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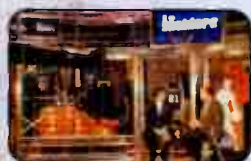
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CBS Primed for Super Bowl in HD

Network brings back Eyevision

by Deborah D. McAdams

HOUSTON

There's nothing ordinary about high-definition production, especially when it's the Super Bowl. The most-watched telecast in the nation, the Super Bowl typically raises the bar for everything associated with it. Even the commercials get national news coverage.

So it is that on Feb. 1, the biggest challenge facing CBS and its coverage of Super Bowl XXXVIII at Houston's Reliant

Stadium will be doing it in HD.

Never mind that CBS carried the very first HD broadcast of an NFL game more than five years ago. Never mind that CBS did the Super Bowl in hi-def two years ago, or that it carried AFC play-off games in HD this year.

"Without any question, it overshadows everything CBS did in the first HD Super Bowl in Tampa in 2001," said Ken Aagaard, CBS senior vice president of operations and engineering.

For the Ravens-Giants
SUPER BOWL, PAGE 16



COFDM Catches on for ENG

Boston market taps alternative transmission format for RF devices

by Mary C. Gruszka

BOSTON

The Boston market has served as a testing ground for digital ENG since the late 1990s, and as a result, a number of early adopters there have latched onto Coded Orthogonal Frequency Division Multiplex (COFDM) modulation for a number of benefits.

While COFDM allows shots in areas where analog didn't work in this congested news market, it will become essential when the new 2 GHz band plan is implemented with new 12 MHz wide channels.

"Analog didn't even cut it in the lab [at 12 MHz]," said Greg Roehr, chief engineer, New England Cable News (NECN) based in Newton Mass., referring to tests at Microwave Radio Communications (MRC), which

NECN participated in.

NECN, a 24-hour regional cable news channel serving most of New England, operates one COFDM ENG van commissioned in 2001 with analog capabilities and two older analog trucks which are dual-satellite and -microwave.

"What pushed us into digital was the prediction of the decrease of spectrum allocation, so it made sense to venture into new technology," Roehr said.

"But digital is an expensive package. For any station, it adds to the price of the truck, but with the lower bandwidth channels you will have no choice [but to go to digital] to save your shots."

COFDM TEST BED

WCVB-TV is a COFDM pioneer, having put its first COFDM van on the road in 1999. This Hearst-Argyle Tele-

COFDM, PAGE 8

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Panasonic ideas for life

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Discovery HD Theater
Covers Antarctic Eclipse



CONTRIBUTING WRITERS

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COLUMN:
Audio Notes



To start the new year off on a solid foundation, we will begin a multi-part series of articles on audio data reduction, a.k.a. audio compression, a.k.a. audio coding. Ever wonder how Dolby Digital (AC-3), AAC, MP3, PAC, WMA, and other schemes actually...Page 26

NAME:
Gary Arlen

COLUMN:
Tuning In



Twenty years ago, the NAB asked me to write a book about "Tomorrow's Television." The resulting volume envisioned much, albeit not all, of the subsequent decades' changes in the media environment. Among the most...Page 35

NAME:
André V. Mendes

COLUMN:
Count on IT



In his "law of accelerating returns" treatise, Ray Kurzweil brilliantly describes a double exponential rate of technological growth that has taken us from the primordial soup to the first unicellular organisms; from the original instance of DNA and cellular divisions...Page 36

Downloadable Sets From the Web

IRVINE, CALIF.

Virtualsetworks, a designer of virtual set libraries, is now offering downloadable sets on-demand for FOR-A's digiWarp EX-II Virtual Set system.

Via the Virtualsetworks automated Web site, www.virtualsetworks.com, digital content creators can view several pre-designed vir-

tual sets, select a studio, and download it immediately after making an online credit card purchase.



Virtualsetworks Studio 83

tual sets, select a studio, and download it immediately after making an online credit card purchase.

"We provide FOR-A's customers with high-resolution, fully immersive images that can be put behind and in front of their talent. When

the camera is moved, the virtual scene, or set moves completely in sync with the talent," according to Eric Pratt, president and CEO of Virtualsetworks.

Targeted at high-end corporate video production and mid-size television broadcast stations, the fully rendered, pre-designed sets may be purchased in packages or individually. When used with a FOR-A digiWarp EX-II system, each set allows the user to pan, zoom, and scan across the backgrounds in perfect sync with the tracked camera movements.

Individual sets run \$400; three different packages of 20 sets each go for \$800; while a three-volume bundle is available for \$1,800. The price for individual sets is \$400. The company will also design custom sets, priced by project. Sets are distributed as 2D image files in the .tga format, backgrounds are 24 bit, and foregrounds (such as an anchor desk) are 32 bit.

Products

Al Hurra Prepares to Launch

SPRINGFIELD, VA.

The new government-funded network aimed at the Middle East is set to launch. Al Hurra, formerly referred to as the Middle Eastern Television Network, will comprise two studios, two control rooms, 10 edit bays and a news floor with nearly 60 work stations. Cinegy of Munich, Germany is supplying the disk-based production workflow hardware, with TGS acting as system integrator. Nvision of Nevada

City, Calif., supplied its NV-5128 Master Control Router, which is designed for analog-to-digital transition.

The 5128 accepts up to 128 AV inputs from one to four channels of digital master control; a single-channel system can handle up to 96 router output buses. The entire system fits in an 8RU frame. Al Hurra and CBS Television City in Los Angeles were the first two NV-5128 customers, according to Nvision.

Network

Matsushita to Build TV Systems

BEIJING

Panasonic parent company Matsushita intends to build a digital broadcast system based on the Panasonic SD storage card.

Matsushita will develop its digital broadcasting system in conjunction with China's largest broadcaster, China Central Television, and Dayang Technology Development. The deal calls for

Matsushita, CCTV and Dayang to have a beta product finished by April and to produce a final version of the system by the year's end.

The system is being developed in anticipation of the 2008 Olympic Games.

According to Matsushita, the deal is not exclusive; the company has approached networks around the world with similar agreements.

Business



NCTA REQUESTS PLUG-AND-PLAY REVISIONS

The FCC's plug-and-play order needs serious tweaking, according to the National Cable Telecommunications Association (NCTA). As written, the order contains security loopholes that hackers are just waiting to jump through, the cable lobby contends.

In a petition filed with the FCC just before the New Year, the NCTA requested "reconsideration or clarification" of the order, for tighter testing and PSIP requirements on plug-and-play compliant devices.

Under the current order, such devices are supposed to have a slot for a CableCARD, the cable industry's trademarked moniker for its point-of-deployment (POD) security component. CableCARD is a PCMCIA-sized successor to the set-top box, and is intended to provide conditional access without all those costly truck rolls.

Any plug-and-play device—from a digital TV set to a DVR—can be a "host" to a CableCARD, and it is this POD-host interface that concerns the NCTA. Where the set-top is a proven bulwark of security, the POD-host interface could end up being the techno-equivalent of a couple of bungee cords and a tarp.

That's because, the NCTA states, the FCC's order requires only that plug-and-play devices be tested by any independent lab with personnel who are "knowledgeable" in the Joint Test Suite defined by CableLabs. What's more, the order doesn't even require that a device pass the test or be certified before it hits the market, but rather that it be retested should it fail. It also allows for a sort of legacy certification for any device manufactured after a first device passes muster. That is, if a company gets a DVR certified, a subsequently manufactured DTV would be automatically certified.

The NCTA emphasized that the viability of the entire cable business was at stake.

"The importance of making this

system work cannot be overstated," the NCTA stated. "CE manufacturers have never before built integrated DTVs with digital cable set-top box functionality built inside, and they have never been responsible for protecting the copy control signals and business models that make the industry work."

The petition went on to contend that only CableLabs could provide a competent and appropriate testing ground for new plug-and-play devices.

"The testing and certification of 'plug and play' products is not one that may be satisfied in a garage," NCTA attorneys wrote in a fit of creative pique. "CableLabs was an obvious selection for testing and certification."

The NCTA requested three clarifications regarding PSIP. The first involves rewriting the rule prohibiting cable operators from carrying more than 12 hours of PSIP event information. The second has to do with language that could require cable operators to correct ATSC noncompliant PSIP data provided by programmers. The third is a request to change a dictate that cable operators must describe *all* services in the PSIP stream to just audio/video services carried in-the-clear.

"NCTA suggests slight changes of working to clarify the rules' intention and avoid misunderstanding."

The NCTA filing had plenty of company. Broadcast Music Inc. (BMI), along with the American Society of Composers, Authors & Publishers (ASCAP) implored the FCC to add an exemption for the type of tracking devices their groups use to monitor performances for the distribution of royalties. The National Music Publishers Association and the Songwriters Guild of America asked the FCC to stay the order, citing inadequate piracy protection for digital audio, and DirecTV complained that CableLabs had too much sway over developing the plug-and-play standard.

Federal Frequency

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Accom®

COFDM

CONTINUED FROM PAGE 1

vision ABC affiliate station now boasts five COFDM vehicles and three receive sites; two in Boston, and one on their transmitter tower in Needham, Mass., about eight miles out of Boston. And soon, one helicopter as well.

Mike Keller, director of engineering, Eastern Regional, Hearst-Argyle Television said that WCVB-TV was used as a COFDM test bed for the rest of the Hearst-Argyle Television group, and that he worked closely with North Billerica, Mass.-based MRC and other manufacturers and industry groups.

Both WCVB-TV and NECN use MRC CodeRunner transmitters and receivers, Tandberg Television encoders and Alteia IRDs.

COFDM ON THE RUN

For portable COFDM transmission, NBC affiliate WHDH recently purchased the Carry-Coder made by Broadcast Microwave Services of Poway, Calif. Russell Murphy, eastern sales manager, Broadcast Microwave Services, said that the Carry-Coder is comprised of MPEG-2 encoding, COFDM digital modulation and RF amplification.

The videographer at WHDH uses the Carry-Coder mounted on the back of the camera, Murphy said, but it can be used in a backpack as well.

With the unit docked to the camera, "he can grab the camera and run," Murphy said. "Using this technology, a shooter [videographer] can go into and wander inside a building. There's no need to trail out cable from the truck and the signal range can go for blocks with an omni to omni antenna, and farther with a higher gain antenna."

Keller said that for WCVB, he has not yet found a compelling circumstance where camera-mount COFDM operations make sense on a day in, day out basis, mainly because shooting that way takes up two channels, from the camera to the ENG truck, and from the truck to the receive site. When needed for special events, he rents a system.

"But we have a portable lunchbox-like setup that is mounted on a tripod, the MRC Strata," Keller said. "With it, we can shoot 20 stories up and aim out the window. You could never get that shot in analog."

WCVB relies on COFDM, to not only produce stunning pictures from the field, but to help them compensate for the distance from Boston. Compared to the other stations in town, they are located farthest from the city.

"We spend more time on the highway, so we have to take advantage of technology to reduce that handicap," Keller said. "We can feed tape to the

station while in motion."

And cover live stories, such as the recent winter storms, while driving.

But COFDM is not without its challenges.

"The cliff effect is the biggest problem," Keller said. "People are used to analog degrading gracefully. If there's interference you may not lose the picture, but [with digital] if someone else

to keep it from happening."

TUNING WITH ANALOG

Keller and Roehr and their crews have come up with various techniques for tuning in the signal. Often analog is used to initially aim the antenna.

"We start up on analog to get the best receive carrier level (RCL), and then switch over to digital," Roehr

Both Keller and Roehr agree that other metrics are needed. Monitoring the bit error rate "could make a big difference by telling if you are on the hairy edge so you know whether or not it is a marginal shot," Roehr said.

Keller cautioned that the bit error rate should be looked at over time.

"We need to plot if it's getting better or worse, how's it trending. If it is getting worse, bail the shot," he said.

Keller has built various bit error rate monitors, with data taken from the IRDs. Spectrum analyzers are also helpful in picking out the signal.

Because of the inherent delay in processing the MPEG signal, the truck's antenna needs to be panned slowly for digital. For analog, "if the picture gets worse, you see the results instantly," Keller said. "With digital you have to wait to see if you get a picture or not."

Roehr said that for the receive site, "the COFDM system would work better with a sector scan antenna, to get a broader receive beam to receive as many packets as possible."

And be wary of static shots or color bars for setup, Keller cautioned. Since they use minimal coding, they don't indicate how a moving image will be transmitted. Keller said that now WCVB's ENG crews plays a test videotape with full screen motion before a live shot.

As for troubleshooting COFDM problems, the key Keller said, is to have more than one of everything.

"If you have problems with one receive site, you can swing the antenna over to the second and compare it to see if the transmitter is working," he said. ■



WCVB technician Craig Pizzo, with an MRC Strata transmitter.

fires up [and interferes], you get the pixels [tile effect] and then go to black. There's no warning to the producer. It's all or nothing. This is a new issue—how to survive that and how

said. "But it's not just based on signal strength. Just because you receive a signal, doesn't mean that you are receiving enough data to create a digital picture."

BUYERS & SELLERS

Turner Entertainment Networks has ordered two Quartz Electronics QMC-HD Master Control switchers to control its new HD Channel, due for a Spring 2004 launch. The QMC-HD controls uncompressed HD signals and supports multiple levels of key, an internal logo store, dual voiceovers and eight channels of audio with full internal shuffling. Control will be from Turner's automation system with QMC-FS control panels for manual operation.

TVA-Chem, a Le Groupe TVA-owned and operated station, purchased and installed Avid's end-to-end digital broadcast systems for news production and dissemination. The station, located in Trois-Rivières, Quebec, is the first Le Groupe TVA regional station to con-

vert to a digital newsroom system following TVA's decision earlier this year to use Avid equipment for news production for its entire network. Terms of the deal were not disclosed.

The system chosen by TVA-Chem consists of Avid Unity LANShare EX for News shared storage system with TransferManager and MediaManager software, Avid NewsCutter XP systems and NewsCutter Adrenaline FX nonlinear news editing systems. Avid Countdown software and Avid AirSpace video servers for play-out are included, as well. The station will use the systems to produce its daily regional newscasts and feed news items to TVA network headquarters in Montreal.

Time Warner Cable has added OmniBus automation systems to two

more of its regional news networks—News 9 San Antonio and News 24 Houston.

At each of the Texas facilities, an OmniBus automation system is integrated with a Pinnacle Systems Vortex video server, AP's ENPS newsroom production system, and VertigoXmedia graphics automation to enable broadcast of local news, weather, and sports delivered in the wheel format, according to OmniBus.

Time Warner Cable previously installed similar systems at its regional news operations in Raleigh and Charlotte, N.C. and Albany, N.Y. News 9 San Antonio launched April 2003 as San Antonio's first 24/7 local news channel. News 24 Houston launched December 2002. Both are operated under a partnership with Time Warner Cable and the Belo Corp.

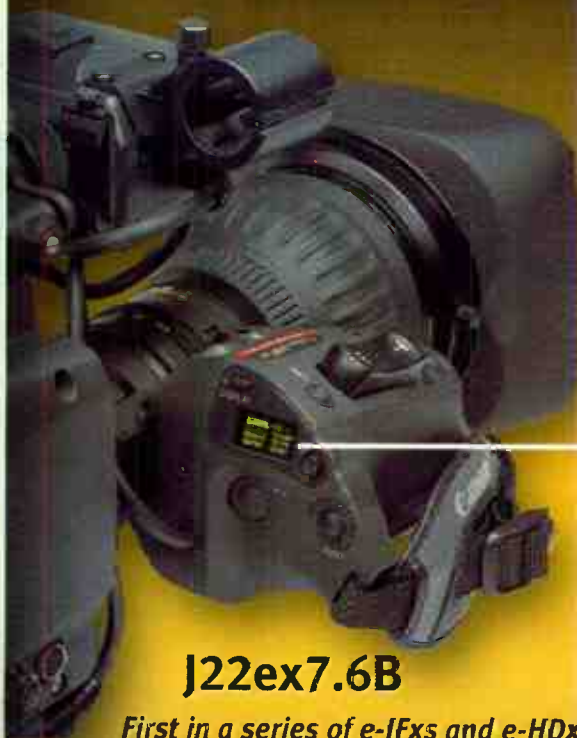
Canon's new 'e' lens brings 'e'nhancement to a new level.

From its enhanced features to its environmental design, Canon's new J22ex7.6B IRSD/IASD lens is engineered to impress. The widest angle portable telephoto lens ever produced, the J22ex7.6B is the first in a series of Canon e-IFxs and e-HDxs broadcast lenses. These lenses feature enhanced digital technology, which improves on the performance of the highly useful Digital Drive tools and are manufactured with non-polluting components including lead-free glass, minimizing environmental impact.

e

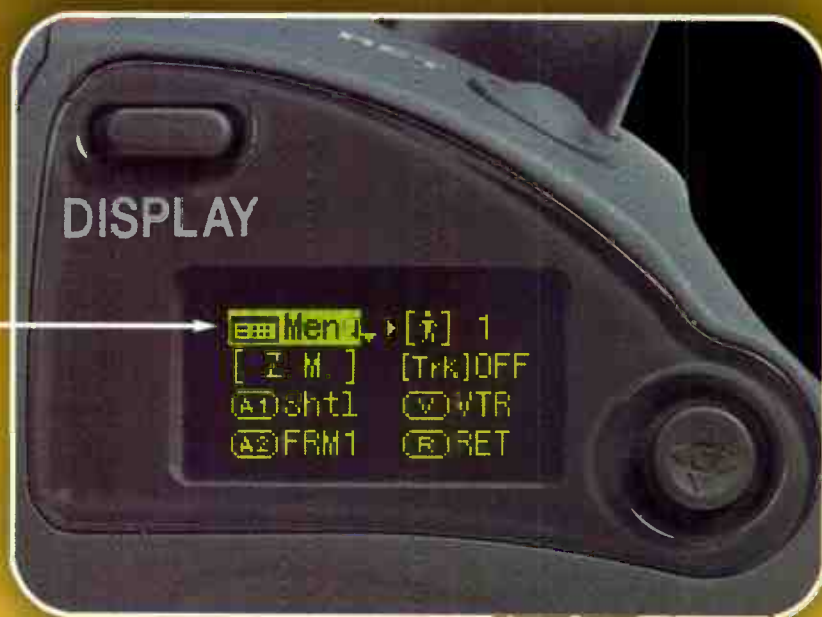
Enhanced Features

Environmental Design



J22ex7.6B

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eIFxs

FEATURES AT A GLANCE

Equipped with an informational LCD display and digital feature navigator, e-IFxs series users can customize the enhanced digital functions with ease and precision. New features of e-IFxs lenses include:

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MSRC Identifies Best Practices

Media Security Reliability Council pursues electronic homeland security

by John Merli

WASHINGTON

When the World Trade Centers in Manhattan were violently razed on Sept. 11, 2001, the nation's loftiest antenna farm, serving the largest U.S. television market was obliterated. Just as the destruction of the Twin Towers awakened the world to a new state of heightened vigilance, the sudden cessation of over-the-air TV and radio signals in New York had a likewise effect on local broadcasters.

In March 2002—six months after 9/11—the FCC created the Media Security and Reliability Council

Broadcast Communications at Harris Corp., who chairs the MSRC's Communications Infrastructure Security Working

each market] need to be part of the solution," he said.

Glenn Reitmeier, chairman of the Prevention Subcommittee in Allan's



Bruce Allan, president and general manager of Broadcast Communications at Harris Corp., who chairs the MSRC's Communications Infrastructure Security Working Group

Group. "September 11th galvanized many in the media community to address more systematically the necessity of planning a response before the next crisis occurs."

FCC Chairman Michael Powell has applauded the MSRC's work to date, but he recently made it clear to broadcasters that having an unrehearsed plan on paper "is not really a plan at all, as far as I'm concerned."

Allan agreed, saying Powell expects the MSRC to provide broadcasters with "tools to identify and take advantage of redundancies, to create templates for assembling disaster recovery plans, and to underscore the importance of rehearsing those plans."

Allan said his group believes all local media "should collaborate to increase their collective geographic emergency operations."

He said a key phrase in the working group's final report would be "collective capabilities" of media companies working in tandem.

"Inter-industry agreements [in

working group, said the level of required cooperation means "we're talking here about considerations that reach beyond the competitive aspects of local news."

Reitmeier, vice president for Technology at NBC, said examples of unorthodox cooperative efforts would include radio and TV broadcasters retransmitting audio of emergency information; translation of various TV/radio signals into Spanish, Chinese and other market-relevant languages; and coordination by broadcasters and cable systems using on-screen text updates and other data to increase uniformity-of-message and universal access.

BEST PRACTICES

While the final report from the MSRC is expected this Spring, 88 best practices have already been identified. (These are available in several documents posted at www.fcc.gov/MSRC.)

Though the practices cover a wide range of priorities, FCC Media Bureau Video Division Chief Barbara Kreisman said one of their common links is they strive to address the question: What can be done to further overcome our vulnerability in catastrophic emergencies? She pointed out that some of the MSRC's recommendations urging total cooperation between agencies and otherwise-competing media were already tested, in part,

MSRC, PAGE 15

Putting Best Practices Into Action

Thomas Fitzpatrick, deputy commissioner of the New York Fire Dept. on 9/11, was a major source of firsthand information for the MSRC. Now a vice president with New York-based Giuliani Partners, Fitzpatrick outlined communication security priorities from a perspective of experience.

"Government crisis communication—including all official warnings and alerts—is accomplished through systems that are typically owned and operated by private companies," he said. "Time is the critical factor in preparing, responding to, and stabilizing an incident. Disaster communication and warning is, in reality, a public/private partnership."

Broadcasters, satellite and cable operators play a major role in delivering risk communications and warnings to citizens because of their capability to provide ongoing real-time coverage of events, Fitzpatrick said.

"It is crucial to national security and public safety to preserve the ability for government to effectively ensure that... information can be communicated to the public during a time of crisis," he said.

"While keeping all stations on-air is most desirable, ensuring that some [broadcast] stations remain on-air to serve the community is an absolute necessity," he continued.

Consequently, community-level planning and coordination is the cost-effective means to achieve the necessary infrastructure redundancy and the geographic diversity of equipment and facilities.

"There is greater need now than ever before for 'joint planning' [among] local levels of government and private industry... involving seamless procedures and systems developed from the ground up—as part of a national scheme—which includes planning and exercising for technical, natural and man-made disasters. There is no better example of the type of planning that is needed than a media-based risk communication, hazard warning and crisis information process."

—John Merli



New York, NY, Sept. 20, 2001 — Rescue workers standing next to the antenna that was formerly atop the World Trade Center discuss next steps in their rescue efforts.

(MSRC), a federal advisory committee formed to issue plans "to assure the optimal reliability, robustness and security of the electronic media" in emergencies.

Given that the key to effective emergency communications is usually local, much of the MSRC's intentions were aimed squarely at local broadcasters.

"The reality is that TV broadcasters have done a great job in dealing with local emergencies even when their most basic operations have been destroyed," said Bruce Allan, president and general manager of

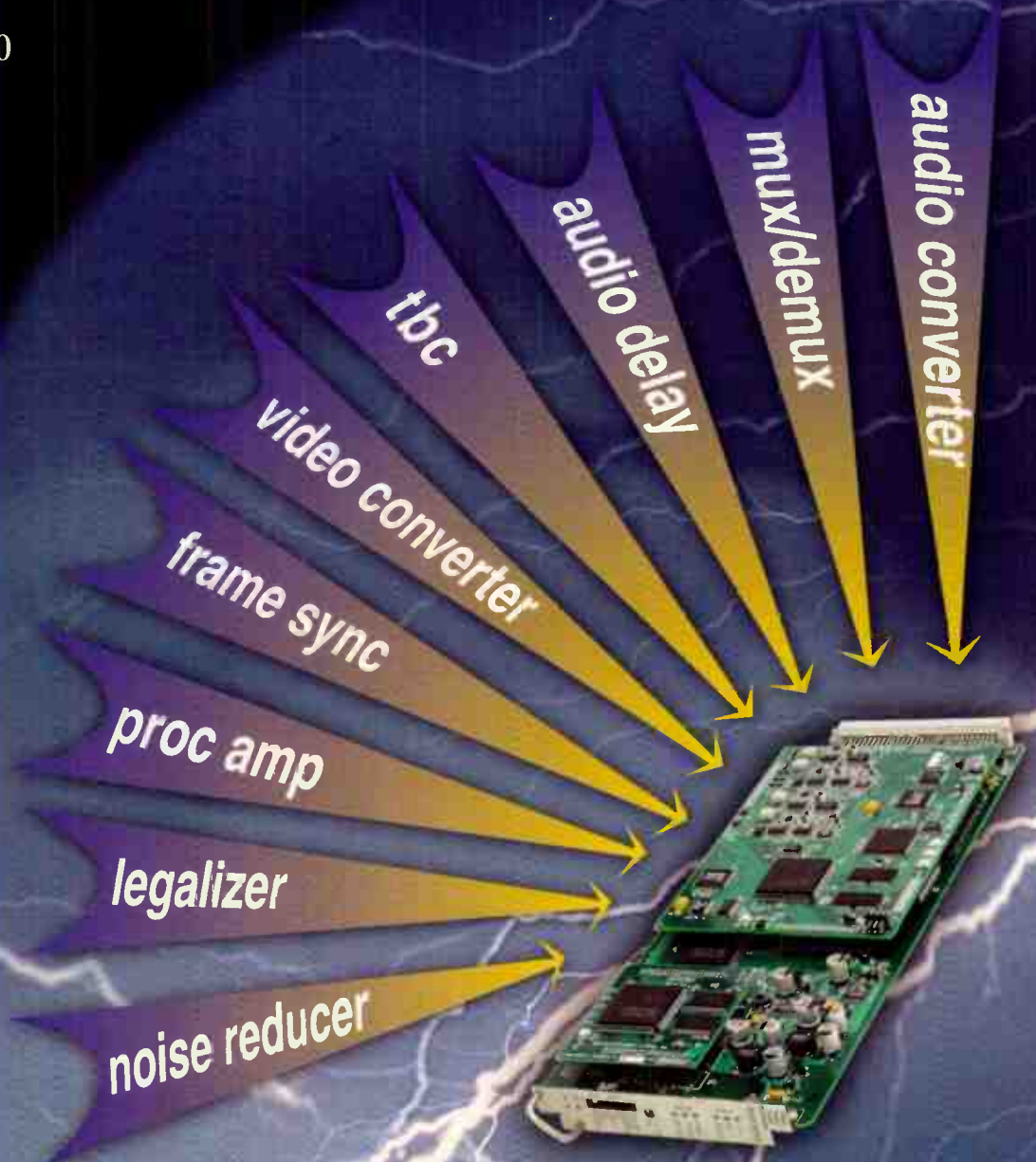
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Basketball Gets Graphic

NBA TV develops unique real-time stat relay systems

by Claudia Kienzle

SECAUCUS, N.J.

NBA TV began in 1999 as an SDTV-only operation. This past summer, NBA Entertainment took its namesake network hi-def. The heart of NBA TV is a new 15,000-square-foot facility in Secaucus, N.J., which generates the content for the 24/7 network; video highlights and programming for other media outlets; streaming media for the league's Web site NBA.com, and information such as real-time stats and scores, delivered to cell-phones and other mobile devices.

The facility design included the integration of the dual-standard capable Sony MVS-8000 production switcher, as well as a number of the multistandard Sony SRW-5000 VTRs.

NBA TV now features four nights a week of live, exclusive NBA games, including up to 50 HDTV telecasts annually. NBA TV is a national rights holder along with ABC, ESPN, and TNT, all of which carry their own exclusive NBA games.

The network originates its own live HD programming as well as takes live HD feeds from Comcast SportsNet, MSG Networks, Fox Sports, and other regional sports cable networks.

"Then, after adding our own graphics packages, NBA TV broadcasts the games nationwide, with the regional markets blacked out to protect regional broadcast rights holders," said Steve Hellmuth, senior vice president of operations and technology for NBA TV.

FORMAT SWITCHING

For HD game nights, NBA TV must convert its studios and control rooms to HD in order to provide support to the HD game telecasts.

"The process takes about 10 minutes, on average, and requires the introduction of a number of standards and format converters," said Mike Rokosa, senior director of engineering for NBA TV. "When the NBA TV control room must switchover from live SDTV to HDTV, the change must be made within 30 minutes, but oftentimes, the production crew has been able to complete it in just three minutes."

Not only does the live production team have to ensure that HD sources are feeding the Sony pro-



The NBA TV control room, where graphic data arrives real-time from remote courtside locations

"Carrying live game statistics back to our Secaucus studio and creating the Duet graphics there is far more cost-effective."

—Mike Rokosa, director of engineering, NBA TV

duction switcher, there's the matter of the complex, extensive dual-standard graphics operation.

With the help of a customized graphics control interface, a single Chyron operator composes two separate graphics packages consisting of the same graphics tailored for either the SD or HD mediums using Chyron's Lyric graphics creation soft-

ware. The same operator then delivers those SD and HD graphics packages live-to-air from two separate Chyron Duet character generators configured for HD and SD respectively.

"The graphics placement in HD is toward the bottom of the 16:9 screen, with information like the game clock and score displayed aesthetically in a narrow bar along the bottom. For the SD program, which is 4:3 letterboxed, the graphics are placed in the black strip below the picture so as to not interfere with game footage," Rokosa said.

Hellmuth said the physical shape of the basketball court lends itself naturally to 16:9.

"HD camera operators shooting courtside or in NBA TV's studio are instructed not to 'protect for the 4:3 picture,' but rather to maximize the 16:9 widescreen. Because of HD's superior picture resolution, the viewer is able to appreciate all the intricate action and teamwork as it's taking place on the court, rather than having the camera zero in on some aspect of the game play—making the HD viewing experience more natural and enjoyable," he said.

Part of the intricate graphics setup is the live, real-time feed of game statistics recorded on laptop computers

by official NBA statisticians sitting courtside. Besides informing the local press, the statistical output also feeds the scoreboard in the arena, and production trucks producing the game locally.

STATS ON DEMAND

But for NBA TV, these statistics are also relayed via an IP network back to NBA TV's Secaucus studio. By inputting this live data feed into the interface to the two Chyron Duets, and incorporating it into the live on-screen graphics, NBA TV is able to ensure that it is always displaying information that accurately reflects the clock and score at the arena. The graphics, which range from lower-third supers to full-screen 3D animations, run through a dual-configured Leitch Opus switcher, which mixes them with either the live 1080i HD feed from the venue or the downconverted 480i video, outputting both an HD and SD signal for air.

The HD program signal is also fed back to the game announcers at the arena so that they can see the HD graphics as they air and refer to them in their live commentary.

"We took this innovative approach because we realized that flying Chyron Duet operators to the sports venues, and maintaining these high-end CG machines in the field was prohibitively expensive. Carrying live game statistics back to our Secaucus studio and creating the Duet graphics there is far more cost-effective," Rokosa said.

NBA TV also airs sophisticated 3D animations and other graphics created in HD. The in-house operation utilizes off-the-shelf 3D/2D anima-

BASKETBALL, PAGE 18



Anchor Mark Morgan, on the studio set of NBA TV Live.

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Super Bowl

CONTINUED FROM PAGE 1

match-up in Tampa two years ago, CBS had separate acquisition operations for its standard- and high-definition feeds.

"We don't do that anymore because it's just too cost prohibitive," Aagaard said. "We'll create one program and two feeds."

CBS will crop the 16:9 HD signal for the 4:3 SD feed. Eliminating dual acquisition certainly cuts down the number of cameras necessary to cover the game, but it creates its own set of challenges. For example, so complicated is it to incorporate historical 4:3 footage into newly created HD pieces that all features will be done in SD, said Arthur Harris, vice president of broadcast operations for CBS.

Fortunately that's not the case with immediate recording and playback, which will be handled with a bevy of 1080i EVS LSM-XTs.

"With the move to HD, it's really made a big difference for us," said Greg Macchia, general manager of operations for EVS. "In the past, a Super Bowl may have had two or three machines. Now we're looking at 12 to 13 systems."

Macchia said the LSM-XTs have an SD output, so no external equipment is necessary for downconversion.

Using a single acquisition source also calls for manipulating technologies that haven't yet achieved HD capability. Such is the case with the special effects of Eyevision and the six Super Slo Mos CBS plans to employ for the game.

The 90 frame-per-second Slo Mo cameras are 16:9, but the vertical resolution is about 45 percent that of HD.

EYEVISION AGAIN

As for Eyevision and its semi-circular view of the action, it's not yet graduated to HD, but it has been spiffed up, said Larry Barbatsoulis, CBS director of technical operations.

"We've improved the video quality and pointing accuracy," he said.

The network originally developed Eyevision for the 2001 Super Bowl in partnership with Core Digital Technologies, PVI, and more recently with German cable company Sa11, which uses the system for soccer.

Eyevision is essentially an array of robotic cameras placed intervals around the field and controlled so that a rotating perspective can be rendered.

In Tampa, the cameras were arranged to capture a 220-degree perspective at 12 degrees apart. In Houston, the cameras will be placed closer together—about five degrees apart for a 180 perspective—to create a smoother image.

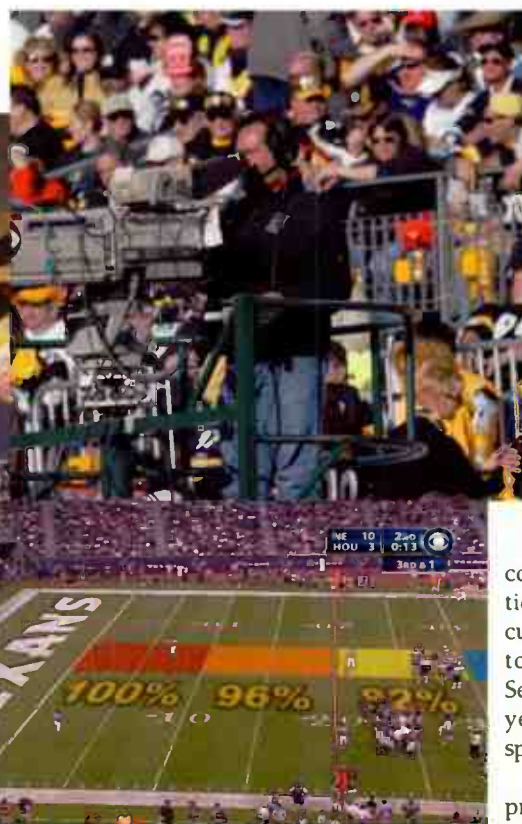
Security concerns mean no Goodyear blimp at Super Bowl XXXVIII, so for those sweeping overhead shots, CBS has turned to Cablecam's Multi-V system. Also known as the "Flying Fox," the Multi-V is fitted with a Cineflex V14 gyro head, a Sony 950, 1080i camera and a fiber optic festooning system for delivering uncompressed HD video.



said Sam McCleary, vice president of business development for PVI.

CBS now has a room below master control in New York where six PVI operators communicate with spotters at stadiums across the country.

The PVI system uses video from the network's cameras placed at the 50-yard line, and at both 25-yard lines. It reads the video in near real-time and places the line using pattern recognition. That, however, can be a problem if it snows.



Clockwise from top left: Ten-time Emmy Award-winner Larry Cavolina, foreground, will direct, and six-time Emmy winner Mark Wolff will produce coverage of Super Bowl XXXVIII. Photo by David M. Russell. Armen Keteylan interviews Patriot's head coach Bill Belichick at the 2002 Steeler-Patriots AFC Championship Game. Sideline cameras will double as feeds for the "First Down" line graphic generator. Photos by Rusty Kennedy. CBS Worldwide Inc. All Rights Reserved. PVI's kicker-stat graphic shows the success rate of a kicker at a given yard line.

At press time, other standard-definition cameras in the CBS Super Bowl arsenal included at least four RF units. In all, CBS will use 26 HD and 10 SD cameras at the game, the majority of them from Sony. Sony will also provide the HD switchers as well as the HD sponsorship of the game.

GRAPHICS FOR 16:9

Graphics are another area where creating two formats from one feed becomes tricky. CBS will have one operator driving two SGI Onyx2 machines powered by vizrt software via a single keyboard. That operator will control statistics, names and CBS's signature clock-and-score "eye-box," which will be generated in both 4:3 and 16:9 and left on the screen for the duration of the game.

The virtual "First Down" line itself will be provided by Princeton Video Image. The company will take a mobile unit to the Super Bowl, even though it recently developed the technology to do the line from the studio, using a spotter in the field.

"We used to have to roll a truck and have three people to a game,"

Not that snow is a huge risk in Houston, especially at Reliant Stadium, the first NFL venue with a retractable roof. It's simply the Super Bowl.

PVI has enhanced the First Down line, with something called "shadow mode," that adjusts for half sun/shade situations. The company also provides the graphic that shows what a kicker's success rate is from a given yard line on the field. PVI introduced kick stats last fall.

PVI's truck will be among a convoy of approximately 14 production units, including, among others, four from NEP, two from All Mobile Video, two from Core Digital, and an NMT hi-def truck for the Janet Jackson half-time extravaganza that MTV is producing.

Because CBS is also doing its pre-

game shows in HD this time around, placement of those trucks is even more crucial, said Barbatsoulis, because HD signals don't travel as far. Fortunately, Reliant Stadium is wired to the max, so drop availability won't be a factor in determining where the trucks can or can't be parked.

SURROUND SOUND XXXVIII

In addition to all the visual and graphic bells and whistles, Super Bowl XXXVIII will also be broadcast in 5.1 Dolby Surround Sound.

CP Communications will capture the audio using four Shure VP88s for crowd effects, several Sennheiser 816 shotguns on the cameras, and probably eight parabolics equipped with Sennheiser MKE IIs.

CP is also providing the CBS audio team with a high-powered Motorola radio communication system, rather than the tradition walkie-talkie system that relies on frequencies that are becoming more and more crowded.

Across the board, frequency coordination for all RF operations is becoming more difficult—so much so that CP has to reprogram standard Sennheiser frequencies every year, according to a CP spokesman.

There are no transmission problems inherent at Reliant, Barbatsoulis said, it's just that the number of RF devices such as baby monitors, garage door openers, and radios used by caterers and security teams has exploded. As a consequence, much of the production team will be using Nextel cell phones for field communications.

Crowded frequencies also limit the amount of RF acquisition equipment that can be used in the field. And even though some news operations are now using COFDM equipment to cope with ever-shrinking frequency paths, that won't happen at Super Bowl XXXVIII, said Barbatsoulis.

"The minute you start processing, you get delay issues," he said. "You're encoding and decoding, and that takes time."

Once the hassles of production are dealt with, CBS is taking no chances with backhaul. In all, six outbound and four inbound feeds will be in use. Vyvx will supply two-way fiber, CBN Satellite will provide C-Band connections and Ku-band will be used for redundancy, something CBS did not do for the 2001 coverage in Tampa.

After all, it is the most-watched telecast in the nation. Even the commercials get national news coverage. ■



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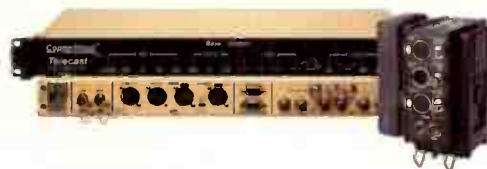
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Basketball

CONTINUED FROM PAGE 12

tion packages such as After Effects, Comotion, and 3ds Max.

However, HD animations and the broadcast design channel branding were created by the EA Sports division of Redwood City, Calif.-based Electronic Arts (EA), a leading video

game developer.

For sleek 3D transitional elements, EA Sports adapted CGI NBA star basketball players, originally animated for EA's video game called "NBA Live 2004," and re-rendered 200 frames worth in Alias Maya so that NBA TV can use them during live telecasts to segue to player highlights.

To meet the delivery requirements of its many media partners, NBA TV

also uses the Panasonic UFC-1800 universal format converter to convert footage between SD, 720p HD, and 1080i HD formats, and must maintain Panasonic D5 HD VTRs, as well as its chosen mastering method, HDCAM. An additional specialized Panasonic frame-rate converter helps convert original material acquired in 720p HD on DVCPRO HD using Panasonic's Varicam HD cameras to

1080i HD.

Another major source of historical footage is NHK, Japan's national TV network, which has been recording NBA games in HDTV since 1992. However, since NHK used one-inch, analog, 1,25-line HD tape (which is now obsolete), to record the games, the footage must be sent to Sony's Hi-Def Center in Hollywood for conversion to HDCAM.

"NBA TV is growing and expanding very rapidly, both in terms of our technical capabilities and the production of HDTV"
—Steve Hellmuth
senior vice president,
operations and
technology, NBA TV

NETWORKED NETWORKS

Besides storing footage on Grass Valley Profile HD or SD servers for instant random access and delivery to air, all Pinnacle Liquid Silver SD non-linear editing systems feed off a very powerful SAN (storage area network) system (the HD conforms are currently out-sourced). And NBA TV is also in the process of adding NAS (network attached storage) systems for near-line archive, and LTO or Sony SAIT data tape systems for off-line archive. The NAS and data tape systems will be installed in Spring 2004.

"The completion of this step will allow us to address the preservation of the NBA's historical footage on a more permanent basis," said Hellmuth. Currently, that library is a mix of Betacam SP, Digital Betacam, and HDCAM, which includes footage from the very first League game played back in 1946 through to the present—when the game schedule now includes over 1,200 games annually.

"Prior to our 1999 launch, our operation focused on the post production of DVDs, home videos, and highlights reels. But today the focus is on the production of live games and features to fill our round-the-clock network. NBA TV is growing and expanding very rapidly, both in terms of our technical capabilities and the production of HDTV and new media content—leveraging and enhancing the NBA's vast, valuable media assets." ■

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Marrying Breaking News with Automation

KIRO TV ties production devices together with MOS



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Page 5

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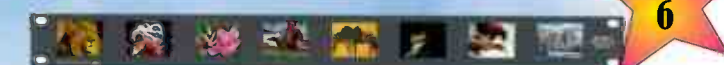
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Page 8

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at NAB



Automation

CONTINUED FROM PAGE 19

cast late in December. LaPlante wanted to get training on the new system out of the way before the next rating period.

"You have to pick your opportunities during the year when you'll have the least impact with those growing

pains," he said.

For the first month or so, editors backed the stories up on tape in case there was an equipment or operator error with the NewsLink.

None of KIRO's other production devices, character generator, stillstore and so forth, were MOS compliant when the station bought the NewsLink. But Walters expects they will soon replace at least some of those

legacy devices with new, MOS compliant equipment.

BROADCAST SOFTWARE

"That doesn't mean we're going to wholesale automate, but we'll look at what portions of that process we can," he said.

And he gives Sundance Digital high marks for its attention to television station workflow in the way it wrote

NewsLink's software.

"Their software people go to TV stations, so they're not just writing software," he said. "They're writing software with a direct relation to how that impacts different broadcast processes."

In KIRO's case, Sundance even went a step further.

"When we went on the air with this," Walters said, "their code writer for the NewsLink came up and sat in the control room with us, found a couple of things he needed to refine, went in the back room and wrote the code and we stuck it in."

There was a measure of comfort for the station going with Sundance Digital for this key automation link; almost a half dozen years earlier they began to install Sundance products in their Master Control room. Today, the Sundance Integrated Device Operation Network (SIDON) controls all the other devices in KIRO's Master Control.

"By putting all this in, what we've done is gone from six people working in master control to one," said Walters.



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**"The system had to
handle breaking
news."**

— KIRO director
of engineering
John Walters.

That one master control operator has become busier and busier preparing material for air during the day, so Walters sees a time when the NewsLink controls not only the newscast elements but the commercial spot play within the show. He's being cautious before moving that far, however.

"At this point I'm trying to keep automation in master without any hooks to the world," he said. "One of the dangers to the news system is that if you're hooked to a system where people are on the Internet all day long, I don't want that access to our automation upstairs. As soon as we can find a gateway that will protect us, we'll put the two of them together."

KIRO's installation of Sundance Digital's NewsLink, with its MOS protocol, is the first, key step in newscast device control automation.

"So if we have the right crystal ball we'll look back a few years from now and say that was the right way to go," Walters said. ■

Watching Winter Sports

Overlay technology brings skiing a new view

by Susan Ashworth

STAMFORD, CONN.

With the 20th Winter Olympics in Torino, Italy, still two years away, the world's best snowboarders and skiers have their focus squarely on the 2003/2004 FIS World Cup Skiing competition. Founded in 1924 during the first Olympic Games in Chamonix, France, today 101 National Ski Associations participate in the annual FIS competition.

A marathon competition held from August 2003 through March 2004, the FIS is covered for the United States by The Outdoor Life Network (OLN), a cable network based in Stamford, Conn., focusing on outdoor events.

For the FIS, coverage meant traveling to Groden, Italy; Lienz, Austria; St. Petersburg, Russia; and Adelboden, Switzerland. Unlike the Winter Olympics, individual FIS events are held

two video clips of each performance and superimposing them over the same background. This allows the network to do in-depth comparison and analysis, he said.

Broadcasters used the technology with much fanfare during the 2002 Salt Lake City Winter Olympic Games.

"Using the technology, we can transfer and dissolve between two images on the screen, as one skier



Separate images of competing skiers are superimposed over a single background using Dartfish's SimulCam.

makes a run down the hill," Carter said.

The technology had been used sporadically in year's past, he said, "But we decided to use it more aggressively this year because we think it tells a great story."

Other technology in OLN's arsenal includes a European-based production truck that treks across the continent to cover various events. OLN primarily utilizes Sony cameras as well as a few Ikegami models.

OLN considers itself unique in that it uses the technology to tell a slightly different story than its European counterparts. The FIS world feed is focused more on the events and skiing techniques, whereas OLN uses SimulCam and other solutions to customize coverage. American audiences are accustomed to in-depth stories about the athletes themselves, in addition to the technical data from the events.

By using technology such as the SimulCam, the network can break down the events more precisely and use standard technologies like telestrators and slow-motion devices to take viewers more completely inside the coverage.

"One of our goals is to use existing technology to tell authentic, in-depth stories," he said.

While the network is not currently broadcasting in HD, it is considering originating with the format for some programming later this year, Carter said. ■

"Using the technology, we can transfer and dissolve between two images on the screen, as one skier makes a run down the hill," Carter said.

simultaneously all across Europe and the United States, which can make the logistics a tad cumbersome, said John Carter, vice president of event productions for OLN. OLN must coordinate crews and equipment rentals in France, Germany and Norway, among other locales.

This year, the network took steps to improve coverage by souping it up with SimulCam overlays from Dartfish. According to Carter, the system allows viewers to compare one athlete's run down a ski hill with another by taking

26x7.8AIF Tele Super Zoom

"We own two Thales Angenieux 26 X Telephoto Zoom lenses (along with five other lenses from Thales Angenieux) that we started

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said Troy Fain, President of TL Mobile Television, Inc.



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concluded Mr. Fain.

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Tech Retreat Features Next-Gen Gear

Digital imaging lures new players

by Robin Berger

PALM SPRINGS, CALIF.

In case you've been living in a spider hole these last couple of months, please be advised that the Tech Retreat will be back in the Palm Springs area Feb. 4-6.

Hosted by the Hollywood Post, the event is the ultimate gearhead smorgasbord, offering something for everyone, be it information, networking opportunities, contests, a softball game, or a nice warm place in February.

Headlining this year's information menu is a nod to the latest in digital cinematography, particularly two panels on Thursday, Feb. 5, which straddle lunch.

Host Mark Schubin moderates "The Cameras" (1:15 p.m.), which he believes will be of particular interest to TV Technology readers. In addition to a traditional triumvirate—Sony, Panasonic and Thomson—the panel boasts companies actively looking

"beyond HDTV," Schubin said.

These include Lockheed Martin, which has a prototype with 12 million pixels per chip; Dalsa with 8 million pixels, and, hopefully, Arri with 6 million. Current HDTV cameras have 2 million pixels per chip.

Lockheed Martin's prism camera, which uses gigantic chips, requires relay optics. The Dalsa and Arri cameras use a Bayer Mask: four sensor sites (two green at the corners plus a red and a blue) to filter color, which enables the operator to use a film lens without needing relay optics.

Arri chose chips that are the same size as a 35mm film frame, said Schubin; Dalsa's are a bit wider because the company preferred a 2:1 aspect ratio

vs. the 4:3 used by Arri and Lockheed Martin.

Schubin pointed out that cinematographers and directors argued for

as valid a starting point as cameras).

Cameras will also justify arguments for better metadata. After all, as Schubin pointed out, "If you have a camera with 6 million pixels that you run at up to 150 frames per second, how the heck are you going to be able to record all that information?"

Early Thursday morning, Evertz Microsystems' Romolo Magarelli will moderate "Metadata: Yesterday, Today and Tomorrow."

The panel has representatives from companies that worked on "Star Wars: Episode III"—Lucas Digital's Fred Meyers; Sony's Nick Dillello; Fujinon's Chuck Lee (who will discuss the lens that provided data to the metadata system); and Marker Karahadian of Plus8video, which supplied the equipment. Sony Pictures Television's Phil Squyres, said Schubin, will explain "how all this relates to more mundane things, like television."

BBC producer Tony Salmon and Snell & Wilcox's Paul Walland will give hands on accounts of the "European MetaVision Project" at 10:30 a.m. The six-company consortium demonstrated a new electronic camera system at last fall's IBC show that could convert film and video shot at 72 fps into any desired rate using motion compensated interpolation. It also provided depth information to support special effects in post production, according to the IBC.

The ramifications of these new digital cameras will not be limited to Thursday discussions.

On Wednesday morning Charles Poynton will replace his signature color tutorial with one on format conversion.

As Schubin noted, "there are so many different formats—4K, 2K and others beyond HDTV—the question is how do you get that stuff down to 'normal HDTV' (720p and 1080i) and standard definition?"

Poynton will also deal with the various displays entailed: DLP, LCD and Canon's SED.

On Friday, Rondal Moore of Via Licensing will host a breakfast roundtable called "Who Should Pay and Why?" as part of his company's initiative to determine the right way to assess charges for using MPEG-4 Part 10.

If this isn't tempting enough, there will also be surprise demos and guests.

"We never know what's going to be there until the last minute," said Schubin. "Last year Sony introduced HDCam SR." ■



One panel will feature the team that handled the metadata on the next installment of the "Star Wars" series. Above, Director George Lucas directs Anthony Daniels in "Star Wars: Episode II Attack of the Clones."

a 2:1 aspect ratio at the time the ATSC standard was being approved.

One other factor that sets the five manufacturers apart is the variable frame rate featured in products by Panasonic and Arri.

Rounding out "The Cameras" panel is the "legendary Hollywood renter of film equipment" Denny Clairmont, who, said Schubin, made his mark inventing things that cinematographers wanted but weren't getting from manufacturers.

Taking note of his reputation, both Dalsa and Lockheed Martin consulted Clairmont when they decided to embark on their respective digital cinematography projects.

The fact that "engineers sometimes come up with stuff that doesn't make sense," has made Schubin most excited about the American Society of Cinematographers' first appearance at the tech retreat.

THE CINEMATOGRAPHERS

Curtis Clark, head of the AFC's Technology Committee, will moderate "The Cinematographers" panel at 11:15 a.m.

Cameras will be featured in "Return of the Digital Camera," with a European perspective from Mike Christmann, a partner in Flying Eye, a German media investment firm. And they will serve as a jumping off point for "The New Digital Workflow" panel (although, Schubin said, John Carey of Walt Disney Feature Animation will probably insist that computers are just

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Oprah Gets Digital

Harpo Productions adopts Sony-DataDirect storage system

by Ken Freed

CHICAGO

The Oprah Winfrey Show has entered the digital age. During the summer, Harpo Productions in Chicago installed Sony's XPRI nonlinear editing system, supported by the backbone of a DataDirect Silicon Storage Appliance (S2A), a scalable storage network that allows video digitizing at twice real time. This is the second U.S. installation of the Sony-DataDirect system, the first one being at Screen Gems in Burbank, Calif., for daytime soap, "The Guiding Light."

with Oprah on the set of the TV series, "Friends."

"We had four days to turn that show around, and we were making changes all the way to airtime," he said. "We never could have done that in analog. Only nonlinear editing gives us the capacity to insert changes as we go and still meet our deadlines."

Selection of the NLE system began in November 2002. As a focus of the advance research, Senior Editors



Joe Davis, and editor with Harpo Productions, works on a project in one of Harpo's three Sony XPRI rooms.

over the serial digital transfer interface (SDTI) at two times real-time speed, so an hour tape can be transferred to disk in 30 minutes.

"The best part is that because the transfer is from digital to digital," he said, "there is no degradation in the clone, virtually no compression artifacts at all. The exact same thing shot on the camera is what you get on the disk."

The transferred video goes into the shared storage device from DataDirect, like a file server, connected to the various edit suites. The storage system at Harpo, he said, can serve data from the storage device at 3.5 TB per second. In contrast, the system at Screen Gems operates at 1.4 TB per second.

"Think of it as a bunch of broadband drinking straws in the same glass, and they all can pull from the glass at once without any loss of speed," Marchitelli said.

What makes the Sony-DataDirect system so exceptional, he said, is that each edit suite can see what each edit suite on a Shared Area Network (SAN) is doing, almost in real time.

As soon as edits are saved to disk, "you can drag that piece of video

OPRAH, PAGE 24

"We have people all over the country shooting stuff in advance of each show, and you'd be amazed at how much we roll into what we shoot in the studio."

— Harpo Senior Editor Mike Mabbott

"We did a whole revamp of our post-production operation," said Harpo Senior Editor Mike Mabbott. "In going from the analog '80's to the digital Second Millennium, we jumped two decades."

Working within a \$7 million budget for upgrading the largest post facility in the Midwest, he said, Harpo converted 16 edit suites to the Sony nonlinear editing (NLE) system, which now ties into nine Avid suites and a couple of Unity suites. These suites are used by about 50 staff members divided into 10 production teams that put in about 100 staff hours of editing per show, which airs every weekday. Each show is turned around in an average of 2.5 days, he said, half the time it took to edit each show in analog.

"We have people all over the country shooting stuff in advance of each show," Mabbott said, "and you'd be amazed at how much we roll into what we shoot in the studio." The studio shoot is always an hour and 15 minutes, and that gets edited down to less than 50 minutes of airtime, with inserts, so the entire show looks live and seamless.

"The good people we have here are why the show has won six Emmys for editing," he said.

As an example, he described a crew in Los Angeles taping a show

Mabbott and John Strolia, along with Editing Coordinator Dave Logan, toured 22 separate post- and network-production facilities in Los Angeles, Atlanta, Chicago and New York.

"We initially focused on facilities

using Avid," he said, "but we were impressed by the XPRI system we saw at Screen Gems. At the 2003 NAB show in Las Vegas, the Sony system became the obvious choice, especially when Sony showed great willingness to work with us in configuring the system to our needs."

CLEAN TRANSFERS

The system that Sony proposed for Harpo is built around an XPRI disk-based editor that natively handles the MPEG-4 IMX tape format, according to Christopher Marchitelli, senior product manager of broadcast and production systems for Sony Electronics in Park Ridge, N.J. Because the disk uses the same compression scheme as the videotape, the system can handle streams

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Learning from the Danes

Danish state broadcasters skip a generation in digital transition

by Tom Butts

COPENHAGEN, DENMARK

U.S. broadcasters looking at ideas for integrating IT with broadcast might want to look across the Atlantic at how their European counterparts are approaching the technology.

Danish Broadcasting Corp., Denmark's oldest and largest public broadcasting network, is aggressively pursuing an IT-based \$500 million-plus overhaul of its radio, television and online facilities; in effect, creating one of the world's most advanced and workflow-efficient broadcast plants.

Launched in 1999, the six-year project involved the building of "DR City," a \$450 million 130,000-square-foot facility that will house the broadcast and online departments, and is scheduled to be completed by 2005. In planning for the project, Danish Broadcasting officials anticipated the impact that digital would have on television and radio broadcasting and planned accordingly, deciding to establish workflow procedures and full digitization prior to the move.

"We decided that the whole organization would be digital when we moved," said Torben Lundberg, head of technology for Danish Broadcasting's news and sports departments. "We didn't want to move and change workflow at the same time."

In doing so, the broadcaster also decided to forego SDI technology that has traditionally characterized the transition from analog to digital.

"We're skipping the SDI phase," said Lundberg, who came from the

IT world and is the first to admit that he knew little about broadcasting when hired three years ago. "It's not customary in the broadcast business to skip such an important chunk of technology, but the cost has been lower as a result." Lundberg notes that while the new facility will be all IP-based, there will be a "very limited" SDI infrastructure available for ingest.

PHASED IN

Phase 1 included the digitization of radio, while phases 2-4 involved the introduction of DR's first DTV pilot for news and morning programming. Media archiving followed in 2002 and the latest phase of the project was just completed with the Fall 2003 opening of its new \$6.5 million Sports and News Production System (SNPS), which was built with the help of SGI.

The Mountain View, Calif.-based company designed the system on its Media Server platform for broadcast. The system is comprised of eight Media Servers, SGI Origin 3000 and

Origin 300 servers, two SGI TP9500 6.8 TB storage systems and SGI Data Migration Facility (DMF) software for archiving. The system ties together hardware from other vendors including a vizrt automation system, a StorageTek tape library and Pinnacle Systems' editing systems.

"The Danish Broadcasting project has been a microcosm of what has been going on in the media market: the trend to adopt IT technology to integrate workflows and to increase efficiency," said Chris Golson, senior director, Media Industry Marketing for SGI. "Danish Broadcasting has integrated the assets used by news



Reporters for Danish Broadcasting's television, radio and online divisions file reports in DR's current facility in Copenhagen.

and production in television, radio and Internet departments into a simplified and centralized system and to streamline the workflow. Easy web browsing from any location can enable the business of television to be carried on faster and with improved production. The system is truly an industry lighthouse of where the industry wants to go." ■

Oprah

CONTINUED FROM PAGE 23

onto your timeline and open it, finding out very quickly what's being done in a neighboring suite," he said.

The only limit is that right now only three edit suites can access a SAN at once, but this is usually enough for producing any given segment of a show.

Additionally, he said, each XPRI edit suite can ingest two video streams at once, one at normal speed and one at double speed,

This provides the ability to ingest up to six streams in each SAN at the same time, which becomes critical when a importing video for last-minute changes before a show goes to air.

The decisive moment for Mabbott came when he realized the XPRI system would relieve him of the dread he'd always felt getting those last minute phone calls about a change in a show they'd just finished editing.

"When I saw that making changes would be no big deal any more, taking the fear out of those phone calls made a real difference for me."

After NAB, a long series of staff committee meetings within Harpo included the production, engineering and administrative departments.

"It was a tremendous democratic process," he said. However, the final decisions to go nonlinear and to buy the Sony-DataDirect system rested with Oprah herself.

One final point sold Oprah, apparently. Because the XPRI system can handle both standard and high-definition digital video, installation of the Sony-DataDirect NLE system means Harpo is ready for HDTV when analog broadcasting ends. Oprah is always looking ahead. ■



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AUDIO NOTES

Tim Carroll

The Skinny on Audio Coding

To start the new year off on a solid foundation, we will begin a multi-part series of articles on audio data reduction, a.k.a. audio compression, a.k.a. audio coding. Ever wonder how Dolby Digital (AC-3), AAC, MP3, PAC, WMA, and other schemes actually get the job done? How do they get all of that audio into such a small package and keep it sounding good? This month we will investigate the requirements for and added benefits of compressing stereo and multichannel audio signals and describe the basics that are common to most all audio coding schemes.

AUDIO COMPRESSION GOALS

Why data-rate reduce audio at all? With AES/EBU and SMPTE standards, we have ways to carry full-bandwidth audio with relative ease, and increasingly even store it all, so why bother? There are several inescapable truths,

one being that transmission of audio (or anything) through the air has limits, and the other is that speed and convenience may actually count more than absolute quality sometimes. For example, a standard 20-bit, 48kHz stereo audio signal takes approximately 1.92 Mbps to carry this audio data. Do you know of any way to get that much data into your house in real time? It would be easy if that were the only stream to which you wanted to listen. What about other programs or 5.1 channel surround sound? A 5.1 channel, 20-bit, 48kHz stream of channels runs at almost 6 Mbps—I have seen quality video programs running at this data rate—it is a huge chunk of data! What does this mean? Simple—audio compression allows a balance to be struck between quality and quantity.

Today's audio compression schemes are simply amazing. The fact that a huge variety of audio, multi-

channel or otherwise, has the potential to be delivered to consumers with a quality nearly indistinguishable from the source is nothing short of miraculous. That being said, all systems are not created equal, and if pushed too hard or used inappropriately they will reveal their flaws.

Some compression systems are designed to be the final link to the consumer and are very efficient (i.e. low bitrate), while others are capable of being decoded and re-encoded. All systems have certain basic functionalities in common, and usually vary only in their intended use and efficiency. Don't be fooled by the hype however: A higher data rate does not always mean that a codec is less efficient, nor does it necessarily mean that it sounds better.

TIME VS. FREQUENCY DOMAIN

Let's jump right in. The first thing

we have to do is get comfortable with the idea that audio signals exist in both the time and frequency domains and that the two domains are intimately, and as it happens, inversely related. An audio signal on a standard oscilloscope is being shown in the time domain, while a spectrum analyzer shows it in the frequency domain. The "mess" we can make on a 'scope screen with an audio signal actually looks fairly orderly if viewed on a spectrum analyzer and we need both views to accurately describe an audio signal.

Both signals have level as the Y-axis (vertical), with either frequency or time defining the X-axis (horizontal). The two signals are mathematically the inverse of each other and much information can be gleaned by looking at signals in both domains.

HUMAN HEARING

In the mid-1930s, H. Fletcher and W.A. Munson, two researchers at Bell Laboratories, published a study that showed that human hearing is not equally sensitive at all frequencies and importantly, that this sensitivity changes with loudness. Since then, research has improved the accuracy of the measurements, but the results have withstood the test of time. Basically, quiet low and high fre-

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quency sounds fall below the threshold but the ear is much more sensitive to the 1 kHz to 6 kHz region, regardless of loudness.

From this table, a single curve normalized to digital audio levels can be generated and is shown on the right side of Fig. 2. In this drawing, you can see two signals: a large one

near the center that is clearly above the hearing threshold, and a small one near the right that is just below the hearing threshold. As we are about to see, this is very useful.

MASKING

Now that we can look at events in both the time and frequency domains

his horn. You continue to talk but your friend can no longer hear you. Has your voice disappeared? No, in fact it is still there and with a frequency domain analyzer (i.e. a spectrum analyzer), you would see very large peaks at the frequencies that make up the car horn, and in the valleys would be the remnants of your voice.

Even though the analyzer sees this, because of Frequency Domain Masking it is inaudible to the human ear. Obviously the peaks will cover or mask your voice at those same frequencies because they are louder, but interestingly the human auditory system will also mask frequencies near the peaks. Picture a skirt around one of the frequencies—sort of like a circus tent around the main pole. The tent is the hearing threshold, and the main pole is the frequency of

arrive at the ear in close succession called "Temporal Masking." Basically, sounds appearing after a loud sound stops will continue to be masked (called "Post-Masking") even though the loud sound has stopped. Amazingly, temporal pre-masking also exists and can actually cause sounds to be masked just *before* a loud sound starts. Post-masking is approximately 10 times more effective than pre-masking, and both depend on the length of the masking signal, but are important effects because highly efficient audio compression schemes rely on saving as much inaudible data as possible.

What you will notice is that underneath the hearing threshold there is a varying amount of "stuff" that is inaudible to the average listener. If it is not audible, and there is a need to fit the audio in a smaller pipe, why not ignore it? Good question—and therein lies the actual magic of audio compression: Knowing precisely what to ignore and exactly how to ignore it. It is a lengthy but interesting answer and will have to wait until next time.

The next Audio Notes will continue our fascinating peek at the guts of audio coding. We will show how coding gain is achieved, begin to investigate some additional tools used to save even more data, and we will discover what certain compression artifacts sound like and why they occur.

Special thanks to Leif Claesson for help with the drawings and to Dr. Deepen Sinha, one of the primary developers of the PAC audio codec for his expert input, clear explanations, and patience with me. If you are interested in finding out more about the psychoacoustic principles presented here, drop me a line and I can refer you to some classic (and readable) texts.

Tim Carroll is a consultant based in New York City. He is presently the chairman of the audio section of the Systems Evaluation Working Group of the ATSC. He can be reached via e-mail at tjcarroll@ieee.org.

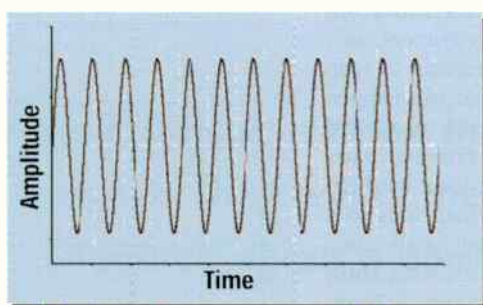
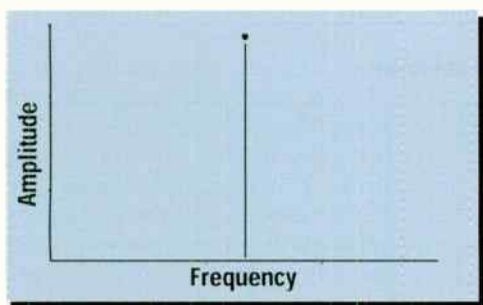


Fig. 1: A sine wave viewed in the frequency domain (left) and the time domain (right).

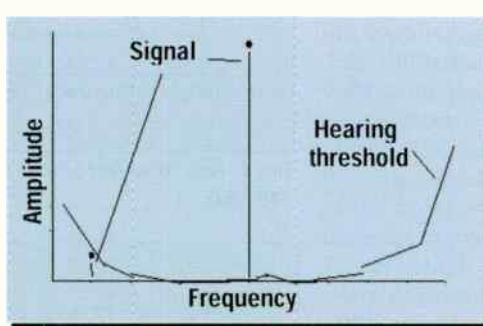
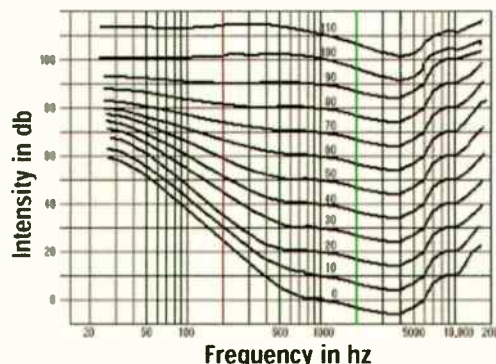


Fig. 2: Fletcher-Munson hearing threshold table (left) and normalized hearing threshold (right). Drawing courtesy of Dolby Laboratories.

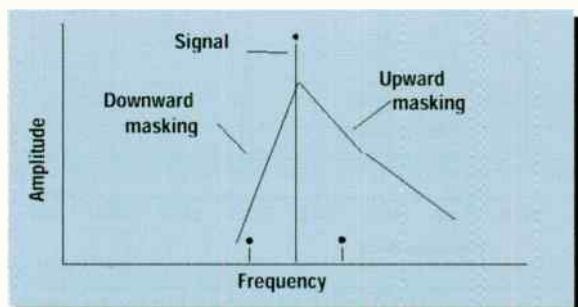


Fig. 3: Frequency domain masking. Note that the two low-level frequencies near the fundamental frequency will be completely inaudible due to the hearing threshold being raised.

and know that there are limits to the threshold of human hearing, some very interesting avenues open up. Think about this scenario: You are standing on a sidewalk talking to a friend when a big yellow taxi drives up next to you and leans on

interest. The higher the peak goes, the wider the girth of the skirt and the more masking takes place. Fig. 3 shows this phenomenon. You should also notice that the skirt is not symmetrical; Upward Masking causes the hearing threshold to become less sensitive above the fundamental frequency, while Downward Masking, which has less of an effect, causes the hearing threshold to become less sensitive below the fundamental frequency, hence the asymmetry.

There is another type of masking that takes place when two sounds



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THE BIG PICTURE

Frank Beacham

A Toast to Larry Thorpe

It was during the Thanksgiving holiday that Larry Thorpe, one of the major figures in modern television technology, decided at age 63 to leave Sony. He was not ready to retire, but when the financially troubled manufacturer offered an attractive early retirement deal to its longtime employees, Thorpe concluded it was time to end "a marvelous, wild ride."

The end of Larry Thorpe's tenure at Sony should not be treated as a retirement, but as a milestone in an extraordinary career. He will be back soon in another role—perhaps as CEO of a technology company, consultant or author. "There's a big desire in me to write a book," he admits. No one, publishers should note, is in a better position to pen a tome on the behind-the-scenes story of digital television.

Thorpe's career began in 1961, when after graduating from the College of Technology in Dublin and the Institute of Electrical Engineers in London, the young engineer went to work at the BBC as a kinescope recordist. Soon, he found himself in the BBC's design department, creating such devices as video DAs, routing switchers and standards converters.

In 1966, Thorpe moved to

America, joining RCA, then the premier American broadcast technology company. As a designer, his first project was the short-lived RCA TK-44 camera, soon to be replaced by

built the broadcast industry's first automatic color studio camera. For the first time, a computer did all the major setup functions, freeing engineers from hours of tedious tweak-

The end of Larry Thorpe's tenure at Sony should not be treated as a retirement, but as a milestone in an extraordinary career.

the popular Plumbicon-based TK-44A. "I did the pre-amplifier and video amplifier on the TK-44A," Thorpe recalls. "We swept the three-plumb market with that model, even beating Philips."

Thorpe's biggest claim to fame at RCA, however, was the legendary TK-47 color camera, introduced in 1979. Project leader on the TK-47 design team, Thorpe and company



Larry Thorpe and filmmaker George Lucas discuss shooting "Star Wars: Episode II" during NAB2001. © NAB

ing before color broadcasts. In 1981, Thorpe was awarded the David Sarnoff Award for his groundbreaking work on the TK-47.

In 1982, with 10 patents under his belt from his tenure at the then faltering RCA, Thorpe joined Sony, the rising star in video technology.

It was an extraordinary time in video and Thorpe hit the ground running. Among his first tasks at Sony was to propose the brand new Betacam format to SMPTE for standardization. The first deliveries of the revolutionary new one-piece camcorder would begin later that year.

Behind the scenes, Thorpe spent significant time in Japan trying to convince Sony executives to enter the studio camera business. "They wanted to stay with portable cameras and leave studio cameras to

RCA and Philips. I said 'you guys have just unbelievable technology, you could be king of the world in studio cameras.' After six months they finally said 'OK, let's see what happens.'"

TERMINATION OF THE TUBE

What happened was Sony's first studio camera, the BVP-360, introduced in 1984. "That was my baby. Very much my baby," Thorpe recalls with pride.

However, another innovation on Thorpe's plate at the time would lead to the quick demise of the Plumbicon tube—the imager of the BVP-360. It was the charge-coupled device, or CCD imager. RCA, in a last gasp in the broadcast business, would introduce the first CCD broadcast camera at NAB 1984. Within five years, tube cameras were history. Larry Thorpe's job during this period was to turn Sony into a leader among CCD camera manufacturers.

At the same time, Thorpe was dealing with high definition television, another emerging technology. In 1983, he was asked to represent Sony before the newly established ATSC and the SMPTE working group on high definition. A short time later he would shepherd the introduction of Sony's first HD cam-

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Toast

CONTINUED FROM PAGE 30

era, the tube-based HDC-100.

From day one, Thorpe was intensely enthusiastic about HD. Sometimes that enthusiasm got him in trouble. In the mid-80s, Thorpe and Joe Flaherty, the CBS senior VP of technology, got so carried away as to predict that HD would result in the death of film. They chose to utter such a controversial comment at an odd place—the American Film Institute in the heart of Hollywood! Eyes rolled in an audience dedicated to the preserving the film image.

Thorpe learned his lesson. The message changed. HD would coexist with film. It was simply an alternate imaging technology. This time, it worked. It may very well be that within the next decade digital cinema made with HD video cameras will replace film. In any case, 20 years has passed and Thorpe is leaving Sony with a pioneer's success.

"It took 20 years for us to make HD a viable reality in terms of size, weight, power and cost," he notes, admitting that the journey to success "was long... longer than I thought" it would be.

"The thing that I would not have

anticipated back in the mid '80s was that the computer and telecom industries, the Department of Defense, and academia—all those entities—would climb so vigorously into the standardization process. Previously, it had always been relegated to the television industry to do

ment of the first studio camera ("It took six or seven years for Sony to become a major force in studio cameras."); introduction in 1992 of the first CCD high definition camera ("It just bowled everybody over. I never saw such a reaction. We had all sorts of horrors with tubes in HD. But

try to put the kibosh on someone else's scheme. Oh, yeah, and once a

Thorpe's final days at Sony have been dedicated to pushing high-definition technology in two directions: one toward mainstream production and the other toward digital cinema.

its own standards. But there was a lot of new muscle and thinking that forced us television people to think about progressive scanning, square pixels, etc. etc. I would not have anticipated that."

HIGH DEF HIGHLIGHTS

As he looks back, Thorpe cites several highlights in his years at Sony: introductions of the original Betacam and later, Digital Betacam; develop-

ment of the first studio camera ("It took six or seven years for Sony to become a major force in studio cameras."); introduction in 1992 of the first CCD high definition camera ("It just bowled everybody over. I never saw such a reaction. We had all sorts of horrors with tubes in HD. But

man, the CCD put all that to bed."); and, finally, the industry acceptance of 24P imaging technology.

Thorpe's final days at Sony have been dedicated to pushing high definition technology in two directions: one toward mainstream production and the other toward digital cinema. "It's my recommendation that we try to steer the industry toward all-HD production gear," says Thorpe. "Today, at the higher end, about 70

percent of cameras and camcorders are HD. That seems to be a marketplace trend and I think people are becoming more and more accepting of super-sampling for standard definition. You get a better standard definition image."

For digital cinema, Thorpe recently returned from Japan where he "opened the kimono" to show Sony's latest technology to a representative of the Digital Cinema Initiative (DCI), a consortium of the seven major Hollywood studios set up to develop a mutually agreeable set of technical and business standards for digital cinema.

"We have fallen in lockstep with the standard being developed by DCI and we wanted to convince them that we are paying attention to that," Thorpe said.

It's been a hell of a ride for a man who insists he's "not hanging up the spurs." So let's take him at his word, raise our glasses to toast his extraordinary string of accomplishments, and keep a close eye on where he turns up next.

All the best, Larry!

Frank Beacham is a New York City-based writer and media producer. You can reach him via e-mail at tvtech@imaspub.com.

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TUNING IN

Gary Arlen

Tomorrow's Television Remains Elusive

Twenty years ago, the NAB asked me to write a book about "Tomorrow's Television." The resulting volume envisioned much, albeit not all, of the subsequent decades' changes in the media environment.

Among the most salient points in that book was the recognition that the television business of that era consisted of three separate industries: broadcasters (both licensees and networks), program producers and equipment manufacturers (studio/transmitter and home electronics makers). In most cases, the three sectors barely talked to each other except at the technical level—a necessity to assure delivery of images and audio to viewers.

Now, 20 years after that report, the TV industry has been invaded—"overwhelmed," some contend—by hordes of interlopers who want to overhaul the way television is sent and seen. Certainly, the ascent of satellites, advances in computer-oriented television programming and the evolution of display technology have revised the fundamental formula of yore. And introduced significant, powerful sectors into the TV process.

NOTHING IN COMMON?

It's no longer a simple equation of broadcasting + production + hardware = television.

About the only thing those three legacy sectors now have in common are their necessary but increasingly embattled technology connections and their penchant to convene in Las Vegas (NAB, NATPE and CES). The reconfiguration within those industries continues to change the business alliances, too, bringing diverse companies under the same umbrella, e.g. Universal and NBC within the General Electric family, allying production and broadcasting. Similarly, there are Sony's holdings in hardware and movie/TV production studios, plus News Corp. and Disney media conglomerates, which expand over various technology, delivery and programming realms.

These entities do not—cannot—move in lockstep as did their mid-century predecessors. Moreover, today's intra-corporate connections—each of which includes several different TV technology bedfellows—offer no guarantees of smooth relationships or deployment agreements.

More significantly, the image for tomorrow's TV is not necessarily coming from these media giants. Nor is it generated from their uneasy relationships with former partners, such as group station owners a/k/a affiliates.

Shifts are underway which will further fragment the business of tomorrow's television.

SILICON ASSAULT

As we saw at this month's Consumer Electronics Show in Las Vegas, Silicon Valley is stepping up

pricing and performance of the global hardware market. Aggressive sales of Chinese-built home display equipment could squeeze the margins out of the traditional TV industry—and could also accelerate the distribution of affordable digital receivers.

Finally, there's programming. Abandoning the "finsyn" rules changed the financial interest and syndication opportunities for broadcast networks and created new production and distribution challenges. But those may be minimal compared

**The TV industry has been invaded—
"overwhelmed," some contend—by hordes
of interlopers who want to overhaul the way
television is sent and seen.**

its assault on the look and shape of tomorrow's television. Intel's introduction of new semiconductors that are expected to accelerate the introduction of big-screen DTV sets got plenty of attention. But a more fundamental factor was Intel's move into the TV business—joining its traditional computer cronies, such as Microsoft, Gateway, Dell and Hewlett-Packard, which have all been infiltrating the TV industry in various ways for several years. Or trying to do so.

The PC makers are stepping up their media center products, adding hard drives and controls and navigation tools that contribute to the disintegration of traditional television viewing. Although a semblance of technical uniformity—or at least compatibility—exists among the computer cadre, there's every reason to expect breakaway initiatives. That's especially true as the companies form new alliances with cable, satellite and even "telco TV" (telephone company video ventures) that increasingly do not rely—or need to rely—on conventional broadcast standards to deliver their programming.

And then there's China. Not only does it have its own plan for "Enhanced Versatile Disks" (EVD), a standard that could bypass the Euro-American technology's copyright and patent hurdles, but China's emerging electronics industry can rattle the

to the impact of DVDs and the emerging Digital Video Recorders on the home entertainment front. Who needs syndication when a viewer can own an entire year of his favorite shows in \$40 DVD boxed sets? And

DVRs—or more pertinently, the DVD-recorders (now dropping toward the magic \$200 price point)—expand the opportunity for collecting and storing personal archives of favorite shows.

Yes, some of these technologies are coming from the new media arms of legacy TV industry stalwarts. But the most aggressive options—certainly the ones with the biggest buzz—are stemming from disruptive outsiders.

We're hearing plenty of hopeful naysaying. Defensive DVD advocates proclaim, for example, that next generation HD-DVDs (Blu-Ray or otherwise), may not make a quick market entry because consumers have just stocked up on today's DVD technology and are satisfied with the quality and price. Who needs to invest in marginally better systems, the status quo folks contend?

Similarly, the disastrous stumbling of streaming media during and after the Internet bubble offer confidence that the promise of Web-delivered television is doomed.

Looked at another way, such ostrich attitudes are merely reminders that new pioneers are ready to rearrange the ways we watch television. We see plenty of examples from the evolving and distracting initiatives in home video, digital cinema and Internet Webcasting. All of them exemplify today's increasing nuances that go far beyond anything that the television triumvirate of the 1980s was planning or implementing.

TV is a business that rightly likes

TUNING, PAGE 36

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back at 2K resolutions for more efficient conforming of digital intermediates. In addition, fire 6.0 on Onyx 350 will allow users to interactively work with up to 32 2K layers in a 3D compositing environment.

MORE LIQUID

Pinnacle Systems is bringing out a brand new version of its high end Liquid blue "any in, any out" multi-format post system for broadcast. Version 5.6 features a new Auto

for NHK, the system's initial cost will be controlled by limiting the system to 1080i signals with 720p following soon. "We intend to provide realtime HD editing in an affordable package," Yamada explains, "so it will be priced about the same as today's standard definition systems"

The EDIUS package will also step up to HD with a new EDIUS Pro release. "This is a combination of our HD hardware and the EDIUS software," Yamada explains, "and builds

brand new high end editing/compositing system only six months after 9/11 created some economic challenges for us, but we have always offered value-oriented products to a market that is differentiated by technological innovation. This price adjustment brings us back on that track."

At the same time, Media 100 is giving us their first edit system using the Genesis Engine technology developed for 844/X on the Mac platform, the

interactive web site with product search engine, spec-your-own patchbay capability, email Request-for-Quote forms, and downloadable AutoCAD files.

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EQUIPMENT REVIEW

PRODUCT REVIEW

Fujinon

CONTINUED FROM PAGE 38

in the least.

I was able to shoot people entering a courthouse, seeing the entire courthouse in the frame from about 50 feet. Saying that this is a wonderful creative tool does not do justice to the versatility of a lens like this.

The minimum object distance has

been greatly reduced as well, half what I'm used to (0.3m vs. 0.6m). This alone makes it easier for a lot of what the typical ENG photographer encounters. For example, I could smoothly get a shot of documents on a desk, then move to a name, phrase or title without fully extending the tripod.

Everything on the A13x4.5BERM worked smoothly, cleanly and quietly, and the ergonomics were natural. The overall feel of the lens was

what I expected from a broadcast-quality product.

SUMMARY

A wide-angle lens such as this one does embody some basic compromises. The focal length on the long end is half what a typical ENG lens is and even with the 2x extender in place, the maximum length is 118mm. I also noticed the difference in weight—this lens is almost a pound heavier than the lens I

use. The clear filter used to protect the front element is a whopping 127mm, quite a piece of glass.

These concerns aside, the Fujinon A13x4.5BERM provides ENG photographers with a spectacular option for creative photography. ■

Frank McDermott is a news videographer with WUSA-TV in Washington. He can be reached at fmcdermott@erols.com.

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AUDIO MIXER

Sound Devices 302 Compact Mixer

by Ty Ford

On the heels of the well-accepted flagship 442 four-channel location mixer, Sound Devices recently brought to market its 302, a three-input mixer (five if you count the stereo return) aimed at run-and-gun audio and the emerging small digital camcorder market.

FEATURES

The 302 does lack some of the features of the 442, but many of the hard controls on the 442 have been internalized in the 302. Although that makes them a bit harder to get to, they are not as likely to get joggled into the wrong position.

With three AA batteries onboard, the 302 weighs under two pounds.

switch. Each of the three XLR inputs can be switched separately for phantom, T power or no power.

The front panel features three sets of input controls. Each input has its own input trim and fader, which allows each input stage to be set so that the rotary fader controls end up centered in their operating ranges.

The trim knobs lock down (and out of the way) with the push of a fingertip. Opto-limiters on each input and the master stereo output are fixed at 1 ms attack and 200 ms release, and are enabled by the master LIM switch on the front panel. Sound Devices suggests leaving the input limiters on, but they can be defeated. The output limiter threshold is adjustable in 1 dB increments from +4 dBu to +20 dBu.

The L/C/R switch on each input routes audio to left, center or right. Each input also has switchable 80 Hz and 160 Hz, 12 dB/octave high pass filters. The second input has a 180-degree polarity switch.

The first L/C/R switch is pretty tightly positioned to the edge of the chassis, which may make it difficult to get to for thick-fingered folks. Changing positions of the L/C/R and polarity switches result in audible ticks at the outputs.

The MIC/1k switch activates the slate mic and tone oscillator. Pressing the battery check button when the tone oscillator is active sets the left output to cycle a tone between 0 dB and -20 dB. This is handy for confirming which channel is which on devices being fed by the 302.

FAST FACTS

Application

Production, post production

Key Features

Lightweight, high-quality, three-input stereo mixer

Price

\$1,349

Contact

Sound Devices
608-524-0625
www.sounddevices.com



The Sound Design 302 is a rugged audio mixer for field recording. It can be powered by internal batteries or an external supply, and has phantom power capability for use with a broad range of microphones.

All inputs, outputs and controls are on three sides, which makes accessing connections and changing batteries easy, even when the 302 is bagged.

The left panel sports three locking XLR input connectors, a mini-TRS headphone jack, mic/line switches for each input and a global 12/48 V

Two small LEDs over each fader knob, PK and LIM, indicate levels are 3 dB below clipping at the input and that the threshold of the input limiter has been crossed, respectively. The OFF/LIM/LINK switch allows the output limiters to be defeated, to operate independently or as a stereo pair.

The 302's 11-position headphone switch provides pre-fader (post-limiter, post-highpass filter) audio from each input, left output bus, right output bus, mono summed output busses, stereo, stereo monitor return, mono monitoring of mid/side stereo, mid/side decoded stereo and mid/side

return decoded stereo. The HP LED lights to indicate headphone circuit clipping.

The twin LED metering display is adjustable to four levels of brightness. It can be set to measure VU, peak, or VU-with-peak and peak-hold. The metering changes color from green to orange at 0 dBu and to red for the range from +8 dBu to +20 dBu. The last pair of orange LEDs indicates the output limiter threshold has been crossed.

The right side of the 302 sports a pair of active balanced XLR outputs operating at +20 dBu (7.8 V rms). The 302 has no master gain control, but the master output level can be adjusted in 2 dB steps from 0 dBu to -56 dBu. A TA3M jack serves as a -10 dBu tape or unbalanced stereo output, or to link to a Sound Devices 442 or another 302. There are also separate return gain pots to adjust aux or line levels coming into the unbalanced, mini-TRS return jack.

External powering, using a locking, four-pin Hirose connector, can be

SOUND DEVICES, PAGE 49

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COMPOSITING SOFTWARE

Boris Red 3GL Compositing Software

by Michael Hanish

It slices, it dices, it does everything from titling and compositing to 3D DVEs and color correction. And there is no fast-talking shill trying to sell this product to you. Too good to be true?

No, the product is the latest version of Red, now called Red GL for reasons that will become clear below, the flagship and omnivorous video application from Boris FX—and it deserves its reputation.

FEATURES

Red 3GL runs under Mac OS X 10.2.6 or later and Windows 2000 or XP. It can run as a standalone application, the RED Engine, or as a plug-in under a huge variety of hosts, including Adobe's Premiere and AfterEffects, Apple's Final Cut Pro, Media 100, Avid's Symphony, Media Composer and Xpress, DPS Velocity, InSync Blade and Speed Razor, Sony Vegas, and Pinnacle's Liquid Edition. (Check the Boris Web site for the latest list of supported hosts and versions.) Red supports dual processors, hyper threading and Altivec acceleration.

The GL relates to OpenGL: One of the big changes in this new version of Red is support and use of OpenGL hardware for accelerated previews and 2D, 3D and texture rendering. RED still works without OpenGL, just not as quickly.

The speed gains to workflow with this feature are quite surprising and very welcome. Feedback in draft preview is almost immediate and rendering speeds are significantly faster than in previous versions—and in production, faster is better.

Red's feature set is huge; just the new features document fills about 75 pages. Briefly, Red is a timeline- and keyframe-based multilayer compositing environment that operates in

three geometric dimensions (so far). It has some of the best image processing and temporal manipulation filters around and every parameter you can think of can be animated over time.

Titling is vector-based, which means any size or dimension of type is as smooth as you'd want it, in 2D, 3D, or anywhere in between. And since Red operates in three dimensions, any flat object can be extruded, moved, transformed, lit and/or mapped in and through any or all of those dimensions.

This is an intelligently designed and developed program, and a pleasant place to hang out and work. The workspace is made up of separate windows including timeline, preview,

pane. This means it is possible, for example, to change preview resolution, magnification and quality with a simple click.

Red ships with an incredibly complete collection of very high-quality filters, including categories of colors and blurs, distortion and perspective, effects (lighting, emboss, glow, mosaic and shadows), motion, time effects, key and matte, and generators (bump maps, particle system, snow, fire, rain and textures). In addition, many AfterEffects format filters will plug in for use inside Red.

The included Plug-in Filter Manager controls which installed plug-ins load. The Pixel Chooser allows precise choice over what part



The Boris Red 3GL user interface has quick controls for many functions at the bottom of each window, as well as full menu access for all functions.

controls, project/render queue, style and library, which can be arranged to suit (and multiple workspace arrangements can be saved).

There are keyboard shortcuts for virtually every possible action and all of them can be customized and saved. Another smart design aspect of Red is that many of the controls for each window display are located right at the bottom of the window, rather than being buried in a menu or preferences

of the frame or color range is affected by the filter.

Also among the massive list of newly added features, improvements and refinements: a Chart Container and Chart Editor (to create 2D or 3D charts and graphs from tab delimited data); a random text and number generator; jitter controls for text (to randomize values for position, angle, scale, hue, and opacity); a new optical flow filter, a retimer (slowing down or

FAST FACTS

Application

Post production

Key Features

Animation, compositing and titling system; compatible with most popular NLE applications

Price

\$1,599

Contact

Boris FX

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speeding up a sequence smoothly) which synthesizes intermediate frames (rather than blending them) for much smoother and realistic motion; direct export and import of entire timelines or parts from the editing application, using Automatic Duck Composition Import or the Media 100 Project Importer.

IN USE

I put Red to use most recently on a project for a local museum and historical society. The tasks were the usual mix of titling and motion graphics; in this case animating a bunch of maps and multilayer compositing.

Upon installing Red, it became the default titling application inside Media 100—and a good thing, too. By using the Style Palette and the Library Browser, I could set up a template for speaker identifications once and simply recall it and plug in the new information, a great timesaver.

The credit roll was also simple to create: I imported a text file, set the font and color, clicked a button and created an instant roll at a speed sufficient to fill the time I had allocated.

Motion graphics, a staple in documentaries, were also a breeze: I established keyframe start and end points for the moves, adjusted the velocities for ease in and out (or set the keyframes to the default interpolation of ease in/out and had the velocities ramped automatically) and previewed. And, as mentioned above, previews are incredibly fast when using OpenGL.

I used Red as both a plug-in to my editing application, Media 100, and in standalone Engine mode, and was glad to have that flexibility for several reasons. First, sequences render faster in Engine than through the plug-in

BORIS, PAGE 49

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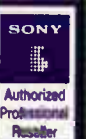
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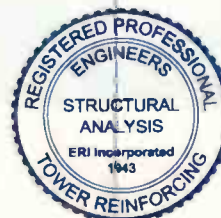
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Sound Devices

CONTINUED FROM PAGE 43

supplied from any 5-18 VDC source. The 302s battery display can be calibrated to six different external power source ranges. The external supply is isolated from the audio circuitry to minimize ground loops.

One of the unusual things about the 302 is that many internal adjustments are handled through a menu. These settings are in the manual as well as on a plastic-coated card small enough to slip into your pocket. Holding down the Pk/VU button while powering up the 302 accesses the menu.

Menu adjustments include output XLR attenuation; output limiter threshold adjustment; stereo linking for either L/R or M/S; input limiter defeat; tone oscillator frequency (1 kHz, 400 Hz, 100 Hz); tone oscillator level (off, -20 dBu, -10 dBu, and 1 dB increments to +8 dBu); slate mic on or off; metering source (stereo only or following headphone selection); VU reference level (0 dBu, +4 dBu, +8 dBu); switchable 20 dB reduction of tone in headphones; metering ballistics (four different combinations); Peak LED threshold adjustment (in 1 dB increments from +4 dBu to +20 dBu); slate/tone switch (changes momentary and latched positions)

and a selection that resets the 302 to its factory defaults.

IN USE

The 302 has the same sonic characteristics as the more expensive +42; solid sound, even with the limiter thresholds crossed and a healthy headphone level. The fader knobs have a nice feel and headroom was never an issue.

The metal sides extend outward ending with slits for a strap. They protrude enough to prevent possible damage to the front panel, should the mixer be dropped. The battery tube sticks out on the right side, but not as far as standard XLR connectors.

Battery life is dependent on the number of phantom (48 VDC or 12 VDC) or T powered mics attached, output level drive, headphone output level and meter brightness. Battery life for three Duracell alkalines using one channel with a Sennheiser MKH 416 in continuous operation was almost six hours.

The size and weight of this unit are excellent, especially considering its sound quality. It fits easily in most project bags and is built to withstand punishment in the field.

It would be nice to have the ability to have presets for the internal settings, which would be helpful when using the 302 to feed different sound equipment on different shoots. Otherwise, the breadth of adjust-

ments that this thing has is amazing—with a little patience and tweaking, you can set this up to deal with exactly the levels you need and to give you the metering necessary to keep the levels in their optimum range. This ability of the tiny 302 is what sets it apart from possible competitors.

SUMMARY

What's not to like? The 302 may not be absolutely perfect, but I don't know of a mixer of its size, weight,

sonic excellence and feature set that's even close. In some situations, having two 302s would be a better choice than a 302 and a +42.

A list price of \$1,349 may be pricey for low-end DV camcorder users but for professionals, the price, sound quality and feature set make the 302 a bargain. ■

Ty Ford often writes for sister publications Radio World and Pro Audio Review. He may be reached at www.jagunet.com/~tford.

Boris

CONTINUED FROM PAGE 44

version because the Engine doesn't have to pass all that data through the host software and hardware. Sequences that did not require precise audio timing, I worked on and rendered in the Engine.

Second, thanks to the integrated export possibilities, it was easy to precisely time sequences inside Media 100 and export them to the Engine for faster renders (and renders in batches using the render queue).

Third, using Red as a plug-in inside Media 100 gave me access to all the Boris filters for color correction and image manipulation.

SUMMARY

Red continues to evolve and

grow at a rather dizzying rate. The challenge for developing and adding features to a program like this is to keep it from being overwhelming and confusing. In my opinion, Boris is riding the crest of the wave and making all the right moves.

Even with the massive feature set (and we've only scratched the surface of what Red can do) and wide compatibility with diverse hosts, Red is very uncluttered and stable. The interface has the most commonly used controls easily accessible, with deeper levels a simple click or twirl away. If you can only afford one tool, let it be Red.

Michael Hanish runs Free Lunch, a video/audio/multimedia production house a few miles outside scenic Guilford, Vt. Contact him at mhanish@sover.net.

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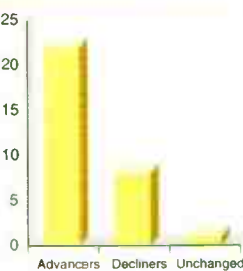
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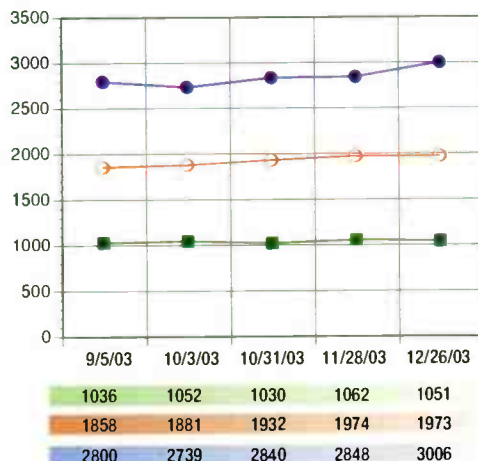
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Tektronix +15.53%

TOP DECLINERS TV STOCKS (DECEMBER 12 - DECEMBER 26)

Ciprico -5.69%
Media 100 -4.62%

TV TECH TREND

TV TECH AVG. NASDAQ COMPOSITE BROADCAST AVG.



TV Tech STOCKS as of Dec. 26

Company Name	52-Week Range	Dec. 12	Dec. 26	% Change
Avid	16.76 - 59.77	47.09	48.25	2.46%
Belden	10.50 - 20.32	19.94	20.91	4.86%
Ciprico	3.23 - 6.81	5.1	4.81	-5.69%
Harmonic	2.13 - 9.35	7.18	7.45	3.76%
Harris	24.09 - 38.95	38.33	37.78	-1.43%
Leitch	N/A	3.9	3.9	0.00%
LSI Logic	3.78 - 12.90	8.69	8.77	0.92%
Media 100	0.60 - 1.70	0.65	0.62	-4.62%
ParkerVision	4.08 - 12.50	8.75	10.3	17.71%
Pinnacle	6.60 - 14.95	8.2	8.57	4.51%
S-A	10.99 - 37.45	28.22	27.57	-2.30%
SeaChange	5.10 - 16.65	14.84	14.96	0.81%
Storage Tech	19.50 - 27.99	24.15	25.4	5.18%
Tektronix	15.65 - 27.68	27.43	31.69	15.53%

Broadcast STOCKS as of Dec. 26

Company Name	52-Week Range	Dec. 12	Dec. 26	% Change
Acme	5.35 - 9.14	8.35	8.7	4.19%
Belo	18.72 - 27.70	28.18	28.35	0.60%
Emmis	14.84 - 24.86	27.17	27.21	0.15%
Entravision	5.20 - 12.00	10.32	11.27	9.21%
Fisher	39.50 - 58.17	48.05	47.96	-0.19%
Granite	1.40 - 3.70	1.8	1.45	-19.44%
Gray	8.62 - 14.90	14.68	15.07	2.66%
Hearst Argyle	19.50 - 26.03	26.69	27.44	2.81%
Lin TV	19.45 - 26.55	25.01	26.55	6.16%
Paxson	1.91 - 6.99	4.23	3.97	-6.15%
Sinclair	7.68 - 14.16	12.99	14.86	14.40%
Liberty	35.85 - 45.30	47	46.26	-1.57%
Univision	21.83 - 38.64	38.1	39.05	2.49%
Young	10.27 - 25.54	19.28	20.09	4.20%
Tribune	41.60 - 50.24	48.78	50.45	3.42%
Meredith	36.91 - 50.32	47.81	48.35	1.13%
EW Scripps	73.90 - 95.15	93.37	93.94	0.61%

COMPANY FOCUS

Nexstar Adds Stations

IRVING, TEXAS

Nexstar Broadcasting Group completed its acquisition of Quorum Broadcast Holdings in the closing hours of 2003.

Nexstar announced in September that it was acquiring the assets of Franklin, Tenn.-based Quorum, comprised of television stations and LMAs in ten mid-sized markets, excluding WTVW-TV in Evansville, Ind., which Quorum sold WTVW to GNS Media for \$44 million last April. GNS is an Evansville start-up backed by Liberty Corp. of Greenville, S.C.

The deal calls for Nexstar to pay \$230 million in stock and cash, and to assume Quorum's debt, net the WTVW sale proceeds. Nexstar financed the transaction with money raised through its IPO, as well as a recently completed private placement of \$125 million in seven-percent senior subordinated notes due 2014 at par. Additionally, Nexstar refinanced an existing \$265 million credit facility with one for \$275 million and priced 75 basis points lower.

The acquisition puts Nexstar into nine new markets and increases its O&Os and LMAs by

60 percent.

"Of the nine new markets that we will enter, five will offer the revenue opportunities and cost-saving benefits of a duopoly market," said Perry A. Sook, Nexstar president and CEO.

Nexstar operates, programs or provides sales and services to 42 television stations in 26 markets in Illinois, Indiana, Maryland, Missouri, Montana, Texas, Pennsylvania, Louisiana, Arkansas, Alabama and New York, and reaches approximately seven percent of all U.S. television households.

Nexstar went public just before Thanksgiving last year, with an IPO offering of 10 million shares of common stock priced at \$14. As of Jan. 2, Nexstar had 28 million outstanding shares priced at \$13.70, putting the company's market cap at \$388.5 million.

Nexstar's business plan involves amassing stations in markets 50-150, where the company claims competition and acquisition terms are more favorable than in larger markets.

—Deborah McAdams

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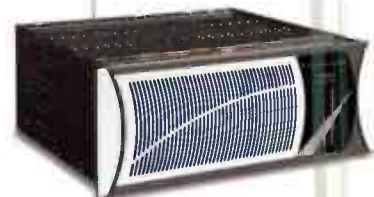
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Digital Audio Network Router

The Bridge

The Bridge Router can hold all the electronics you'll need for a small console: I/O cards, mix engines, and DSP processors. Naturally it can also have automatic fail-over DSP and CPU cards to keep you on-air. You can expand the system with a simple cage-to-cage interconnect.



It's not just a Digital Console, It's AN ENTIRE AUDIO INFRASTRUCTURE

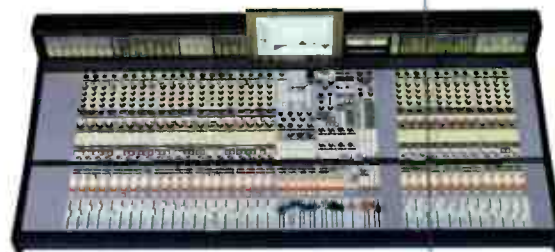
YOU CAN START with a simple AES router with analog and digital inputs and outputs. From there you can add logic I/O cards and scheduling software; you can link multiple master bridge cages together to achieve thousands and thousands of I/O ports; you can create a custom system that includes multiple smaller remote satellite cages— with everything interconnected via CAT5 or fiberoptic links.

BUT THAT'S JUST THE BEGINNING: you can also add mix engine cards, interface to your automation system; you can choose from two different WHEATSTONE series control surfaces (D-9 or D-5.1), each specially configured for production room, on-air or remote truck applications. We also provide a full complement of Ethernet protocol remote router control panels, as well as a complete family of plug-in modules that interface the routing system to existing Wheatstone digital and analog standalone consoles.



The D-9 is Compact yet Powerful:

It can route, generate and monitor 5.1 surround signals and produce simultaneous 5.1 and stereo master signals for your dual broadcast chain. The console also provides extensive, rapid communication paths throughout your entire Bridge system. Motorized faders and control setting storage and recall make show-to-show transitions fast, easy and accurate.



Wheatstone Knows Live Audio. The D-5.1 is loaded with MXMs, foldbacks, and clear easy-to-read displays. You'll have all the power you need when the news breaks! Its intuitive layout helps your operators work error-free, and it can handle and generate all the 5.1 content and simultaneous stereo capability any large or medium market station could need.

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