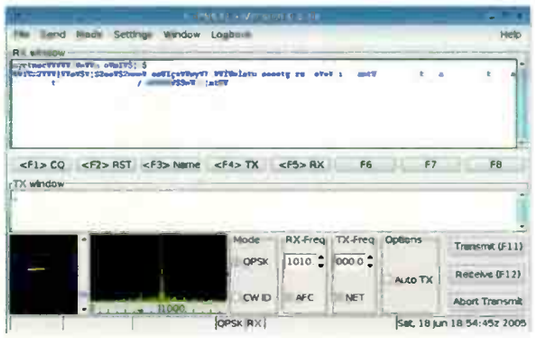

Fig. 4: A screen from GPSK31, a program that includes a vectorscope-like display that shows phase as well as a frequency versus amplitude spectrum display

PSK31 programs are also available for Windows computers or you can use a live CD to boot your Windows computer into Linux without installing any software.

Download the AFU Knoppix live CD from *http://www.afu-knoppix.de/*, and boot your computer from the CD to run the KPSK software without touching your hard disk.

If hooking up the receiver to the computer sounds too complicated, I found I could get a reasonable display simply by using the microphone on the laptop to pick up the tone coming from the receiver's speaker nearby.

If you have an opportunity to try out either of these low-cost DTV test solutions, please take the time to drop me an e-mail to let me know how it worked. If you know any other simple, low-cost ideas for verifying DTV signal quality, let me know and I'll share them with my readers while giving you the credit. ■

Your comments and questions on any RF topic are always welcome. Drop me an email at dlung@transmitter.com.

MEDIA SERVER TECHNOLOGY

Karl Paulsen

Anticipating Storage Management Needs

Storage is now the name of the game and the wake-up call to address it has already happened. Postponing decisions related to long-term digital media storage is just not an option.

By its very nature, storage must and will evolve to meet the needs of continuous data growth. Expectations for increased storage and performance are tied to a continual rise in service-level expectations. As a result, the supply will never be sufficient and the job of managing storage will never be finished.

Data growth, particularly in the media industry, is a constant. Just consider today's storage requirements, and it becomes a given that next year's will be more—by possibly an order of magnitude or more. There are some suggested methods for controlling the need for more storage, some practical and others not.

The first is to create less content, something that is highly unlikely. The second is to create more local storage, but that, too, has consequences—finite floor space, access performance in retrieving the data, limits on capital budgets, etc. A third method is putting the same data into less space, which is where improvements in compression help. A fourth method is to manage the storage differently, such as using off-line storage, data migration or archive management and the controlled purging of expired media.

When a media enterprise takes into account storing material from all sources that generate data, many elements must be considered. E-mails, database records, documents, videos and other digital objects all become information components that must be stored somewhere and somehow. So what does it take to keep up and is there any answer to "how much storage will be enough?"

These are difficult and delicate questions that need to be answered.

STORAGE UPON STORAGE

In the past, each individual server had dedicated storage, sometimes internally to the device and sometimes externally through a local storage array. Scaling was accomplished by adding or replacing individual drives, upgrading servers or by adding external arrays. It wasn't long before the media servers became a set of disconnected storage islands.

Nonlinear editing platforms had their own storage. Graphics images were kept on small footprint local drive arrays. Video servers had a very limited amount of high-performance storage capacity on small hard drives. Once the video server reached capacity, users were forced to purge valuable content and often had to re-ingest it for programming or interstitials on any given day.

All these woes pointed to poor use of capacity, which in turn resulted in many operational headaches.

The lines between media and data content are getting fuzzier all the time. Regulatory compliance with record-keeping will certainly be extended beyond spreadsheets, accounting databases and e-mail. For a content-generating organization such as a local TV news department, it is only a matter of time before some entity forces

Subwoofers

CONTINUED FROM PAGE 24

mix for, as far as I'm concerned. It is one of the economic compromises that consumers sometimes make, but it's beyond our ability to correct.

The subwoofer is probably the least critical element in surround audio production and playback. It is dedicated to effects and those moments when the end is nigh. Mixing for it can be treated quite straightforward and conservatively.

No need to obsess here. Just get enough audio in it so that the end user knows the sub is working, and so that when something particularly exciting happens, maybe there's a little LF adrenal hit. Thanks for listening. ■

Dave Moulton is down to a really low frequency these days. You can complain to him about anything at his Web site, www.moultonlabs.com.

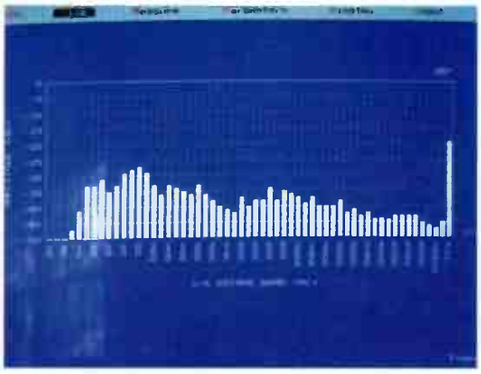

Fig. 4 shows the left channel in 12 seconds in the bridge of the "Theme From Shaft."

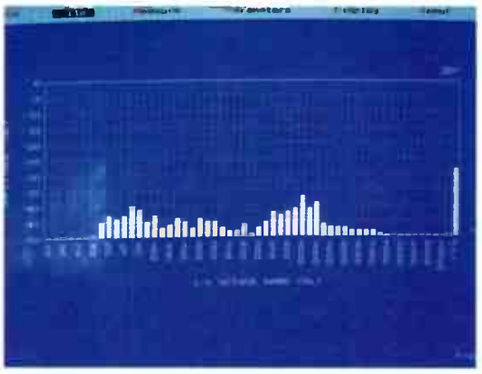

Fig. 5 shows the left-surround channel for the same time period.

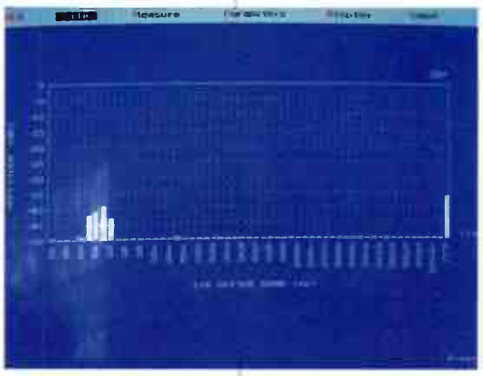

Fig. 6 shows the LFE channel of the same segment.

the retention of all content to "protect the risks and liabilities" of the stakeholders. And what will this mean if every raw image, spoken word, script, graphic and completed broadcast story must be retained?

The material will need to be kept electronically; and at least for today, that means the data will need to be stored on a magnetic or optical platform!

Some challenges when dealing with continual need for more storage—not spending too much; controlling growth while containing staffing requirements; retention, backup, protection and security of the data assets; disaster recovery including failover and failback; and making improvements in performance throughout the network and the application space.

POOLING STORAGE

One method for managing growth from a physical perspective is centralization, or the creation of a storage pool. Consolidation of long- and near-term media assets is one of the fundamental concepts for addressing growth.

The same platform that provides immediate access, high bandwidth and high throughput does not have to be the same platform that stores the assets during off-peak periods. A common storage system, potentially a hybrid of spinning disks and optical or tape-based off-line devices, can be used for lower priority assets.

Such a centralized storage pool can be arranged in any of three basis structures. (See Fig. 1.)

The earliest structure deployed for media servers was direct attached storage (DAS), which provides for dedicated block storage and is directly attached to heterogeneous servers.

A storage area network (SAN), whereby multiple servers are connected to shared storage arrays over a network, is the newest. Last, a network attached storage (NAS) system is one in which clients and servers access files over a network using standard Internet protocols such as Common Internet File System or Network File System.

Due to the limited ability to scale storage, DAS is used mainly for small applications when only modest growth is anticipated. NAS platforms are relatively easy to deploy. Using specialized servers dedicated to file serving, the NAS will generally come with integrated storage, which can be added to the network with relative ease. Most SANs will use higher performance Fibre Channel connectivity because it provides robustness, high bandwidth, fast throughout and low latency.

Gateways provide further connectivity between NAS and SAN hybrid storage systems. Storage pools need not necessarily be confined strictly to spinning magnetic disk drives—they can include DVD or tape systems.

For managing the data, automation is often applied to manage migration, retention and retrieval. Metadata, that descriptive information about the data, is used to categorize and validate the movement of data between storage tiers; and is based on work-flow requirements. Tiered storage systems are often comprised of disk, tape, and optical-storage devices. For applications focused on data retention, tiered storage is just one method that helps lower hardware costs while retaining pools of storage for different service levels.

Work-flow policies dictate how and when data migration takes place. For example, files that have not been accessed in the past six months are migrated to secondary storage, which could be either near-term DVD or large sets of inexpensive spinning disks. In the case of a long-term storage requirement, a tape-based archive is often employed. The archive's data mover application associates the asset-management application to the migrated data process. Coupled with browse and asset management routines, users can still search and access the data even though it might be semi-offline.

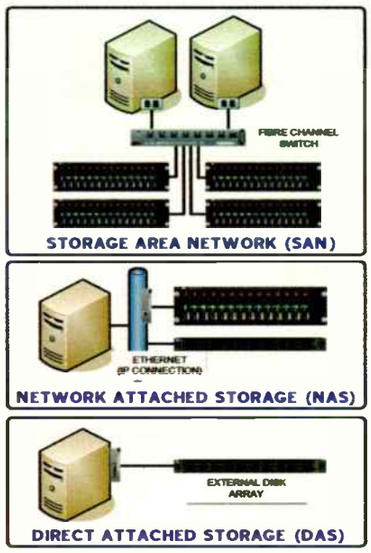

Fig. 1

Storage and application performance is governed by technology and driven by user needs. Beyond data migration, another solution for improving efficiency is to deploy higher performance storage arrays. Attributes affecting performance include RAID type, number and type of storage processors, amount of cache, number of host ports, internal bandwidth and architecture, number and type of disk drives, and the workload profile.

Installing faster and higher performance arrays unfortunately has a direct relationship to price, so selecting the proper mix of attributes is an important part of storage network system design.

Even with the faster arrays, other bottlenecks may still reduce performance. When connectivity between servers and storage is the issue, increasing the number of connections or employing a faster networking technology (e.g., 4 GB Fibre Channel) may solve the problem. Conversely, decreasing the number of "hops" or interswitch links will in turn increase throughput and provide better connectivity.

Every user's need for storage may require a customized solution to the overall storage-pool concept. Products with application specific requirements, such as news editorial systems or production-content rendering, are optimized for dedicated storage solutions.

These applications require not only large amounts of storage, but fast and wide bandwidth delivery performance. The manufacturers of storage systems and content media servers have literally spent thousands of man-hours perfecting their particular solutions.

Those in the manufacturing sector recognize that for long-term homogeneous solutions, a common storage pool is essential. This is one reason why the products offered by dozens of vendors are being accepted and deployed in operations worldwide. However, it is a two-way street. For media asset management solutions to be valuable, the balance with other hardware must be considered. ■

Karl Paulsen is vice president of engineering for AZCAR. Contact him at karl.paulsen@azcar.com.

NONLINEAR EDITOR

Apple Final Cut Studio

by Michael Hanish

Always stylish to the max, the new collection of Apple pro applications for video, audio and DVD production on the Macintosh platform arrive in a large but sleek-looking black box. The now familiar and seriously upgraded applications have been dubbed Final Cut Studio, and consists of Final Cut Pro 5, DVD Studio Pro 4, Motion 2 and Soundtrack Pro.

The four major components of Studio can be purchased or upgraded separately—individual details will be listed below, along with discussions of new features, improvements and system requirements.

BASIC REQUIREMENTS

The basic requirements for Studio are fairly modern, but not absolutely cutting edge, allowing a variety of users to adopt the latest versions: a Macintosh G4 or G5, running OS X 10.3.9 and QuickTime 7, at 867 MHz or faster, 512 MB RAM, and an AGP Quartz Extreme video card.

The recommended system, naturally, is the latest dual G5 2.7 GHz with 4 MB RAM and OS X 10.4 and an Apple HD Cinema display, which Apple provided as the test bed for this review.

The only additional hardware used for this review was a DataVideo DAC-100 bi-directional DV-analog converter for I/O and monitoring. Hard drive requirements will be commensurate with the level of material you are working with and much more stringent for uncompressed SD or HD material.

System requirements are somewhat exacting because all the applications are so CPU-and GPU-intensive. I commend the designers at Apple for making so many of Studio's features available to users with systems at the basic end of the spectrum.

FEATURES

FCP 5, the Studio flagship and juggernaut of the Apple pro apps, rolls on, getting better and more capable with each iteration. FCP 5 retails for $999; upgrades from a previous version are $399, or $699 from Final Cut Express.

Apple has packaged Final Cut Pro 5.0 with DVD Studio Pro 4, Motion 2 and Soundtrack Pro into Final Cut Studio.

One big group of improvements to FCP has to do with formats. Native HDV editing is now built in to FCP, using direct FireWire input from tape. Rendering is needed only for transitions or effects, not for any slow transcoding. Native DVCPRO HD, P2, and IMX editing are also supported, widening and simplifying everyone's way to affordable HD production and system scalability. HD monitoring is now much easier and more affordable—you can preview to a connected Apple Cinema Display, with the pixels mapped 1:1 for accuracy.

Another major addition is integrated multicamera editing, which used to be a nightmare kludge of work-arounds. This extremely slick new feature allows the editor to group up to 128 sources into multiclips, adding or subtracting shots and/or sources at any time. These multiclips can be played back in the viewer at up to 16 sources at a time. Switching sources for an edit is as simple as an on-the-fly click. This feature alone will bring many editors to FCP for its fluid simplicity. FCP now allows for up to 24 channels of simultaneous audio input (at 24 bit, 96 kHz), with the proper hardware. Soundtracks can be exported to an external DAW through OMF export or directly (and seamlessly) exported, and linked, to Soundtrack Pro.

Also improved are the scale and rotate algorithms, long a weak spot in FCP, as well as the gamma processing (especially beneficial for HD output), and the addition of more 32-bit floating point filters. All the motion effects, color-correction tools, and filters look vastly better, so more of such work can be done directly inside FCP. For whatever needs to be done outside FCP, you can still directly export and link to LiveType and Motion 2.

FAST FACTS

Application
Nonlinear editing, audio/DVD production, graphics

Key Features
Package includes Final Cut Pro 5, DVD Studio Pro 4, Motion 2 and Soundtrack Pro
FCP includes support for HDV, DVCPRO HD, P2, and IMX; integrated multicamera editing, HD monitoring/preview via Apple Cinema Display

Price
$1,299

Contact
Apple
800-692-7753 (MY-APPLE)
www.apple.com/finalcutstudio

IN USE

I had a small video and DVD job that seemed like a good way to try out Studio. It was a rather rush, pro bono memorial service video, consisting of interviews, speeches, musical pieces and still photographs. The first pleasant sur-

prise came while doing some pan-and-scan work on a couple of photos, and indeed, the marketing blurbs were true and the motion and scaling were good enough to use. The video was the fairly straightforward part, and FCP tore right through it. The audio, funky and run-and-gun as it was, seemed to be where the most work would have to be done.

Soundtrack Pro (MSRP $299, upgrade $99) is a totally new audio application, combining a fully rewritten and greatly expanded Soundtrack and major elements from Apple Logic, the major league, full-featured digital audio workstation. The price of Soundtrack Pro completely belies its capabilities. It can provide almost any function required for audio post production. That's a rather bold statement, but let's look at some major parts of the feature set.

SOUNDRACK PRO

While Soundtrack Pro is primarily loop-based, you can also record, edit and mix audio. (MIDI is not a factor in Soundtrack Pro, except as a means for integrating a hardware control surface, so if MIDI composition is your preferred mode, you need to find an external sequencer.) The program comes with a DVD library of more than 5,000 categorized music loops and 1,000 sound effects and foleys to get you started.

Soundtrack Pro features nondestructive sample accurate editing in its waveform editor. The toolset includes waveform, global waveforms, and time displays, a frequency spectrum view and the Action List. This feature functions like a Photoshop history list, providing a complete list of all edits, processes and filters, all of which can be rearranged, modified, suspended or deleted.

Scripting is quite simple, making Soundtrack Pro a very useful batch processor for all those repetitive tasks that always present themselves in a sound mix. A software mixing console provides for full automation and recall of all aspects of the mix.

The program supports the Apple Audio Unit plug-in format and ships with a suite of more than 50 effects plug-ins, including dynamics processing, reverbs, EQ, distortion and modulation, time stretch and noise removal.

An absolutely amazing feature is called Intelligent Find-and-Fix. This function analyzes an audio file or selection for clicks and pops, hum and phase issues, highlights the problem areas and allows the editor to automatically fix all problems or fix them one at a time. A similar function, Ambient Noise Print, can store a chunk of a file's room tone and using it to replace unwanted sections of the file, with the room tone automatically fit to fill, and cross-faded in and out.

I found that I was able to adapt rather quickly to the workspace Soundtrack Pro presented and accomplished all that I needed to get the soundtrack into shape, while feeling fairly ergonomically comfortable in it. While Soundtrack Pro doesn't have the high profile or extra wide feature set of some other DAWs, it certainly proved itself to be up to the jobs I threw at it.

Motion 2 (MSRP $299, upgrade $99), Studio's motion graphics, compositing and special effects component, continues to have the most stringent hardware requirements of the package. It needs one of the approved graphics cards (see the list at the Apple site) to perform its real-time, GPU-accelerated effects and rendering, which have all been upgraded to 32-bit float for higher quality, even when rendering to 8-bit formats, thanks to intelligent dithering.

The new version inherited native HDV support from FCP, so no more transcoding for motion graphics. Also new is tight integration with After Effects. Motion 2 projects can be dragged and dropped into AE 6.5; when changes are made in Motion, they are automatically updated in the AE project.

The other really major news about Motion 2 is that it has been opened up to third-party plug-ins. The FX Plug format allows developers to easily write directly to the Motion render engine and GPU acceleration at full 32-bit depth.

Thus far, developers Boris, ZaxWerks and WonderTouch have written plug-ins to this format, and more are expected. If run under Mac OS X 10.4 Tiger, Motion can take advantage of Image Units, a part of the new OS Core Image technology. Image Units provide a simple, standard and systemwide way for plug-in developers to write GPU-accelerated, 32-bit apps for image processing and manipulation. Rather than being limited to plug-ins written specifically for Motion, plug-ins can be shared among numerous apps, much as Audio Units allow for one plug-in to serve inside several different applications.

Motion 2 can now take advantage of as much RAM as your system has available; no more 4 GB limit. This means even more real-time performance with multiple effects and multiple layers, perhaps the greatest strength of Motion. And speaking of real-time performance, consider this: you can now map any number of filters or transform parameters to knobs, buttons or faders on a MIDI control surface, making Motion "playable" spontaneously in real time as a musical instrument.

The new version of DVD Studio Pro 4 (MSRP $499, upgrade $199) has perhaps the least number of new features, but the changes and expanded capabilities are still significant. While most of the functionality of the program hasn't changed much since the previous version, there are several large improvements under the hood. First and foremost is the ability to encode and author HD-DVDs. DVDSP 4 supports the current specifications for HD-DVDs, even though the competing specs have yet to be ratified. Compressor 2, the encoder that comes with DVDSP 4, can now encode using H.264.

That kind of encoding takes computing power and time. The G5 provides the power (Tiger is required to encode and play HD-DVDs), and Apple QMaster provides a means for cutting the time even further. QMaster, inherited from Shake, enables distributed encoding over a network.

Quality control is now made simpler by the addition of full-screen HD preview to an Apple Cinema Display. Surround sound can be previewed and checked at the same time through a surround decoder. Advanced authoring improvements include GPRM partitioning (more flexibility in complex scripting by letting the user create up to 112 register partitions, making more efficient use of memory), and control over Video Title Set allocation to optimize playback.

Users of DVDSP 3 will find almost all of the workflow and functionality of this new version to be familiar, which makes the upgrade path quite easy. It also has another great side effect: It is extremely easy to substitute HD assets for SD assets in any project, thus making it a very simple process to repurpose existing SD DVD projects for HD.

SUMMARY

There is a wealth of additional applications and resources included with Final Cut Studio. Live Type is an animating type-and-text effects program, which maintains live links to the host program (FCP, Motion, DVDSP), and ships with two DVDs full of animated fonts. Compressor 2, with a redesigned and improved interface, can now encode Dolby Digital Professional surround formats without the use of A.Pack, the previous external tool.

Additional resources include a training DVD for all applications and a DVD full of tutorial media that provide clear, step-by-step instructions to all major features of each application. It's a huge package with ample bang for the buck and all the features one would need in a digital media post-production environment, wrapped up in a stable, well-integrated and interoperably linked system. ■

Michael Hanish runs Free Lunch, a multimedia production house near Guilford, Vt. E-mail him at mhanish@sover.net.

NONLINEAR EDITOR

Pinnacle Systems Liquid Edition Pro 6

by Stephen Murphy

Pinnacle Systems Liquid Edition editing system continues to charge forward in its battle against better known and well-entrenched desktop NLE systems. Armed with an impressive interface overhaul, native HDV support, built-in DVD authoring and a host of other pro features, Liquid Edition 6 has the potential to gain significant ground.

The previous version of Liquid Pro (Version 5) included an ATI Radeon AGP video card to provide real-time acceleration and audio/video I/O. While this proved useful in guaranteeing real-time performance, it also locked Liquid users into using a specific AGP display card that could not be upgraded and did not support multiple monitors.

The latest incarnation of the program (Version 6) is a Windows XP-based system that relies solely on the host computer's CPU and GPU for its real-time processing and display capabilities. While some high-bandwidth features may choke older computers, users with souped-up machines will enjoy very good real-time performance and the freedom to expand their system without restriction.

FEATURES

Liquid Edition is available in a software-only version ($499) or in the Liquid Edition Pro ($999) bundle that includes a comprehensive audio-video breakout box.

Liquid is an NLE application boasting unlimited video and audio layers, multiple-timeline projects, timeline nesting, source-record monitoring, four-point editing and a built-in multicam editor. The application includes processing such as primary/secondary color correction and real-time motion blur, as well as 1,000-plus 2D and 3D effects and transitions.

Pinnacle Sytems Liquid 6 is available in a software-only edition or a Pro edition with a breakout box.

The NTSC/PAL-compatible breakout box (aka BOB) included with the Pro version is a sleek 6-by-6-by-2-inch metal enclosure designed by F.A. Porsche. The box interfaces with the computer via the USB 2.0 protocol, and is powered by an included AC adapter.

Video connections include composite and component inputs and outputs (on RCA jacks) as well as a set of Y/C jacks for S-Video I/O. Audio connections include stereo analog inputs and six-channel surround outputs (on RCA) as well as a pair of optical connectors for digital audio I/O (S/PDIF and ADAT formats) and a 1/8-inch stereo headphone jack. A full-size (6-pin) FireWire connector is provided for DV and HDV I/O.

Also included in the Liquid Edition Pro package is a six-foot USB cable, a six-foot 4-to-6-pin FireWire cable, TitleDeko RT software, Hollywood FX Plus RT, Alpha Magic FX, an instructional DVD, an introductory manual and a hefty (600-plus pages) reference manual.

As there is no way to cover the full feature set of this software in this article, I will concentrate on the most significant new features.

The most immediately noticeable

LIQUID, PAGE 38

FAST FACTS

Application
Nonlinear editing

Key Features
Windows XP-based NLE system; unlimited video and audio tracks; primary and secondary color correction; 1000+ 2D and 3D effects and transitions; SmartRT real-time effects rendering and playback; supports SD and HD formats, including MPEG-2 IBP on the same timeline; Dolby Digital Surround encoding; VST plug-in support

Price
$499 (software-only)
$999 (Pro edition with breakout box)

Contact
Pinnacle Systems,
800-298-2948
www.pinnaclesys.com

TRIPOD

Shotoku TT-66L Tripod

by Bob Kovacs

There are two types of tripod users out there: Those who have the need for speed and those who don't.

The speed users are generally ENG shooters who must get set up quickly at a news event and be capable of moving on a moment's notice. Those for whom speed is not critical are generally EFP shooters, who have the time to tweak a setup until it is perfect and use gear that can be relied upon for smooth moves and precise repeatability.

The Shotoku TT-66L tripod is for the latter group—shooters who have the time to work with this sturdy camera support to take advantage of its flexibility and unusual characteristics.

FEATURES

The Shotoku TT-66L is a four-stage tripod, meaning that each leg has four sections. Three heavily knurled and rubberized retaining nuts can be quickly worked to extend the legs to the right length.

And *length* is the right word: The TT-66L adjusts from a height of 24 inches to more than 68 inches, and that is without a pan/tilt head on the tripod. This tripod is so tall when fully extended that I could easily duck underneath it to get to the other side.

The tripod's aluminum legs are grooved to permit extension and locking using only one hand. There is no spreader to add stability; when its legs are swung out to their full arc, the hinge point has a positive stop that holds the TT-66L firmly.

The tripod's legs are black-anodized aluminum that is nonreflective and the 100 mm bowl assembly on top is finished with rugged gray enamel that resists chipping and scratches. The feet are soft nonslip black rubber that will not scratch wood floors.

The TT-66L is a tripod only; it does not come with a pan/tilt head. The unit weighs 6.6 pounds, can support a payload of 45 pounds and is available with either a hard or soft carrying case.

I have a nice-quality 100 mm pan/tilt fluid head that I used with

SHOTOKU, PAGE 37

FAST FACTS

Application
EFP

Key Features
Four-stage legs; 100 mm bowl mount; high payload capacity

Price
$895

Contact
Shotoku Broadcast Systems
866-746-8658
www.shotoku.tv

Shotoku

CONTINUED FROM PAGE 36

the Shotoku TT-66L tripod. It was a snap to fasten the pan/tilt head in place on the tripod and the resulting combination stood 74 inches tall when stretched to its maximum height.

Figuring that a camera is another couple inches above the pan/tilt head's mounting surface, this puts the lens of a camera at a height of 76 to 78 inches or so, well above the mad-

Photo: Mary Ellen Dawley

The TT-66L adjusts from a height of 24 inches to more than 68 inches, and that is without a pan/tilt head on the tripod.

dening crowd. At the other end, you can shoot with this tripod at a lens height of 32 to 34 inches, or about even with the license plates on some SUVs.

Considering that the TT-66L has no spreader, it is sturdy and rigid. With the legs collapsed, it supported my weight of 160 pounds or so with virtually no deflection. All the hardware worked perfectly after holding my weight. (It could not hold my weight with the legs fully extended so I didn't try. However, you can safely place quite a load on the TT-66L if its legs are kept short.)

I used the Shotoku to shoot with a small digital camera, nothing close to the payload of this tripod. It was easy to set up more or less level on wildly uneven surfaces, setting the final level with a pan/tilt head adjustment using the 100-millimeter bowl.

The rubberized tightening knobs were easy to grasp, lock and unlock, and gravity was all I needed to extend the legs. There was no obvious deflection in the tripod as I panned with the camera and the TT-66L was rigid and firm. Swinging the tripod's legs out to their maximum arc resulted in a stiff assembly that had no detectable slop.

The overall feel was that of a more typical pro tripod that has a spreader and more complex legs. The Shotoku TT-66L was a stable platform for my 6-pound pan/tilt head and 2-pound camera.

SUMMARY

If you need a tripod with maximum flexibility with regard to height and terrain capability, the Shotoku TT-66L is worth careful consideration. The tripod itself is lightweight, sturdy and has an amazing vertical range. Set for maximum height, you need to be a basketball player to use this thing.

The TT-66L's payload capacity is rated conservatively by Shotoku; this tripod can easily support the weight of a camera, light, large lens and prompter, assuming your pan/tilt head is up to the task. Extended to shorter heights, the TT-66L can hold a surprising amount of weight for a lightweight ENG/EFP tripod; if it can hold me, it can hold whatever camera you have.

There are tripods that set up on a flat surface faster than the Shotoku TT-66L. However, you will be hard-pressed to find one that can shoot as tall or short, while carrying the load the TT-66L can. ■

Bob Kovacs is a broadcast engineer and regular contributor to TV Technology. *He can be reached at* pvreditor@yahoo.com.

Liquid

CONTINUED FROM PAGE 36

change to the program is its redesigned user interface that ditches many of the nonstandard remnants from original developer FAST Multimedia's interface.

The new and instantly familiar Windows-standard interface is customizable, even to the point where those who were partial to the old interface will still be happy. Additional interface improvements include Avid-esque key command sets and Wizard interfaces to make getting up and running with the program a little easier.

At the technological core of the new version is what Pinnacle calls "SmartEDIT," another name for the fact that Liquid can intelligently use clips of varying resolutions and codecs from a wide range of SD and HD formats (including uncompressed, DV, MPEG-2 I-frame and MPEG-2 IBP) on the same timeline, without time-consuming processes that could damage quality.

The other major technology implemented in Liquid Edition 6 is its native real-time processing engine called SmartRT.

This refers to the process by which Pinnacle uses both the host computer's DirectX-compatible graphics processor (GPU) and central processor(s) (CPU) for real-time graphics rendering and playback to video monitors. SmartRT continues working to improve graphics and effects playback as you work on a project by taking advantage of unused CPU processing to render in the background. An indicator on the timeline displays background rendering activity.

Audio support in Liquid Edition 6 has also improved significantly over its predecessors. The mixer now supports 5.1 surround mixing, and a Dolby Digital encoder is included. Even better, the program now supports VST plug-ins (no doubt an improvement resulting from the short-lived acquisition by Pinnacle of Steinberg). Liquid also includes a set of fairly comprehensive DVD authoring tools, allows DVD creation directly from the timeline, and includes support for 9 GB dual-layer burning.

For a complete list of Liquid Edition 6 features and system requirements, please visit the Pinnacle Web site.

IN USE

I tested Liquid Edition 6 Pro on an Intel 3.20 GHz HT PC running Windows XP Professional (SP1) with an ATI X600 128 MB AGP video card and a SATA RAID. Installation of the software and breakout box was relatively painless, though I did end up installing a dedicated Adaptec PCI USB 2.0 controller due to an incompatibiltiy with the breakout box.

In general, my PC was able to keep up nicely with the demands of Liquid's real-time processing, though I occasionally experienced some brief stuttering at the beginning of heavily layered and effected projects. When I worked with HDV footage captured from a Sony HDR-FX1 camera, my computer became quite sluggish, and poor real-time previewing resulted. A fast, dual-processor computer and top-of-the-line AGP video card are highly recommended for HD work.

Part of the barrier that prevented me from fully exploring the Liquid editing software in the past—besides the fact that I was required to use certain other systems—was its relatively steep learning curve, caused in good part by its unconventional user interface. Though Pinnacle did not try and reinvent the traditional source/record editing paradigm like Sony Vegas did, it shot itself in the other foot by ignoring the conventional Windows menu system and layout in favor of a unique GUI complete with cryptic (and dark) icons and unfamiliar terminology.

The Liquid 6 Pro breakout box features a variety of analog video inputs and outputs, an extra DV connection and analog and digital audio connectors (including a headphone jack).

Though much of the terminology has remained ("Racks" instead of "Bins" for instance), the adoption of the traditional Windows conventions in Liquid Edition 6 provides potential users a far easier entrée into the program.

New and seasoned editors alike can now be up and running at a basic level in a very short time. Likewise, although I am not a big fan of the use of dialog Wizards, the ones incorporated into Liquid Version 6 streamline initial media import and export operations considerably. Overall, these are part of a logical and overdue set of improvements that may win over new users.

Even with these improvements, there are still a number of settings procedures and dialog boxes that are unnecessarily complicated or confusing, especially when compared to Liquid's principal competition.

Additionally, while a good deal of layout flexibility has been added to the program, inexplicably, many of the main windows (timeline, source/record monitors etc.) could not be resized and/or reshaped to fit my needs and desktop.

After some initial learning-curve climbing, accomplished on and off over the course of a couple weeks, I began to enjoy and look forward to working with Liquid Edition 6. In general, the Liquid workflow follows—and improves upon, in many instances—the Avid paradigm. With the fine-tuning of the keyboard commands, it wasn't long before I felt comfortable enough with the program to tackle some corporate and commercial projects.

In one such project, I made good use of the built-in multicamera editing interface to comp footage from a four-camera live educational performance for a World Wildlife Fund project. While the editing portion of the multicamera project went quickly, I did run into some trouble on the capture side. When capturing a multicamera project, each tape is designated "Camera 1," "Camera 2" and so on.

It wasn't until all four tapes were captured that I realized that, in this mode, only the audio from the "Camera 1" tape is captured—a very odd and frustrating "feature." Since the footage required that I use audio to set the initial sync points, I ended up re-capturing the remaining tapes as wild tapes with audio, and then I brought them into the multicamera editor. Once over that hurdle, the live switching and fine-tuning afterwards was simple and intuitive.

As a long-time professional audio engineer as well as video editor, I was especially pleased to see the addition of VST plug-in compatibility to the program. While the audio editing and mixing support doesn't come close to that which can be accomplished in a dedicated audio application, the addition of VST support opens the door to a wealth of professional audio processing (and even hardware-accelerated VST processing via TC PowerCore or Universal Audio UAD-1 cards) otherwise unavailable to video editors.

As I mentioned earlier, Liquid Edition 6 is available as software only, or bundled with an external analog and DV A/V breakout box for about $500 more. Is the BOB bundle worth the extra dough? In using the program over the course of a couple months and on a variety of projects, I found the breakout box to be nearly indispensable.

Although the BOB isn't cheap, the convenience of having the full variety of analog video inputs and outputs, an extra DV connection and the analog and digital audio connectors (including the headphone jack) at my edit desk—instead of in the machine room where my CPU resides—was nearly worth the price of admission. It allowed me to conveniently ingest nearly any source presented to me without any rewiring hassles, and also allowed short analog leads to my edit station HD LCD and SD NTSC video monitors.

It should be noted that, without the BOB hooked up, you are unable to preview any real-time, multi-layered video with FX through a standard FireWire output (e.g., FireWire out through a DV camera to a monitor); it can, of course, still be previewed on your computer monitor. I was disappointed to learn, however, that using the DV output on the BOB disables the analog video outputs, and vice versa.

SUMMARY

Despite a few rough spots, and after spending a good amount of time exploring Pinnacle Liquid Edition Pro 6, I found some very compelling reasons to consider adopting the application for professional use. For my purposes (I work a lot compiling material supplied on DVD and all manner of analog), its ability to seamlessly integrate non-decompressed MPEG-2 files into a timeline with several other formats and codecs already in use easily proved the program's worth. Likewise, the handy—if not inexpensive—breakout box adds convenience, improved performance and value to the deal.

Features such as RS-422 machine control, ALE/OMFI project support, built-in SAN and NAS network support and project compatibility with other Pinnacle software (including the basic Studio editing product line) should make Liquid Edition 6 attractive for broadcast houses and small production offices.

With its vastly improved interface and standard Windows menus, Liquid Edition 6 creates an easier entrée for new users, and its seamless integration of formats, powerful effects and processing, and its real-time native processing capabilities will appeal to seasoned editors. ■

Stephen Murphy, technical editor of TV Tech's sister magazine Pro Audio Review, is a video editor and audio engineer with over 20 years of broadcast and production experience. He can be reached at editor@smurphco.com

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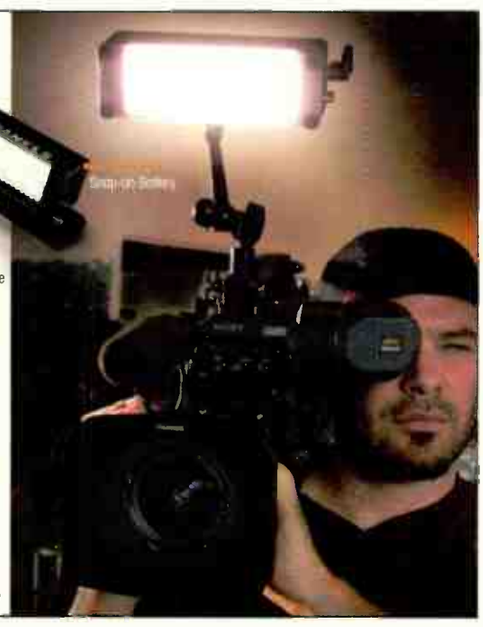

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FIELD AUDIO ACCESSORY

Koala Windsocks

by Carl Mrozek

Wind can easily ruin recordings made with the very best microphones and recorders and as Murphy's Law suggests, will do so at the most inopportune times. The best way to prevent that from happening and ruining your audio is to equip your microphone with some sort of wind-dampening cover. Unfortunately, the best protection, provided by a zeppelin, adds considerable bulk to a microphone making it inconvenient, and often impossible to use with a camera-mounted microphone.

Fortunately, today there are a number of alternatives, most notably windsocks, in all sizes, shapes, colors and styles.

There are now windsocks available for virtually any type of microphone from the tiniest lavaliers to the longest shotguns. Finding one that perfectly fits your specific microphone and application can still be a challenge, but a company I stumbled upon at NAB this year simplified the process considerably. That's because Koala Windsocks, of Australia, has made it its business to make a windsock for virtually every type and size of microphone, for a broad range of applications.

DESCRIPTION

Koala Windsocks, of Australia, makes windsocks that fit over foam 'softies' as well as zeppelins. The zeppelin covers come in several colors and patterns and feature double zipping at the base so that they can fit over most zeppelins. One of these, "the Koala Max," is especially geared for long microphones, requiring large zeppelins.

It features extra long knap for maximum wind protection—at least 10 to 12 dB worth—according to Koala. Overall, Koala makes half-a-dozen wind covers for zeppelins with "fur" ranging from short to shaggy for protection from wind ranging from light to blustery. They are designed to be fast and easy to change as wind conditions change.

The texture of many of the Koala windsocks I touched emulates that of authentic animal (maybe koala?) fur, albeit glossier. But, fortunately for koalas, wallabies and other Australian marsupials, no real animal hides are used in the making of Koala windsocks. All the fur on their windsocks is "genuine imitation;" animal fur made of a proprietary blend of synthetic materials. As you might expect, they don't elaborate on what materials are used to mimic the texture of marsupial fur, other than to insist that "No koalas were harmed in the manufacture of this product."

Koala even has windsocks for lavaliers, the Baby Koala series. These little fuzzballs come in white, tan, black, grey... to blend in better with the speaker's clothing.

As with windsocks for shotgun and handheld mikes, the babies are designed to fit onto standard foam softies or metallic helmet-style windscreens for lavaliers. The softie is essential for a snug fit but with a layer of air around the microphone head for proper operation.

Perhaps their most practical line of windsocks is called the Mini-Max series designed to fit over shotgun-style microphones equipped with simple foam windscreens, or softies.

Sizes range from 120 mm to 190 mm in length, which covers the full gamut of ENG microphones. They come in different lengths of fur for different wind conditions but all include a non-slip Velcro strap at the lower end. This is for securing the windsock to the camera's microphone bracket to prevent it from flopping around and creating noise, or worse yet, from accidentally slipping or blowing off while in use.

Photo credit: Kathy Beck

The 190 mm Koala Mini-Max with the AT897 shotgun mic from Audio Technica.

IN USE

I tested the 190 mm Koala Mini-Max with the AT897 shotgun microphone by Audio Technica. The AT 897's capsule measures approximately 180 mm with an overall microphone length of 280 mm. The Mini-Max slipped over the AT897 fairly easily yet snugly enough to adhere to the softie without using the Velcro strap. Hence, I was able to use it independent of a camcorder as well as with one.

My first application with the Mini-Max on the AT897 was while shooting in the Nevada desert with the Sony DSR 570W. After strapping the Mini-Max to the microphone bracket, I felt ready for the desert wind, at least to shoot in it without losing the windsock. The wind came soon enough, thanks to the cool nights and hot days of spring time in Nevada.

In fact, the wind blew pretty steadily during the middle of the day, ranging from light to fairly intense—upwards of 30 mph.

Would the Koala Mini-Max enable me to record ambient audio other than the desert wind? I was a bit skeptical.

Fortunately, I was pleasantly surprised. In winds under 20 mph or so, I was able to clearly distinguish the calls of the birds or burros that I was shooting. As winds gusted above 20 mph or so, the rustling of sagebrush and other vegetation muffled the animal sounds I hoped to record. The good news was that the recorded blend of wind, rustling bushes and muffled animal vocalizations actually sound pretty much like it did without a headset on, basically pretty natural. The Mini-Max did its job of preventing wind distortion while faithfully capturing the sound of the blowing wind. As any soundperson can attest, this is not an easy thing to do without a zeppelin and thick windsock.

I was also pleased with the quality of assorted horse and burro vocalizations recorded during winds ranging from 10 to 20 mph. Once again, the sound of wind was clearly audible, but was replicated much like it sounded in the field, to the unaided ear, i.e. natural. After several days of shooting in the breeze, I was pretty pleased because I captured the target audio—animal vocalizations—in the wind and under varying conditions, and the recordings accurately reflected the relative intensity of the wind, but without drowning them out.

While recording songbirds in western New York, with the Ares PII+ solid-state audio recorder, the ability to handle a moderate breeze proved a godsend. There are few enough pockets in the urbanized East remote enough to record more than a few snatches of bird song at a time without intrusion by some motor vehicle, be it a car, truck, motorcycle, airplane, a distant highway or a train—even at dawn!

Consequently, a bit of a breeze can help if it doesn't distort the recording. Once again, with the Mini-Max on the AT897, there was little detectable wind noise at all under 10 mph. Everything from catbirds to cuckoos was recorded without distortion.

Moreover, more distant vehicular noise was muted somewhat by the wind, resulting in a cleaner overall recording. Above 10 to 12 mph, vehicular noise was muted to an even greater extent, but the sound of the wind became increasingly audible in the recording as wind speed increased.

The problem with this is that ideally, ambient audio, whether bird song or a slamming door, should be pristine and without other competing sounds, to maximize its future applications. Nevertheless, a light rustle of wind is much easier to work into a soundtrack than the same sounds punctuated by a screaming Cessna or Harley.

CONCLUSION

A good windsock is a wonderful thing and can make the difference between capturing clean ambient audio which you can and will want to use versus audio you'll have to replace.

The Koala Mini-Max more than pays for itself the first time it spares you from spending hours hunting for clean audio to replace your wind-damaged audio track. The savings multiply if you have to locate and then purchase replacement audio.

The Mini-Max weighs only a few ounces and adds no hard edges to your camcorder when packed away. It's a worthwhile addition to the kit bag of any videographer or DP who takes audio seriously. ■

Carl Mrozek operates Eagle Eye Media based in Buffalo, N.Y., specializing in wildlife and other outdoor subjects. His work appears regularly on the Discovery Channel, CBS, PBS and other networks. Contact him at eagleye@localnet.com

FAST FACTS

Application
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Key Features
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PRODUCTS & SERVICES SHOWCASE

GRAPHICS

12 Inch Design Production Blox

by Michael Hanish

Every day in production, we need to create lower-thirds, info screens and title treatments. For the artistically challenged among us, creating these elements from scratch may be too difficult or time-consuming.

However, help is on the way! One possibility is to use a graphic generator, such as GakPak (an After Effects plug-in from Profound Effects), to produce customized graphic elements. An alternative to creating animated and static graphics is a construction set of pre-made elements.

Although numerous sets are on the market these days, the newest kid on the block is the lovely collection of ProductionBlox and PowerBlox from 12 Inch Design.

FAST FACTS

Application
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Key Feature
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Price
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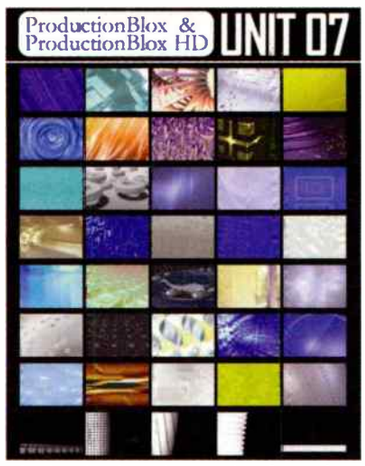
FEATURES

ProductionBlox and PowerBlox provide animations and elements in QuickTime format using lossless compression at resolutions of 720 x 486/30p for NTSC, 720 x 576/25p for PAL and 1,920 x 1,080/24p for HD. These elements are on multiple DVDs, ready for importing into any NLE or motion-graphics application.

Each volume of the ProductionBlox series contains full-screen, full-resolution looping animations with color-coordinated, matching lower-thirds and left/right elements in abstract and geometrical shapes. New volumes are released every quarter and the quality continues to be impeccable and extremely usable.

The PowerBlox series concentrates on less-than-full-screen elements, such as moving textures, static mattes and ramps (with alpha), animated borders, simple shapes, transitions and display elements, animated corner-pin displays (which include corner-pin tracking data for use in After Effects), and even sets of multilayer DVD menus. There is no filler here—all the elements are beautifully designed, usable and, with a little work, can be customized to meet a wide variety of needs.

For example, 12 Inch Design sent me Units 5 and 7 of ProductionBlox and PowerBlox Unit 1 for review. I was working under deadline and looking for some elements to use immediately to identify subjects in a documentary, so I investigated the two volumes of ProductionBlox first.



The Production Blox catalog for Unit 7 shows some of the animated backgrounds and elements in the set. SD and HD versions of all elements are included.

The first thing I noticed in each box was a catalog disk, in addition to the two double-sided DVDs of elements. The catalog disk is a DVD-ROM, playable in a set-top DVD player as a standard, menu-driven DVD, or in a computer drive to access browser, Acrobat or Word-based printable previews and catalogs. To be able to easily show clients previews of possible elements, or just to be able to choose among them while editing is a real timesaver!

Each ProductionBlox element (full-screen, left-, lower- or right-thirds) is available in QuickTime, Photoshop, Targa and Tiff format with blurred, clean, shadowed and shadowed-with-alpha variations. Color, shape, edges and attributes can be modified easily in Photoshop or any other image-editing program, making each set of coordinated elements almost universally customizable.

The PowerBlox sets come with a printed catalog of the three double-sided disks (NTSC on one side, PAL on the other), as well as browser, Word and Acrobat disk-based, customizable and printable catalogs, and a QuickTime Pro license. The elements are available in the same variety file formats as the ProductionBlox for flexibility.

IN USE

As noted above, previewing the possibilities to choose the appropriate elements was easy, thanks to the browser-based catalog. Importing the chosen elements into my editor (Media 100) was likewise effortless, because they are in QuickTime.

I chose one of the animated full-screen elements, cropped it for the lower-third background I needed and cropped it again for the background for several graphic screens. A little opacity adjustment and some slight color modification and it pleased everyone—all in a fraction of the time it would have taken to create the elements from scratch.

The PowerBlox set again came into use when I needed to turn the piece into a DVD. Each PowerBlox collection comes with 10 sets of designed DVD menus, provided in multiple formats: layered Photoshop files, layered Photoshop files formatted for Adobe Encore, DVD Studio Pro project templates and MyDVD style packs. I easily loaded all the DVD Studio Pro templates into the Application Support directory for DVD Studio Pro, following the simple instructions that came with the package.

From there, themes are available as either project files (preset with multiple links between buttons and assets, and nine chapters in the timeline, all easily customized) or as templates that appear in the Inspector/Library pane, and contain assets for buttons, clip frames and background images. From that point, all I had to do was make the choices, load the template and start building.

PowerBlox also contains many other usable elements, several of which came in handy during the construction process of the project DVD. These include animated borders, display elements, transitions, simple shapes (star, rectangles, ovals and triangles), Earth images, as well as textures, static mattes, ramps and patterns. All these elements are full-screen with alpha as well as progressive-scan (no need to de-interlace before use) and are easily scalable. I found uses for several animated borders and transitions, which needed only minimal tweaking before use.

SUMMARY

Both sets were not only an absolute delight but eminently usable and all included elements that are well-designed, color-coordinated and formatted. They provide great starting points for project design and can easily be manipulated, cropped, scaled, color-corrected and otherwise tweaked into virtually any needs of a project.

For immediate use, even with no tweaking necessary, 12 Inch Design's collections will more than fit any bill, providing not only great-looking elements and animations, but color- and design-coordinated elements with ease. These collections are a great value for any shop that does any sort of video, animation and/or DVD production. ■

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Want to Sell

Echolab Prima MSV6 10-input switcher w/chroma key, $12500; Grass Valley 200-2, $5000; Miranda Digipath 16x16 SDI router w/remote panel, $3500; Sierra Video 16x16 composite video router, $1500; Leitch 4x4 MB routers, $175; GVG Ten X, $600; Kramer 5x4 A/V switchers. new, $475. 818-788-4700 or www.tvprogear.com.

TEST EQUIPMENT

Want to Sell

Leader LV-5700 SDI waveform/Vector, $10500; Videotek TVM-821D SDI waveform/vector, $3995; Tektronix WFM601M SDI waveform, $5500; Tektronix WFM601A SDI waveform, $4000; Tektronix WFM601 SDI waveform, $3990; Tektronix 1731D PAL SDI vectorscope, $2000; Tektronix 764 digital audio monitor, $2000; Tektronix 760A audio monitor, $1000; Videotek VTM-100 on screen monitor, $1850. 818-788-4700 or www.tvprogear.com.

VTRs/VCRs/ RECORDING MEDIA

Want to Sell

Sony BVH-2000 1" VTR w/TBC, new 96 min V1-K tape & empty reel, manuals, calibrated & working fine, $400. Ted, 847-441-5999.

Sony BVW-65, xlnt cond, $1500; Sony BVW-70, xlnt cond, $4000. 203-322-3000.

Sony UVW-1800, lw hrs $5000; Sony PVW-2800, from $4500; Sony BVW-70 from $4500; Sony BVW-60,from $1500; Sony DSR-1500A, new, $5150; Sony DSR-45, new, $3995; Panasonic AJ-D950 DVCPRO 50 rcdr, from $6950; Panasonic AJ-D850 DVCPRO 50 rcdr, $3950; Panasonic AJ-D750 DVCPRO 50 rcdr from $3950; Panasonic AJ-D230H DVCPRO rcdr from $1695; Sony VO 9850 w/timecode, $1200; Sony VO 9800 w/timecode, $1000; Accom WSD Xtreme, $3500; Doremi Labs V1 DVR, $3900. 818-788-4700 or www.tvprogear.com.

EMPLOYMENT

HELP WANTED

Iowa Public Television is seeking applicants for an Engineer 2 position to work primarily in the Master Control area. This position will operate master control and transmitter control system for all IPTV transmitters; complete the FCC logs, and record satellite programs for delayed playback or library storage. Other duties include operating servers, flexicart, still stores, digicart, character generator and the weather warning system, along with reporting errors or technical difficulties to the appropriate departments. Work hours are primarily 5:00 p.m. to 1:00 a.m. Tuesday through Saturday with changes as needed. Requirements: Must have experience in operating master control equipment. Salary range: $33,425 to 47,964/annual, plus full benefit package. You may request an application form by: Mail: Human Resources, Iowa Public Television, P.O. Box 6450, Johnston, IA 50131. Telephone: (515)242-3117, Fax: (515)242-4113, Email: Humanresources@iptv.org or complete and print an application form from our Web site, www.iptv.org EOE/AAE.

KPNZ in Salt Lake City, Utah seeks a General Manager for immediate employment. Pay commensurate with experience. Call Art Kralowec at 801-519-2424 or email resumes to: ackralowec@aol.com.

Microwave Radio Application Engineer

Nucomm, Inc. seeks an Application Engineer to assist sales with technical advisement. You will work with sales prior to the customer order to understand system requirements. Assist in the preparation of bid proposals and manuals. Ensure all documentation is generated to manufacture, test and commission the system. Work with equipment vendors to ensure their delivery schedules are met. Oversee final system testing to ensure it meets the customer's requirements. May be required to travel to the customer's site for system commissioning or problem solving. Position has potential of managing an expanded team.

Successful candidates will have:

- BSEE/MSEE preferred
- Good technical writing skills
- Experience managing a team
- Knowledge of MPEG equipment
- Knowledge of television broadcasting equipment
- Knowledge of microwave radios systems and path calculation and analysis

Send resume: apps@nucomm.com, ref.: application engineer

Nucomm

www.nucomm.com

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Business News

Belo to Buy UPN Affiliate

DALLAS

Belo is purchasing WUPL-TV in New Orleans from Viacom for $14.5 million. Belo also owns CBS affiliate WWL-TV in New Orleans.

The cash deal is subject to regulatory approval.

The addition of WUPL will create Belo's fifth duopoly. The company's other duopoly markets include Seattle/Tacoma, Phoenix, Spokane and Tucson. Belo also operates two television stations in San Antonio with its ownership of CBS affiliate KENS-TV and a local marketing agreement with the market's UPN affiliate.

Belo owns 19 television stations and owns or operates seven cable news channels as well as The Dallas Morning News, The Providence (R.I.) Journal, The Press-Enterprise in Riverside, Calif. and the Denton Record-Chronicle in Denton, Texas.

Quartz Electronics Expands Staff

NEVADA CITY, CALIF.

Quartz Electronics has added two new key people to its staff.

Jim Barclay was tapped to be the western regional sales manager for the routing and master control technology manufacturer. Barclay joins Quartz from Accom where he spent 20 years supporting on-air Abekas products.

Another Accom veteran, Rosemarie Collins, has joined Quartz as the office administrator in Nevada City.

"The continued growth in our business meant that we needed additional staff," said Mike O'Connell, executive vice president in charge of U.S. operations.

Recent customer wins for the 15-year-old company include major equipment orders from the Disney Channel, Fox SportsNet and Turner Entertainment Networks. In addition, at NAB2005, the company announced a distribution deal with Sony for its QMC master control switchers.

Rohde & Schwarz Tapped for MediaFLO

SAN DIEGO & MUNICH, GERMANY

German transmitter manufacturer Rohde & Schwarz has signed a deal with telecom vendor Qualcomm to supply its NV7000 liquid-cooled transmitters for the Qualcomm MediaFLO network—for transmitting high quality live audio and video to consumer cell phones.

Qualcomm will use the NV7000s to help the network stream up to 100 channels of content to 3G cell phones through its Forward Link Only (FLO) technology; the service is expected to launch in the United States by the fourth quarter of 2006.

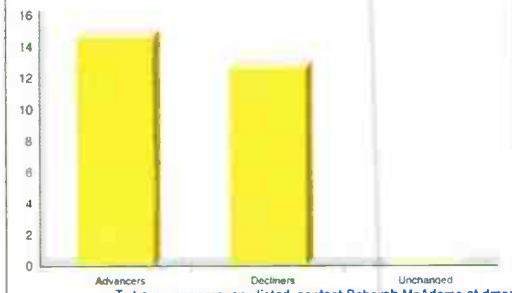
Features of the compact NV7000 include built-in redundancy, two complete exciters—including the associated automation switchover unit—and software designed for smooth upgrades.

The transmitters can be outfitted with a second exciter and the associated automatic switchover unit; the two units can be integrated into the transmitter rack.

The UHF analog transmitters provide 2 kW to more than 40 kW of power while the DVB-T version features 400 W to more than5 kW of transmission power.

In addition, the integrated LDMOS high-power amplifiers have their own power supply for full redundancy.

WIN-LOSE RATIO



TOP ADVANCERS BROADCAST STOCKS
(July 1 -July 15)

ACME + 9.80%
LinTV + 7.58 %

TOP DECLINERS BROADCAST STOCKS
(July 1 -July 15)

Young - 19.76%
Nexstar - 5.56%

TOP ADVANCERS TV STOCKS
(July 1 -July 15)

LSI Logic + 16.43%
Sci. Atlanta + 8.92%

TOP DECLINERS TV STOCKS
(July 1 -July 15)

AVID - 22.62%
Pinnacle - 16.20%

To have your company listed, contact Deborah McAdams at dmcadams@imaspub.com.

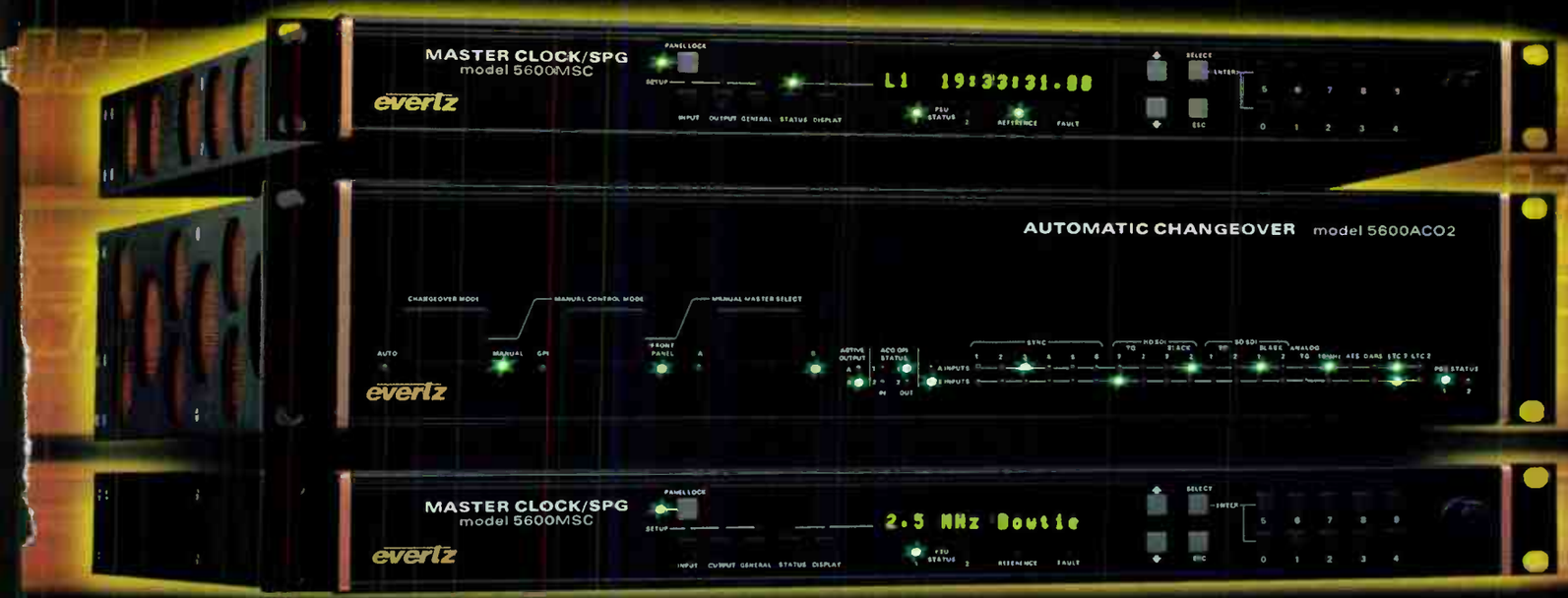
TV Tech STOCKS as of July 15

Company Name	52-Week Range	July 1	July 15	% Change
Avid	39.80 - 68.35	55.05	42.6	-22.62%
Belden	17.65 - 24.59	21.01	22.18	5.57%
Ciprico	3.15 - 4.90	4.27	4.12	-3.51%
Harmonic	4.25 - 12.40	4.92	5.2	5.69%
Harris	21.60 - 35	31.71	32.58	2.74%
Leitch	6.72 - 11.50	11.12	10.27	-7.64%
LSI Logic	4.01 - 10.75	8.69	10.11	16.34%
Pinnacle	3.25 - 6.24	5.68	4.76	-16.20%
Sci. Atlanta	24.61 - 38.10	33.51	36.5	8.92%
SeaChange	6.84 - 19.75	7	7.52	7.43%
Tektronix	20.97 - 34.39	23.32	24.59	5.45%

Broadcast STOCKS as of July 15

Company Name	52-Week Range	July 1	July 15	% Change
Acme	3.30 - 7.45	4.08	4.48	9.80%
Belo	18.00 - 26.45	24.12	24.29	0.70%
Emmis	15.29 - 20.43	17.83	18.15	1.79%
Entravision	6.85 - 9.11	7.85	8.41	7.13%
Fisher	44.40 - 52.60	47.1	44.51	-5.50%
Gray	10.58 - 15.74	12.27	12.97	5.70%
Hearst Argyle	22.57 - 26.48	24.56	24.38	-0.73%
Nexstar	4.52 - 10.90	5.93	5.6	-5.56%
Lin TV	13.68 - 20.70	13.85	14.9	7.58%
Paxson	0.48 - 3.23	0.63	0.6	-4.76%
Sinclair	6.12 - 10.29	9.24	8.89	-3.79%
Liberty	34.32 - 46.91	37	37.3	0.81%
Univision	25.00 - 35.22	27.7	27.09	-2.20%
Young	3.15 - 13.00	4.25	3.41	-19.76%
Tribune	34.53 - 44.32	35.18	35.08	-0.28%
Meredith	44.51 - 55.57	48.44	49.8	2.81%
EW Scripps	44.73 - 53.30	48.62	47.68	-1.93%

Master SPG, Master Clock & Test Set System



5600MSC & 5600ACO:

The ***5600MSC*** is a Master SPG, Master Clock and Master Time Code Generator all in one box.

The ***5600ACO*** Automatic Changeover completes the package.

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