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ON THE COVER: Video disk storage is almost 30 years old. And, while early systems were capable of only a few seconds of storage, today’s video disk recorders can store hundreds of hours of high-quality video. Shown on the cover is the ASC VR300 file server, which provides Fibre Channel and RAID configurations. Cheetah disk drive from Seagate. Cover design by Stephanie Kastelan.

ON THE COVER: Video disk storage is almost 30 years old. And, while early systems were capable of only a few seconds of storage, today’s video disk recorders can store hundreds of hours of high-quality video. Shown on the cover is the ASC VR300 file server, which provides Fibre Channel and RAID configurations. Cheetah disk drive from Seagate. Cover design by Stephanie Kastelan.

This month:
• Need a job? See the classifieds/jobs on-line
• Question of the month
  The following people received a deck of Broadcast Engineering playing cards for responding to last month’s Question of the Month — What was the most interesting thing you saw at this year’s NAB?
  Mark Russell, New London, CT — “Kiki’s outfit”
  Randle G. Mason, New York — “HDTV Flat screens from NEC and Toshiba”
  Larry Laing, Seattle, WA — “ASC’s video server”
  Jaime Allyn Avanaki, Scranton, PA — “Orban Optimod 2200, Sennheiser MKH2-80mic, Clear Com Tel-14”
  Brian McCaffrey, Watertown, MA — “Harris exhibit”

www.broadcastengineering.com

Do you remember?
CBS first pioneered digital effects with its Action Track for the Masters Golf tournament in 1978. However, it was a product that produced the effects shown here that really made DVEs popular. What was it?

Answer: Action Track

Freeze Frame
A look at the technology that shaped this industry.

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My digital is better than your digital

The battle lines have been drawn — CBS and NBC will use 1,080i. The Disney crowd has “progressively” cuddled up to the computer folks with 720p. FOX says it will go with 480p. PBS says it is focused on 720p and 1,080i, but is ready to transmit in any ATSC format. Multicasting specialist Sinclair also selected 480p. The cable industry at first says it will go 480, which would choke off any HD broadcasts, but then backed down saying it will “pass-through” whatever the broadcasters send.

It seems to me that all of this talk about different platforms will do nothing but confuse the viewers. I guess that wouldn’t be so bad if the intent was to provide the best service possible, but I suspect the format selection was a lot more political than it was analytical.

Now, I’m not saying that 1,080i is right and 720p is wrong or that 480i is only SD but 480p can be called HD. What I am saying is that the commission's wonderful decision to not decide will leave the consumer totally befuddled.

Viewers are going to be hammered with claims of who has the better images. The advantages of digital will be brought down to the lowest common denominator — a number. What should be a march to better television will turn into a battle of numbers. Those with “smaller” numbers are inferior to networks with “bigger” numbers. I can see it now, “My digital is better than your digital.” Consumers are already in digital overload and soon they'll be told that one network has higher quality images than another. Poppycock! Or, should I say Peacock?

I ran this idea by some friends and at first they didn’t see a battle developing. That was until I demonstrated it had already started in our own hometown — Kansas City. We currently have five major commercial network stations. In just the last few months, each channel has been making new claims about its new digital weather radar system. Under the guise that digital is better, look what's already happening. Channel 4 has “Real-time Doppler radar.” So, what did it have before, tape-delayed radar? Channel 5 beats that, claiming “Live power Doppler radar.” Whoa, here we have live, not dead, and power, not wimpy. I'm sold. Channel 41 claims to have “Live digital Doppler.” So, what's the alternative, a dead analog radar? Finally, Channel 9 wades in by claiming it has the Weather Bureau’s Nexrad system. So, is that supposed to make it better?

TV viewing always comes down to programming, not technology. I don’t care how much resolution you add to “Roseanne” or “NYPD Blue,” I won’t watch it. And, it doesn’t matter how little resolution is used to transmit “Ally McBeal” or “Married with Children.” Some people will still tune in. To borrow a phrase, “It’s the programming, stupid!”

Brad Dick, editor

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April Fool’s cover

We had fun with the April cover and so did our readers. We were deluged with humorous comments about the TCI technician playing solitaire while on duty. However, it was a joke!

The folks at TCI were kind enough to allow us to stage the photo and this isn’t their normal mode of operation. Thanks go to TCI’s Peter Douglas, Brad Martens and their engineering staffs for helping us stage our April Fool’s joke. This wonderful cover was brought to you by Philips, whose automation runs the TCI facility. Thanks to them for having a sense of humor, and to you readers who wrote, thanks for catching on! Here are some of the comments.

EDITOR

We couldn’t help but get a chuckle around here noticing that the gentleman seated in front of the cover photo in the April issue was working diligently — at a good game of solitaire.

KIRSTIN NELSON EUPHONIX

After receiving my April issue of Broadcast Engineering, I immediately started updating my resume to send to TCI’s pay-per-view center. Imagine working in a facility as well-equipped as theirs and getting to play solitaire on the computers while you monitor pay-per-view movies like the guys on the cover. Sign me up!

But seriously, it was a great issue with some impressive features, including TCI. Just couldn’t resist poking a little fun at hard work.

TIM WALKER
WTOK

The design team at TCI should be proud of the system they built. The automation system must work flawlessly, evidenced by the operator in the foreground of your cover playing solitaire on a PC.

DON ROBERTS
WUHF-TV

I have been reading Broadcast Engineering for the past two years. I have found the information to be educational and interesting. Now is the first time that I feel inclined to share some of my wisdom with your expert staff. Please advise the technician on the cover of your April issue that he can move the black five to the red six.

JERRAD S. RICHARD
UNIVERSAL CARD SERVICES

TCI’s 32-channel pay-per-view control room is incredible. In the background is the system’s network response center and in the foreground is an employee playing solitaire on Windows. I wonder how his boss likes the shot.

MIKE STARR
MARTHA STEWART LIVING TELEVISION

re: Screw the laws of physics, we’re the FCC

I read your editorial in the April issue of Broadcast Engineering regarding the FCC mandating the laws of physics. You have written what most station engineers have been wanting to say for a long time, but because of politicians have been silent.

I fully support your editorial and it is my hope that it might in some way plant a seed that may germinate into a congressional mandate to require that at least two of the FCC commissioners be engineers rather than attorneys. That just might make the commission far more effective.

ROSS KAUFMAN
WCVB-TV

Ross — the SBE tried for years to get the Communications Act changed so that one FCC commissioner had to be an engineer. Needless to say, it fell on deaf ears. Washington seldom listens to the voice of reason. — Brad Dick, editor and former SBE president

Wonderful editorial, “Screw the laws of physics . . .” For years I’ve been thinking the same thing about the FCC (and the rest of Uncle Sam).

STAN HUBLER
CO-FOUNDER OF RTS SYSTEMS

Winners of April’s Freeze Frame

The tower shown in the Freeze Frame was for radio station WLW. To those of you who sent in correct answers, you’ll be getting a copy of the original article. Thanks for entering. Here’s a partial list of those with correct entries:

Doug Smith, WSMV-TV
William Culpepper, Culpepper & Associates
Dave Burns, Harris Broadcast (Still has the original magazine!)
John Szkudlarcz, Sinclair University
Rick Sedlak, The Hi-Fi Hospital
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less facility will be the backbone of NBC's digital network.

NBC plans include its Microsoft Web TV for Windows entertainment programming, along with efforts with Wink Communications and Intel's Intercast. These data broadcasting projects will be compatible with digital and analog broadcast and cable signals.

NBC will begin digital programming in four top 10 markets by Nov. 1: KNBC, Los Angeles; WRC, Washington, DC; WCAU, Philadelphia; and KXAS, Dallas. NBC's O&Os in New York (WNBC) and Chicago (WMAQ) are scheduled for May 1, 1999, followed by San Diego (KNSD), Miami (WTVJ) and Raleigh (WNCT) on Nov. 1. By May 1, 2002, the remaining NBC O&Os in Columbus (WCMH), Providence (WJAR), Hartford (WVIT) and Birmingham (WVTM) will broadcast a digital signal.

ABC

The folks at ABC took a different approach to HDTV when it selected 720p as its format. Announced the same day as CBS, Preston Padden, ABC Television Network's president, also announced that ABC's entrance into digital delivery of high-definition programming will be from a new "HDTV Release Center" headquartered in New York. The facility will be built and installed by Panasonic.

ABC's DTV launch is expected to be in early 2000. According to Padden, the reason ABC selected the 720p format is, "To make the best possible pictures, to be ready for second-generation progressive flat-panel displays and to be ready for the multimedia opportunities of the converged world of computing and television." 720p makes great pictures and is the right solution for a converged future," added ABC broadcast operations & engineering president, Preston Davis.

ABC has also purchased DVCPro equipment for evaluation and possible inclusion in the network's long-term acquisition plans. ABC's HDTV Release Center will revolve around the AJ-HD2700 1,080i/720p switchable D-5 HD videotape recording systems provided by PDSC. ABC will also purchase 720p studio cameras, monitors and other support equipment for use in future HD programming origination.

Robert Mueller, president, PDSC, said, "D-5 HD recording systems are the industry standard for high-quality HDTV recording and program distribution. The switchable AJ-HD2700 permits the choice of recording or playing back HD programming in either 1,080i or 720p formats."

FOX

FOX's approach to digital delivery is a departure from the others. It doesn't look to employ any of the high-definition formats for openers. According to Andy Setos, senior vice president of broadcast operations and engineering for FOX Television, it will embrace 480p, not HDTV. The folks at FOX are focused on progressive over interlace. They believe that the alphabet soup surrounding the ATSC definitions of HDTV and SDTV are a matter of semantics and the industry should not get hung up on them.

FOX has been working behind the scenes to convince government and equipment manufacturers of the benefits of progressive scan television. FOX is reserved in making any formal commitment to broadcasting high-definition in prime time. One network spokesperson indicated that FOX would experiment with 720p transmission for special events.

Setos indicated that the progressive approach gives FOX a host of benefits ranging from a three to four time's improvement in picture quality over analog NTSC. Besides better pictures, progressive provides more flexibility in what can be done with the spectrum. Santos mentioned that it compresses more efficiently and can interoperate with computers more easily and FOX can go from one scanning standard to another without dramatically making obsolete its earlier production archive.

With FOX beginning its excursion into delivery of 480p this fall, it plans to experiment with digital applications, including time-shifting, multicasting and data broadcasting.

TCI won't carry CBS and NBC

Speaking at the NCTA convention, TCI president John Malone told reporters his cable systems would not carry CBS and NBC because their formats take up "too much space."

Ken Johnson, spokesperson for Congressman Billy Tauzin (R-LA) of the House Telecommunications subcommittee in response to Malone's statement said it looks like the cable industry just fired on Fort Sumter. "If John Malone wants a war, he'll get one."

Details on this escalating war between cable and broadcast will appear in the June issue.
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Thomas Fabian
Director of Global Broadcast Marketing & Product Development
Teleglobe International Corporation

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State of the unions

In our jobs, we sell ideas, products, services or a combination of these three things. And, throughout history, there have been unions or guilds to cover just about every craft — broadcasting included.

Three unions who have traditionally represented broadcasters include the National Association of Broadcast Employees and Technicians (NABET), the International Brotherhood of Electrical Workers (IBEW) and the International Alliance of Theatrical and Stage Employees (IATSE).

Of the nearly 1,700 TV stations in the United States, there are few stations that have union agreements or contracts. IBEW has about 14,000 technicians at 350 radio and TV stations and represents CBS. NABET, who a few years back merged with the Communications Workers of America (CWA), represents NBC and ABC. NABET’s contracts cover crafts beyond those in the technical areas of broadcasting for a membership of about 10,500 at 85 stations. IATSE is approximately 6,500 strong, with locals in Canada and the United States.

In March, there was an ongoing dispute between NABET and ABC that could have affected the Academy of Motion Picture Arts and Sciences (Oscar) annual presentations show. NABET’s local 57 in Burbank, CA, represents the engineers, technicians and other crafts at ABC in Hollywood.

Dan Mahoney, secretary-treasurer of local 57, said that the Academy and ABC had always been joint employers of the crew that worked the technical end of the Academy Awards broadcast. This year was supposed to be no different. According to Mahoney, “The (Oscar) show was broadcast by ABC, with the signal feeds going through the hands of NABET-represented employees. ABC management is still involved and the technical production company is the same. Some of the same technical crew worked the show.”

Mahoney made it clear that this issue of the Academy Awards show only deepened the gap in the negotiations that seem to be bogged down at this time. “The only difference (this year) is that ABC and the Academy cut a deal to exclude NABET as the bargaining representative of the crew that works at the Shrine and we don’t believe that’s legal,” explained Mahoney.

In response to Mahoney, ABC company spokesperson Julie Hoover, said, “NABET-CWA had filed a charge against ABC and KABC when, upon the request of the Academy, the Academy took back the production of the Academy Awards. The NLRB has now ruled on that and has said that, in fact, it was perfectly legal. The NLRB in March of this year, determined unless NABET withdrew its charges, that they would dismiss them. The unfair labor practice charge was withdrawn by NABET.”

According to Hoover, “The Academy hired its own engineering crew that was a union crew. The Academy Awards was a 100% union operation” (the IATSE). Hoover said she was told that it was the same people who had done the work the previous year. Explaining that, “Many people hold multiple union cards and they choose to be represented by IATSE as opposed to NABET.”

Mahoney explained what brought this all on, “Our contract expired last year, and the Academy claimed to be concerned about a strike. But it never talked with us before colluding with Disney/ABC, and they really didn’t protect themselves because we still handle the signal feeds.”

Hoover was uninhibited in addressing most every issue Mahoney brought up and some that IBEW shared. Hoover began by saying, “I think it is important to understand that this was the decision of the Academy of Motion Picture Arts and Sciences.”

According to Hoover, “They (the Academy) decided to ask ABC to step aside as the producer after they became aware of the fact on virtually a weekly basis NABET was threatening a grievance strike and in fact had a grievance strike against ABC on Nov. 1, 1997, and ABC was unable to carry a live golf event. Since NABET had been clear about threatening virtually every live event that ABC telecast, the Academy became concerned and asked if they could take over the production and ABC felt it was only fair to agree and let them do that.”

Hoover continued, “that KABC went to NABET and specifically requested that NABET promise them that there would be no grievance strikes the night of the Academy Awards. They (KABC) asked for a concrete, specific and limited promise as regards only the night of the Academy Awards because they wanted to use a NABET crew to do their pre and post shows.”

Another factor Hoover said played a
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major role in this was that, “Gena Stinnett, head of the local in Los Angeles waited weeks before answering the letter, set up a meeting and then did not attend. As a result KABC was forced to use an outside contractor to produce their pre and post show.”

In addition to the Oscar show issue, Mahoney pointed out that one of the big issues on the bargaining table is ABC’s proposal to strip union members of jurisdiction in all areas relating to computers and digital technology. He explained that if ABC succeeds in transferring the new technology work to lower paid non-union employees and subcontractors, this erosion of jurisdiction will put the union membership out on the streets within the next 10 years.

Hoover said, “ABC wants union members to continue to use and to be responsible for much of the technical work that is being done. As new machines become available, however, they have sometimes simplified the job to such an extent that it is possible for people who are not particularly well-trained to use that machine.”

This lack of understanding for technical exigencies and bean counter mentality seems to be gaining a foothold like a cancer in the broadcast industry.”

Jack Stanley, director, broadcasting and recording department for IBEW in the Washington, DC, headquarters said, “I see the union facing the same problems we faced 20 years ago and that’s basically technology. The only difference between today and yesterday is technology is moving so much faster and rapidly, going from analog into digital. We have a habit of inventing ourselves out of jobs in the engineering field. To make things easier, technology plays a big role in that. We have to adopt and adapt different ideas and methods we have to do it much faster then we’ve done in the past.”

According to Hoover, “It’s not that people are not being trained to do it, it’s that as these new machines come out, only the company that provides them is really equipped to fix them.” “Rather than hold things up while they work on a machine, they just send you a new machine. That is my understanding and I think that is a more up-to-date description of why maintenance no longer has the importance that it once had and it was certainly at one time an important part of the mix.”

Stanley of IBEW said, “We don’t have any nationally organized training program like we have in the construction trades, such as an apprenticeship program, but we have encouraged many of our locals and we have a meeting every year, a broadcast conference, we’re always encouraging our local unions to get their people interested in training.”

Hoover said, “NABET members have not always shown great enthusiasm for training that has been offered.” Hoover continued to say, “I agree that training is important and ABC is happy to provide training and that is provided for in the contract that we have offered to NABET.”

Tiglio of NABET did express concern
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about member training. He said, “In fact, NABET does not have a national training program, but many locals have programs and incentives for SBE certification and vendor specific training. But regardless of the availability of training programs, our membership has seen television go from black and white, film and mechanical cameras to color, tape, ENG, satellite and have continued to do the work and make the transition necessary.”

How do you know if it works?

This is a question that has been asked of every service technician since Ben Franklin first flew his kite with the key on it. Manufacturers and service personnel are faced with having to determine if the “set” is working. With only a few DTV stations on the air and then only transmitting one of the 18 formats, how will you know if you can receive and decode these signals correctly? Fear not, Sarnoff Labs comes to the rescue.

It was at this years’ NAB that Sarnoff Corporation introduced the world’s first suite of compliance tests for receivers of the new U.S. (ATSC) digital and high-definition TV (HDTV) standard. The ATSC compliance bitstreams allow receiver manufacturers, broadcasters, makers of computer video boards and other service technicians to determine whether their products will reliably decode complex digital SDTV and HDTV signals across the 18 ATSC formats.

Screen 2 (at top). When a receiver is properly decoding a DTV or HDTV signal, the ATSC compliance bitstream displays the word “Verify” on a gray background. The format being tested here is a 1,920×1,080 HDTV signal broadcast at 30fps. Screen 3 (bottom). Here is the same signal being processed by a non-compliant decoder. The scrambled background alerts testers that the decoder is not properly interpreting MPEG-2 information. A title screen announces which decoder function is under test.

The Sarnoff ATSC compliance bitstreams delivered on a set of CD-ROMs cause a receiver to decode and display a series of test frames. If the decoder makes an error, it shows up in the on-screen frame. Each test is keyed to a specific decoder function so service people can quickly locate problems. The ATSC compliance bitstreams suite
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It includes Preread technology, compressed digital output in either SDTI or MPEG ES formats, and the analog Betacam playback features of the legendary BVW-65. All for a list price of $27,000.

The Betacam SX acquisition products include a dockable recorder and a full-line of one-piece camcorders. Sony’s camcorders are known for their ruggedness and reliability. Betacam SX equipment continues this tradition in packages that are smaller and lighter in weight than analog Betacam camcorders. The line-up includes products supporting both 4:3 and true 16:9 aspects with IT or FIT imaging.

New CCDs and DSP processing have significantly extended low light shooting capabilities, improved overall picture quality, and added important new operational aids, including set-up cards and the Good Shot Marker system.
In the news business, timing is everything. Sony delivers a variety of editing solutions to meet your business demands. The Betacam SX line includes portable editors and efficient nonlinear systems, as well as more traditional linear editing products. All support the SX Good Shot Marker system, streamlining the decision-making process from acquisition to editing.

The SX portable editors weigh under 30 lbs, yet include powerful features like DMC and studio-quality audio cueing capabilities. The Betacam SX nonlinear editors provide many time-saving features, including faster than real-time transfer from tape to disk. All of the SX editing systems allow easy integration of analog Betacam material into your work.

Sony also offers a wide range of newsroom servers, including the NewsCache™ system. This affordable server system takes advantage of MPEG-2 4:2:2 P@ML compression technology to deliver high quality news playback with efficient disk storage. NewsCache integrates with many popular newsroom computer systems and can grow with your news operation.

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includes four sets of tests, each one targeting a specific area of performance. The comprehensive set of tests show the ability of the decoder to handle various decoding functions, such as motion vectors, over the full range of permitted values. It runs the decoder through all 18 ATSC formats and their variations, based on Table 3 of the ATSC standard A/53. The test material will also show if the decoder can handle the full stream of information, including audio, video and system information tables and allows testing of synchronization between audio and video. They include standard- and high-definition streams and a multicast stream, the equivalent of four 480-line interlaced programs on a single channel. In addition to this the tests will demonstrate the decoder's ability to handle demanding encoders and to conceal errors.

“Our compliance bitstreams are the industry's most complete objective standard for testing ATSC decoders,” said Dean Malmstrom, head of DTV professional products at Sarnoff. “They allow DTV set makers to prove out their designs and broadcasters to qualify decoders for ATSC compliance.

“We’ve seen decoders that work fine when tested with one encoder but lock up and lose the picture when fed signals from another,” said Malmstrom. “Thorough testing during design can prevent such problems. But until now there has been no comprehensive set of tests for receiver designers to use.

“ATSC compliance bitstreams run on readily available bitstream players, are fast and easy to use and perform the most comprehensive set of tests available.”

---

First opening day baseball game in HDTV

With as many companies participating as there are players on a team, our nations' favorite past time launched the 1998 baseball season on March 31, with the Texas Rangers opening game, out of Arlington, TX, when it went up against the Chicago White Sox. That in itself isn't earth shattering. What does make this event newsworthy is that the game was the first ever done in NTSC and HDTV terrestrial broadcasting.

Most all of the players, and not just those on the baseball teams, were Texas companies. Writing this page in ATSC history and bringing this historic event to the public were representatives from all five phases of television: acquisition, manipulation, storage, distribution and presentation. Included on this list are HD-Vision, LIN Television, NBC/KXAS, Comark and Comark Digital Services, ECI-Telecom, MCI, Global Broadcasting Corporation, Circuit City, Texas Instruments, Mitsubishi Electric, Toshiba, Panasonic and Zenith.

Dallas' HD-VISION provided the HD crews, HDTV cameras, fiber-optic camera cabling and HDV-3, a specially equipped mobile production truck to shoot and uplink the ATSC 1,080i HDTV format. Six high-definition TV cameras were used to shoot the game. The game was broadcast locally on KXAS-TV, in the Dallas, Fort Worth area, live on Channel 41 in HDTV and Channel 5 in NTSC. The original idea for this was hatched back when LIN broadcasting owned KXAS, but since that time, KXAS-TV has been acquired by NBC.

The game was also transmitted via fiber and satellite to Washington, DC. It was broadcast from WHD-TV in DC, a high-definition test station, for a special demonstration to congressional representatives, through a Comark digital transmitter. It was viewed in HDTV on Capitol Hill by members of the Texas congressional delegation and other guests at the U.S. House of Representatives in the Rayburn Office building on a Toshiba 65-inch widescreen (16:9) prototype digital receiver.

TI had a projector set up in a theater within the ballpark. Special 28-inch monitors were set up in the stadium so that an estimated 49,000 fans could see their favorite team in the HDTV format. Jerry Fryar, acting director of engineering of KXAS-DT, Channel 41 tried to get bigger monitors, but none were available. Fryar said that HDTV doesn't really come into its own until you get a screen larger than 35 inches. The one was be transmitted live, using the new Comark "Advantage" digital transmitter, as well as on Channel 5 in standard-definition NTSC. For sports fans not lucky enough to be at the ball game, they were able to check out a new technology at designated Circuit City locations the Dallas-Ft. Worth area. Circuit City’s participation marks one of the first public exhibitions of HDTV.

HD-Vision's founders have been working with HDTV for more than 11 years. "For sports fans, we think this event has even more significance than the introduction of color had back in 1960s," said Randall Dark, president and CEO of HD VISION. "The picture is six times clearer than current television. The wider pictures and increased resolution allow a director to show the viewer more of the playing field as well. The ability to show an HDTV picture on large, big-screen TV sets without losing any quality...
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will drive sports enthusiasts to electronics stores in droves, even at today's introductory prices."

According to Robert Ogren, vice president of engineering and operations of LIN Television, “The biggest challenge in this whole event was getting the signal from the ballpark to the transmitter site. This has really been a chore, but it all worked fine.” LIN Television retained responsibility for this event, even though the station had been sold. Ogren said, “The pictures looked great and I can’t think of a better way to showcase HDTV. We do owe a debt of gratitude to Global Broadcasting Corporation who saved the day by loaning us the CODECs that transported the signals to one ad agency, the transmitter and some monitors.”

Mark Richer, vice president and general manager of CDS added “CDS is proud to be a part of this ground-breaking broadcast, the first opening day baseball game to be shown live in high-definition.”

HD-VISION has the only multicamera HD production trucks in North America at this time. Two of the mobile units can be equipped with six HDTV cameras, fiber-optic camera cable, six HDTV videotape recorders and an HDTV graphics system. The mobile units can also provide simultaneous down-conversion so those programs can be delivered in standard-definition as well during the transitional period to an all-digital broadcasting infrastructure. Dark said that this game was covered in NTSC and HDTV, using separate facilities and equipment, like two separate events.

MCI’s roll in this event was to provide its fiber-optic network from the ballpark to the uplink facility and to WHD-TV for broadcast in the HDTV format on the Model Station in Washington, DC. The broadcast will be carried via MCI Communications Corporation’s advanced fiber-optic network and will mark the first commercial digital broadcast transported via fiber in asynchronous transfer mode (ATM). What makes the MCI digital TV fiber-optic network unique? It’s the deployment of the ATM access-multiplexing device. The device allows digital TV subscribers to send and receive program material at
Broadcast technology is on the fast track as stations across the country begin converting their technology to digital. If you're not on track for this important transition, the time to begin is now. And Professional Communications Systems is here with the tools to help.

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speeds of from 19.4Mb/s to 622Mb/s.
Texas Instruments' (TI) Digital Light Processing (DLP) was used to project the game onto an 18-foot diagonal screen in the 16:9 HDTV format. The use of HDTV signals with TI's DLP technology provided clear, sharp and lifelike images that few people have ever experienced from a live telecast. Jerry Setliff, TI's manager for the project said, "Our DLP technology is the only truly digital projection/display technology currently in wide scale production."

Mitsubishi Electric Corporation says the HDTV broadcast of the Texas Rangers and Chicago White Sox game was made possible, in part, by technology developed at its company and distributed by its Digital Broadcasting Business America division. The Mitsubishi Electric MH1000 HDTV encoder compressed the signals it received from the HDTV remote truck to a 19.4Mb/s encoded bitstream for transmission to KXAS-TV, serving the Dallas-Ft. Worth area, and to WHD-TV. Mitsubishi MH1000 decoders were also used to decompress the audio/video signals to maintain the highest quality studio images and sound.

Circuit City spokesperson Morgan Stewart said, "This broadcast gave the consumer the first chance to see products that will be available to them this fall. They witnessed the remarkable picture quality that an HDTV broadcast can deliver."

Circuit City showed the game on HDTV sets provided for this event by Panasonic and Zenith. The Panasonic HDTV set used was a 56-inch widescreen rear-projection model with a DTV set-top converter box. The Zenith HDTV set used was a 64-inch widescreen rear-projection model.

To sum it up, everything went well, except for the Rangers — they lost 2 to 9.

Sony throws its hat into the telecine ring

Telecine is something that used to be a big part of most every TV station. With advances in videotape and other technologies, the telecine island has become as scarce as hen's teeth in most all facilities except the post houses.

Except for news and live sports, nearly 80% of all programming on television today originates on film. That film has to be transferred to an electronic media. Enter the post houses and the telecine suites. Until recently, there have been two major players in the telecine business: Rank/Cintel and Philips. The Rank/Cintel, now called Cintel, uses a flying spot scan technique. An oversimplification of a flying spot scan telecine is on one side of the film is a photocell on the other is a cathode ray tube operating at whatever rate the system is intended to work with NTSC (525/60) or PAL (625/50).

The Philips Spirit has a line array CCD imaging system and operates like most any other CCD line array, on one side of the film with a light source on the other. There is a
“...expect a high today of -60 °C, with winds
gusting to 160 kph. We’ll be
back with sports right after this...”

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First generation digital quality is maintained by editing in the DVCPRO compression format, and newsBYTE’s built-in switcher provides a host of real-time special effects during editing.

DVEDIT™ is Panasonic’s all-digital DVCPRO based nonlinear editor for the NT platform in a pre-configured, fully integrated real-time editing system. DVEDIT features a dual-codec DV video engine, a streamlined version of POSTBOX editing software, real-time Jog Pad edit controller, over 110 real-time transition effects, internal SCSI media hard drives (70 minutes of video) and RS-422 VTR control card, all working under Windows NT™.

NewsBYTE and DVEDIT. No wonder that in the fast-moving business of news and production, people are moving to Panasonic.
web page for those working or having an interest in telecine at www.alegria.com.

The Sony approach

The Sony telecine uses a two million pixel CCD frame array device. This differs from other telcines in its transport by using an electro/optical image registration system. This allows frame rates up to 30fps. Viewable pictures are also available in the shuttle mode.

Another feature is an updated version of the Peterson/Bell & Howell type RGB lamp house and an integrating sphere to illuminate the film. The sphere allows diffuse light to illuminate the film image, reducing dirt and scratches. Exposure control and color balance is achieved by controlling the amount of red, green and blue light into the sphere and then on to the film.

Most telcines use the edge of the film as a reference, but the mechanic reference for the film image is the registration perforations. The perforation-to-edge tolerance is coarse when compared to the perforation-to-perforation tolerances, so with edge guiding getting a stable image is always a challenge. Sony achieves image stability equivalent to that of pin registration by sensing the capacitance of the sprocket hole separately on an x and y axes. It sends this information to two servo-driven optically flat pieces of glass that refract the image to bring it back to the point where it is in register with the previous frame at the imaging arrays. The film doesn’t move during this registration process, only the image moves. Because many perforations are measured at the same time and a microprocessor is used to process this data, a great deal of information about the film can be derived.

The film can be transferred at any of six standard frame rates: 23.976, 24, 24.975, 25, 29.97 or 30fps making it a multistandard telcine. Film frames are progressively scanned out of the 16x9 format images and then interpolated subsampled to the desired output standard. Because the electronic path through the signal system is RGB, you can output RGB or Y, R-Y, B-Y.

And the $$$ just keep rollin’ in

Whoever said that auctions wouldn’t pay off were wrong in a big way. After 128 rounds, the commission raised a net revenue of $578,663,029 at the local multipoint distribution service (LMDS) auction. According to an FCC spokesperson, “The LMDS is a new fixed, broadband point-to-multipoint microwave service, which, because of the amount of spectrum that will be licensed, will offer more capacity than is currently available from existing wireless services. LMDS has the flexibility and the potential to promote competition in the local telephone and cable television.”

The ethers bided away are located in the 28 and 31GHz bands. According to an FCC spokesperson, this represents the largest amount of spectrum the commission has auctioned to date.

Chairman William E. Kennard is excited. “The marketplace now has 104 new LMDS players. LMDS operators have the potential of being the next serious players offering real competition in the local loop. This can only lead to great things for consumers.”

With the taste of this kind of fast and easy revenue fresh in our government’s mouth, don’t think for one minute Congress or the FCC will permit TV stations to retain their dual-channel status any longer than is necessary to make the switch to DTV. It is small consolation to the 864 successful bidders’ pocket books; they had to make their first down payment on their newly acquired licenses within 10 business days after the release of the Wireless Telecommunications Bureau’s public notice announcing the close of the auction. The surviving bidders had to file their long-form applications with the FCC within the same time period. Of the 864 licenses sold, 142 were won by entities claiming rural telephone status, 30 were won by those claiming women-owned status and nine by those claiming minority-owned status. It is highly possible, however, that the cost to each of the surviving bidders is less than the cost of going through the comparative hearing process.

“Potential bidders have been waiting for years for the LMDS opportunity,” said Daniel Pphython, chief, Wireless Telecommunications Bureau. “Once again the commission’s auction process has worked in rapidly assigning licenses. Now, it is up to the marketplace to determine the best use for these raw materials of competition.”

Spectrum reallocation may spell trouble for LPTV stations

The clock is ticking for those more than 14,000 low-power TV (LPTV) stations serving folks in rural areas who may find their operations blown off the air with the reallocation of channel frequencies by the FCC.

The situation results from two FCC policies. First, Congress has mandated that the FCC require the major national TV broadcasters in the top 30 markets offer digital programming by Nov. 1, 1999. To aid them, the FCC is allotting the broadcasters another channel of frequency space for their digital transmission, much of the space coming from the UHF range.

Second, the FCC on April 1, allocated Channels 60-69 for mobile radio, public information and some purchased TV broadcast use, leaving Channels 14-59 for the bulk of TV broadcast spectrum.

The primary provision offered by the FCC is “displacement relief,” but there is a crucial timetable. LPTV operators who fear their signal might be in jeopardy can on a first-come, first-serve basis apply for relocation to another channel beginning on April 20. Although the application windows extend to at least 2006, there is limited channel spectrum, and those LPTV operators and broadcasters that do not apply early, may be left without any channels in the future.

Larry Bloomfield is a former chief engineer, industry consultant and author, located in Bend OR.
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www.euphonix.com
June 30 is final deadline for tower registrations

BY HARRY C. MARTIN

All tower structures built before July 1, 1996 must be registered by June 30, 1998. The commission established a two-year period (from July 1996 to June 1998) for owners to register their existing structures of more than 200 feet in height. To facilitate the registration process, filing windows were established based on geographic location. Only the Texas window, which closes June 30, is still open.

Owners who have been granted waivers to register all of their towers together and those who have missed their filing windows must submit registrations by the June 30 final deadline. Nevertheless, owners of towers built before July 1, 1996, for which a new FAA study is required, should not register their structures until a valid FAA determination has been received.

Towers built after June 30, 1996 that require registration must be registered prior to construction.

Antenna structure registration applications may be filed either electronically or by mail using FCC Form 854. Those who register electronically will receive a registration number within minutes. There is no registration fee, nor will owners be required to renew their registrations. Structure owners must notify the FCC, however, of any change in structure height, ownership, the owner's address or upon the dismantling of the tower.

After registering an antenna structure with the commission, the tower owner will receive an FCC Form 854R containing a unique seven-digit number identifying the tower. Tower owners are reminded that they must post the registration number for their structures in a conspicuous place on or adjacent to the tower structure so the number is readily visible.

V-Chip standards adopted

The commission has approved both the technical standards for the V-Chip and an accompanying rating system which, in conjunction, will allow parents to block programs not suitable for children. The new standard requires set manufacturers to install V-Chip technology in at least half of their sets with a picture screen 13 inches or greater by July 1, 1999, and in the remaining half of the sets by Jan. 1, 2000. Computer manufacturers similarly will have to install the chip in monitors that include a TV tuner. However, the commission clarified that the V-Chip only needs to have the ability to block broadcast transmissions and not video transmissions over the Internet or via other computer networks.

Program ratings

In connection with the V-Chip installation requirements, the FCC found the programming rating system currently in use to be acceptable. The approved TV Parental Guidelines rating system, created jointly by the NAB, the NCTA and MPAA, was generally found to fulfill the requirements of the Telecommunications Act of 1996.

The approved rating system categorizes programming by age group, similar to the system used by the motion-picture industry and by program-specific content. The rating icon and associated content symbols appear for 15 seconds at the beginning of the rated programs. Although the guidelines will be applied to programs by the producers, TV stations will have the final say as to the rating they deem appropriate for their particular audiences.

NBC and BET continue to refuse to include program-specific content tags despite the commission's approval of the industry ratings standards.

Deadline for Channels 60-69 changes

July 6, 1998 is the last day current licensees of TV stations on Channels 60 through 69 can file applications to modify their existing analog authorizations. The FCC is tightening its processing rules for those channels as part of its program to reallocate the Channel 60-69 spectrum to public safety and other services.

In the future, protection of Channels 60-69 signals will be afforded only over a licensee's actual coverage area and not the maximum coverage area. Therefore, licensees who are considering expanding their coverage areas must act swiftly in order to meet the July 6 deadline. Permittees of unbuilt stations on Channels 60-69 must undertake long-term planning to meet the commission's newest requirements.

Jan. 2, 2001 has been established as the deadline by which such permittees must complete construction and file a license application. The deadline is being set so that permittees who are not progressing with construction will have their permits cancelled, releasing spectrum for use under the reallocation process.

Harry Martin is an attorney with Fletcher, Heald & Hildreth, P.C., Rosslyn, VA.

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Production format wars: Will the confusion matter to the consumer?

BY LOUIS LIBIN

The disagreement over production formats has the look of a bad family dispute. It’s almost as though the family will break apart from the stress. Does the fact that there are tremendous differences in the way major groups will implement their new DTV facilities impact the industry at large? The Federal Communications Commission (FCC) adopted a technical broadcast standard for digital television. This means that the disruptions and chaos resulting from DTV implementation will be minimized. The broadcast technical standard is a guarantee that a station will have a good service area and its quality of service will be upheld. But what about the format war?

Many broadcast groups are selecting different production formats and are worried that there will be compatibility problems. The answers are straightforward and the confusion is less than it first appears. Station owners should bear in mind that all of the decisions on production format, no matter how different they appear, are in accordance with the FCC’s mandated DTV standard adopted in 1996. All U.S. broadcasters must comply with this standard.

The differences

There are many proponents and opponents of progressive and interlace scanning. Many people on the technical side of the industry today agree that progressive scanning is the way of the future. On the down side, progressive scanning is not in the toolbox of those broadcasters who need to produce locally in the near future.

From the practical standpoint, 1,080-line interlace is winning the battle. If viewed up-close by the expert viewers, a small number of the interlace artifacts can be seen. In fact, the artifacts only slightly resemble those of NTSC. How will consumers react to even the smallest artifacts? They will probably be forgiving at the beginning of the transition, and as the level of sophistication rises, so will the viewers’ expectations. To quantify the differences, interlace scanning is analog to digital friendly, while progressive scanning is digital to digital friendly. Progressive scanning simplifies conversion to other scanning formats. For digital signal processing, progressive scanning looks and performs better.

But we cannot simply focus on the number of lines. This oversimplification mitigates the complexities and the dynamics of the human visual system and can lead to confusion. Contrast and brightness have a greater impact on the human visual system than does resolution. For example, the 720-progressive scanning format picture is brighter and has greater contrast than the 1,080-interlace picture. Therefore, the number-of-lines comparison is not a valid measurement tool. And this complexity is only one of many confusing issues, even for the experts.

Why the artifacts?

When interlaced formats are used, horizontal motion in the original source between frames results in blurring and vertical motion results in a flickering effect. Progressive formats do a better job of rendering moving pictures because they use the most advanced digital broadcasting technology available. Progressive scanning covers every line of the picture sequentially each time the screen is scanned. It takes only 1/20th of a second to scan one complete picture. On the other hand, interlace scanning first covers the odd-numbered lines each time the picture is scanned, followed by the even lines. From the viewers’ standpoint, the perceived differences between the production formats will be virtually nonexistent.

DTV receivers

TV receiver manufacturers, as well as the other experts in the industry, believe that the future lies in the new flat-panel displays. Manufacturers further believe that mass adoption of DTV and then HDTV will begin only when the flat panels are a true part of the picture. How does this relate to scanning formats? The flat-panel displays are inherently progressive. Those who have chosen progressive scanning formats have decided to leapfrog over the initial consumer receivers and shoot for optimization at the second level, the more-sophisticated DTV consumer receivers. For the initial receivers, glass-tube and projection digital TV sets are designed to decode and display all of the ATSC formats. Equipment will be available to broadcasters in the near future who adopt the interlace, as well as the progressive scanning production formats.

There was a showdown of sorts at NAB 98 between manufacturers and users of the production equipment.

Louis Libin is a broadcast consultant in New York and Washington.
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The battle over formats

Now that the networks have chosen differing standards for the implementation of (H)DTV, how do you see that influencing the cost and timetable for implementation?

I find the circus atmosphere surrounding the choice of picture formats for DTV to be disturbing, at best. I would liken it to arranging deck chairs on the Titanic. The various choices made by the networks seem to contain a large measure of political considerations. The only network that seems to understand the potential for DTV is FOX. Its choice of 480p/30 reflects a real understanding that the bits are bucks and that it is both silly and wasteful to force-feed picture formats that won’t be noticed by the consumer’s eye on their consumer-grade monitors. That is, if they can receive at all. The choice of 1,080i by CBS and NBC for HDTV seems to be more of a political move than a sound commercial choice. CBS’s choice of 480i for SDTV really seems to fly in the face of its position that the network wants to deliver the highest-quality DTV pictures. ABC’s choice of 720p for HDTV and 480p for SDTV is at least reflecting the advantages of progressive vs. interlaced in terms of picture quality.

Getting back to the Titanic, we seem to be steaming at full speed toward an iceberg and no one is on watch. A paper was given at NAB that detailed the results of the reception tests in Washington, DC, for both WHD and WETA, and it confirmed some of our worst fears. This data should have set off a serious debate as to the viability of the Grand Alliance system as an over-the-air service. Instead, there is a hushed silence on the subject.

The paper, sponsored by MSTV, detailed how at more than 50% of the sites in Washington, where signal levels were strong enough and an outdoor antenna was used, there was no ability to produce a picture. This is not indoors. For indoor reception, at sites where signals were strong enough, more than 65% of the locations could not produce a picture. So while Congress debates the HDTV vs. multichannel issues and networks set format standards, we on the Titanic of DTV are steaming forward into the dark night ignoring the warning signs.

The costs of the format selections by the networks may be immaterial compared to the cost of a failure of DTV with the American public. We as an industry should get our priorities straight. The system must work robustly or there will be no need to debate picture formats. A blank screen in any format is still a blank screen.

I believe that most manufacturers anticipated some standards disparities between the networks and have designed the new (H)DTV equipment accordingly. So I don’t think there will be much effect on the timetable, at least not as a result of equipment availability.

Cost is also another matter. It always costs more to design and manufacture a product that does more. Had the networks settled on a single standard, all equipment would be a single standard. Now, standards-sensitive equipment must deal with two or more formats, and this translates to higher costs. Over time, this premium will likely diminish as designs get refined and more silicon sources are available. But initially, some additional cost will result from the lack of a single network standard.

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THE DESIRED EFFECT.
All color TV systems use the principle of additive colors with green, blue and red (GBR) as primary colors. The main source of analog and digital video signals are color video cameras, which generate gamma-corrected primary green, blue and red component video signals.

GBR signal amplitudes are best described using a signal containing color bars. Color bars are widely used and, unfortunately, often misinterpreted. In this article we will make reference to a standard set of color bars that have well-defined characteristics. The signals described here feature a full-screen sequence of vertical bars showing the saturated primaries (green, blue, red) and their complements (magenta, yellow, cyan), as well as black and white. The active line is thus divided in eight equal parts. The first is occupied by a luminance reference white bar, i.e.; a white bar of a standard amplitude. The last bar is a black bar, that is black level only. Two groups of color bars signals are described here. They reflect the peculiarities of the two conventional TV scanning standards (525/60 and 625/50) in terms of white and black signal levels. Each group comprises a full amplitude (100%) and reduced amplitude (75%) color bars signal.

Figure 1 summarizes the relative amplitudes of the components of a color bars signal.

- The first row presents a fully saturated color bars signal with maximum signal levels of 100% and minimum signal levels of 0%, referred to as 100/0/1000. The dotted lines represent a fully saturated color bars signal with a 75% amplitude referred to as 75/75/7.5.
- The second row presents a subset of the 75% color bars signal referred to as 100/0/75/0. This signal is identical to the 75/75/7.5 signal except that the luminance bar has an amplitude of 100%. This signal is sometimes erroneously referred to as 100% color bars.
- The third row presents a fully saturated color bars signal with a maximum signal level of 100% and a minimum signal level of 7.5%, referred to as 100/7.5/100/7.5. The dotted lines represent a fully saturated color bars signal with a 75% amplitude referred to as 75/7.5/7.5/7.5.
- The fourth row presents a subset of the 75% color bars signal referred to as 100/7.5/75/7.5. This signal is identical to the 75/7.5/75/7.5 signal except that the luminance bar has an amplitude of 100%. This signal is sometimes erroneously referred to as 100% color bars.

Component video

In component video systems, color pictures are represented by a number of video signals, each of which carries a component of the total picture information. In component video facilities the analog or digital component signals are processed separately and, ideally, are encoded for transmission only once — just prior to transmission. There are two choices of component video signals:

1. GBR component video signals: GBR components, in some form, are the basic ingredients of any color TV system. Because practical color TV cameras generally have three sensors, one for each primary color, a GBR system exists at some stage inside the camera, even if it doesn’t emerge in that form. GBR consists of three signals, each having the same bandwidth. GBR signals need to have identical bandwidths and distribution channel gains, as well
as controlled (read: extremely small) differential delays with respect to the reference (green) signal. Loose channel gain and frequency response tolerances result in corrupted (colored) whites. Differential delays result in poor registration resulting in colored-fringe pictures, much like those found on newspaper comic pages. GBR signals have limited applications in teleproduction environments, such as the source of chroma-keying signals, complex signal manipulations in digital video effects (DVE) generators, as well as character generators. There are no GBR component video VTRs available on the market. As a consequence, this article will deal only with Y, B-Y, R-Y component video signals.

2. Y, B-Y, R-Y component video signals:

This requires the generation, distribution and processing of three signals obtained by matrixing the primary GBR signals. The GBR signals are matrixed together to form a full-bandwidth luminance signal (Y) and two narrowband color-difference signals (B-Y and R-Y). The human eye relies on luminance to convey picture detail and, therefore, much less resolution is needed in the color information. Some savings in bandwidth can thus be obtained by using color-difference signals. One-half or one-quarter of the Y bandwidth is usually acceptable, depending on the application. Y, B-Y and R-Y component analog signal outputs are available with many contemporary cameras.

Y, B-Y, R-Y component video signals

The mathematical expression for the luminance component is:

\[ E'_Y = 0.587 E'_G + 0.114 E'_B + 0.229 E'_R \]

where E represents a voltage and the prime sign indicates that the signal has been gamma-corrected.

---

Q. How can I make sure programs being made now will have the best production values in the DTV era?

A. Originate in a format that will give you the most data - either 35mm film or 1080i HD video if your budget allows. 1080i offers the best spatio-temporal capture parameters of all video formats. You can derive all of the ATSC transmission formats from it. And in the future it will give you the best quality conversions to HD progressive. The faster field rate of video makes it more suitable for sports than 24 frame film which is often preferred for prime-time dramas.
Chrominance information is conveyed by two of the primary signals minus the luminance component. These signals are known as the blue color-difference and red color-difference signals. They are:

\[
E'_b - E'_y = -0.587 E'_c + 0.889 E'_b - 0.299 E'_r
\]
\[
E'_r - E'_y = -0.587 E'_c - 0.114 E'_r + 0.701 E'_r
\]

There have been limited attempts at standardizing analog component video signals in North America. Currently, a number of de facto proprietary “standards” coexist, making interconnection of equipment difficult. The difficulties encountered are mainly due to the non-standard scaling factors of the color-difference signals.

The color-difference signals are scaled in amplitude by suitable multiplication factors. The scaling factors depend on the application. Figure 2, which includes the scaling factors, shows the typical waveforms of Y, B-Y, R-Y signals and the signal characteristics. The signal amplitudes are typical of 100% color bars. Normally, the Y signal has sync added. The color-difference signals are bipolar and symmetrical about the reference axis.

- The NTSC and PAL color TV systems use identical scaling factors to avoid transmitter overmodulation. The PAL system refers to the scaled B-Y signal as E'u (or U) and the R-Y signal as E'v (or V). Figure 2 shows the signal amplitudes of NTSC-related Y, B-Y, R-Y signals obtained at the output of an NTSC decoder. Note that the color-difference signals have unequal p-p amplitudes and are also different from the p-p amplitude of the luminance signal (sync excluded).
- The EBU N10 standard specifies the characteristics of the European com-

**Q. My budget doesn't allow 1080i. Can I squeeze good quality upconversions from Betacam SP or DV?**

**A.** They can be better than you might expect!

Betacam SP is analog, but its advantage is that, like DV, it is component, so it doesn’t suffer from composite encoding and decoding artifacts. It also has quite a reasonable bandwidth and low noise. The main thing is to shoot well on a good quality camera. Component makes a far better job than composite of reproducing the image the camera saw – enabling the upconverter to do the best job.
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ponent analog Y, B-Y, R-Y component analog video signals. There is no equivalent North American SMPTE standard. The scaling factors shown in Figure 2 for EBU N10 are identical to the scaling factors specified in the ITU R 601 (formerly CCIR-601) component digital standard. ITU R 601 calls the scaled color-difference signals \( E_c \) and \( E_c' \). The same signals are known in North America as \( P_l \) and \( P_h \). Note the equal 700mV p-p signal amplitudes (ignoring the sync) of the three component signals.

- Signal amplitudes and scaling factors for the North American versions of the Betacam component analog VTR format, as well as the component analog outputs of color cameras of Japanese manufacture marketed in North America are shown in the third column of Figure 2. Note the 933mV p-p color-difference signal amplitude and the 714.3mV (including setup) p-p luminance signal amplitude (ignoring sync). These same products marketed in 625/50 countries have scaling factors and signal characteristics per EBU N-10. The same products marketed in Japan are similar to the North American version except that the luminance signal has no setup.

- Scaling factors and signal characteristics of the North American version of the MII component analog VTR format marketed in North America are shown in the fourth column of Figure 2. Note the 648mV p-p color-difference signal amplitude and the 700mV (including setup) p-p luminance signal amplitude (ignoring sync). In the 625/50 countries, these products have scaling factors and signal characteristics as per EBU N-10. Products marketed in Japan are similar to the North American version except that the luminance signal has no setup.

Potential problems

Both component analog recording formats feature analog composite and analog component in/out ports. The composite in/out ports are mutually compatible. Consequently, connecting equipment using analog composite NTSC signals should cause no problems other than the unavoidable accumulation of analog NTSC impairments. The component in/out ports are signal-level incompatible. They are also incompatible with normalized signal amplitudes conforming to EBU N-10 as used by component digital (4:2:2) equipment.

A common mistake is the integration of Betacam SP VTRs into a digital component 4:2:2 environment using 270Mhz/s SDI signals. This requires a deserializer feeding EBU N-10 signals to the component analog input of the VTR and a serializer being fed the component analog output signals available at the output of the VTR. This arrangement is analog signal-level transparent. Problems occur when the resulting videotape is played back on a Betacam SP VTR using the component NTSC signal output. The result is an NTSC signal without setup and with reduced chrominance amplitude (-25%). Alternately, a videotape recorded on a Betacam SP VTR using composite NTSC input signals and played back on a Betacam SP VTR using an SDI serializer at the output results in a luminance component signal with setup and excessive amplitude color-difference signal levels (+33%).

This problem is compounded by the use of 100/7.5/5v/s bars as a reference in specifying the component analog signal levels of Betacam equipment. This type of signal generates a luminance signal with a 1V p-p amplitude (714.3mV white bar + 285.7mV of sync) and 700mVp-p color-difference signals (75% of 933.3 mV). To the uninformed this looks like the normalized signal levels in column two (EBU N10) of Figure 2.

Good engineering practice requires the normalization of the component analog signal levels in the component analog signal distribution path to EBU N-10 specifications and the use of signal level adapters to match the component analog inputs and outputs of non-standard equipment.

Michael Robin, former engineer with the Canadian Broadcasting Corporation engineering headquarters, is an independent broadcast consultant located in Montreal, Canada and the co-author of “Digital Television Fundamentals” published by Mc-Graw-Hill.
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Windows NT in broadcast applications

BY BRAD GILMER

Over the last few years, a number of broadcast applications have moved to the Windows NT platform, so I set out to find out why this is happening.

Why NT?
The main reasons manufacturers move to NT seem to be the following:
- robustness;
- connectivity;
- low cost;
- familiar user interface;
- device driver model;
- ability to also run office productivity tools; and
- large pool of trained application developers.

Robustness: Older versions of Microsoft operating systems (Windows 95, Windows 3.x and DOS) do not support individual memory space for applications. As a result, it was not uncommon for applications (especially Terminate and Stay Resident or TSR programs) to stop the system in its tracks. As an early C programmer, it was not uncommon for me to write directly over some of the DOS operating system by incorrectly defining an array or for some other reason.

With Windows NT, Microsoft corrected this long-standing problem. Applications now run in their own memory space. This translates to less crashes, good independence (one application cannot write over another) and ultimately, more reliable applications.

Connectivity: Network connectivity is built into NT rather than being supplied as a separate application. This allows manufacturers to count on standard and simplified installations. Another advantage of NT over other operating systems is that it can be easily configured for multiple protocol stacks (IP and IPX for example). This allows manufacturers to build an application that speaks multiple protocols. Doing this in previous systems was a major headache and required expert knowledge.

Low cost: Although NT Server is priced similarly to other operating systems, depending on the configuration of user desktops, an NT environment can be significantly less expensive than other operating systems.

Familiar user interface: By now, there are many people who know and understand the Windows GUI. This has an advantage for manufacturers in that training time is greatly reduced, as are operator errors.

Device driver model: Figure 1 illustrates the device driver model in Windows NT.

In the old model (DOS and Win 3.xx), applications wrote directly to device drivers. Manufacturers had to write specialized applications to communicate with almost all devices and there was no standard way to address devices. As a result, applications had to be rewritten as devices changed. This was extremely costly and caused headaches for users caught with incompatible hardware and software.

In the new model, the application speaks through a standardized application-programming interface (API). The same type of commands (i.e., open, close and write) are used regardless of the commands used to perform those actions on a specific device. Device drivers benefit from a common interface as well. They receive commands from the system services layer, simplifying the device driver and standardizing the dialog between the two layers. The result is lower development cost and the separation of applications and device drivers that allow these two elements to be developed independently. However, adding the standard API and system services layers does not come without a price: These additional layers cause a reduction in overall execution speed.

Ability to run office productivity tools: As broadcast-specific applications and desktop applications get closer, there is a value added to a manufacturer’s final product by being able to interact with desktop products, which NT allows.

Large pool of trained application developers: Many manufacturers are moving to NT because of the large pool of programmers who can write applications for NT. This is no small consideration given the current severe shortage of technically skilled personnel in the United States.

Large number of well-developed programming tools: A wide variety of programming tools for NT allow manufacturers to develop products in just about any programming language you can imagine.

Figure 1. Windows NT device driver model.
“5 Doctorates, 34 degrees and 32 technical qualifications, combined with over 1500 years of UHF broadcast experience, have worked to make EEV IOTs the world’s No.1 choice for high power analog UHF TV transmitters. A purchasing decision made easier for you when considering that analog IOT transmitters are upgradeable to digital operation.

Additionally in preparation for the digital broadcast age, EEV has developed a full range of digital IOTs. Production resources have been increased, ensuring your access to unrivalled products and engineering support. Who better to help you into the digital age than EEV?”
Why not Windows 95?

In researching this article, I asked a number of people why they did not choose Windows 95 for broadcast applications. Here are some of the reasons:

- Insecure memory model. Although Windows 95 improves on the DOS and Windows 3.1 memory models significantly, it still has common display memory. This means that if one application crashes the display memory space, the display for all other applications will be affected. This is true even if the underlying application is still running correctly. The only way to reset the display memory space is to reboot.

- No government security model. NT supports security models that meet government requirements. This is an incentive for manufacturers that sell their products to that sector.

- Limited-life product. Microsoft may not continue development of Windows 95 beyond the Windows 98 version. Many manufacturers have decided to move to Windows NT now rather than develop for an operating system that is going to have a finite life.

- File system. NT uses a new file system called NTFS, which provides improvements over earlier Microsoft file systems. Some improvements include striping data across multiple volumes and support for large files. An improvement that is critical for video-based applications is that NTFS files only occupy the amount of space on disk that is consumed by the data. This may seem logical, but older file systems allocated space in blocks. Block sizes were kept large in video applications for reasons of efficiency, but this resulted in lots of wasted space if the end of a file occurred just at the beginning of a block. (See Figure 2.)

It is not difficult to see why some manufacturers have chosen to adopt NT for broadcast applications. Although NT has a particular niche, other operating systems also have their place in the broadcast environment. One major limitation is that NT is not a real-time operating system. Real-time applications, such as vertical interval switching and precise time-sensitive commands are not handled well in NT. NT is only well-suited for between five and 50 users; other operating systems are better-suited for large client bases. Also, you may not be able to find NT device drivers for some hardware.

Brad Gilmer is president of Gilmer & Associates Inc., a technology and management consulting firm.
As if millions of possible configurations in our matrix switchers weren’t enough.
I'm looking for a solution to carry a complete RF band to a remote location, approximately 1km from the source. The subject band is 40-300MHz carrying 31 cable TV channels (CCIR). The remote location cannot be linked by wire due to highway, but a leased telephone line (full audio range on up to four twisted pairs) is available. The channels cannot be transmitted over-the-air due to a nearby airport and local RF regulations. Any suggestions?

Zulfiquar Ahmed Khan
King Fahd University, Dhahran, Saudi Arabia

Good question, bad location. No one ever consults the engineer until after all the decisions are made. How many times has the GM mentioned an upcoming remote, then asks: “We can do that, can’t we?” Those phone lines aren’t going to be much help, so I contacted a few manufacturers and here’s what I learned.

Ken Ito from Canon USA suggested:

Canon’s Canobeam uses a light beam instead of RF, however, the Canobeam video system does not carry an interface to accommodate 31 cable channels. We suggest the Canobeam data transmission system, which can interface with fiber-optical networks, such as Fast Ethernet 100 BaseFX, FDDI and ATM/OC-3.

Well that’s a start. The ATM/OC-3 data rate is approximately 155Mb/s, which if divided by 31 channels leaves 5Mb/s for each channel. Using compression and statistical multiplexing, the final signal quality should be pretty good. You don’t get many sandstorms there do you? With the delivery problem solved, the next question is formatting the signals for delivery.

Joel Wilellite at Divicom, Milpitas, CA, has that answer:

To successfully transmit the 31 channels and allow for future growth, consider MPEG-2 encoding with statistical multiplexing. MPEG-2 compression allows the limited bandwidth to be maximized. An ATM/OC-3 transmission scheme provides a maximum data rate of 1.55Mb/s. Overhead eats up 20% of that leaving only 125Mb/s, which can accommodate up to 36 channels if each channel is compressed to 3.5Mb/s. However, content requirements may dictate rates of up to 6Mb/s for complex streams such as sporting events. Allocating bandwidth on demand using a technique called statistical multiplexing is the solution. The DiviCom MV40 DiviTrack lookahead feature provides this capability by evaluating content prior to encoding and then allocating the bit rate as needed.

To accomplish this particular task, the channels must be divided into two separate pools of 16 each for encoding. The resulting encoded streams are then multiplexed, formatted and fed to a modulator for transmission. With this approach, each channel would require between 1.5 and 6Mb/s of bandwidth.

If those sandstorms get out of hand, and assuming there are appropriate frequencies that won’t bother those pilots, the use of high-frequency microwave is also possible.

Christine Doyle at the MRC division of California Microwave suggested:

Two different approaches allow wireless interconnections of cable TV systems of this size.

For analog cable systems, up to 60 channels, a wide-band radio system using AM modulation is cost-effective. In this case, the entire set of cable TV channels is block upconverted to a microwave frequency. AM systems typically operate in either the 12GHz or 18GHz bands, either of which is effective for a 1km link.

Another approach is appropriate for a digital cable system. Using MPEG-2 compression, up to eight or nine cable channels can be placed within a 45Mb/s channel. In this way, four separate DS-3 (44.736 Mb/s) digital microwave radio systems can be multiplexed together to transmit 31 cable TV channels 1km to 2km. If some of the programming is already digitally compressed and received via satellite, using the combination of MPEG-2 compression and digital microwave radio systems might be an appropriate solution. Again, an 18GHz or 23GHz system will function fine in Saudi Arabia at a distance of 1km.

Software upgrade

That switcher setup software I spoke about in the March issue worked fine five years ago. It still works, but a timing loop designed to slow down a 12MHz 286, isn’t anywhere near as effective as it was then. Al Dodds, one of the first people to get a copy of the software, wrote to tell me he was trying to run it on a P-III at 300MHz. Needless to say it ran a tad fast.

I went back to the compiler and made some adjustments. That timing loop is now processor independent and a fully tested and functional version has now gone out.

Ask Dr. Digital

Airport neighbors

BY STEVE EPSTEIN, TECHNICAL EDITOR

May 1998

Broadcast Engineering

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First, we broke the 4:2:2 digital price barrier. Now, we've smashed it to smithereens!

Get into Digital-S for less than $10,000.

The high price of 4:2:2 digital seemed to be set in stone until JVC made it an affordable reality. But breaking that price barrier wasn't enough. Because now, our new additions to the Digital-S lineup put this dynamic format in the hands of even the most cost-conscious professionals.

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Now, available in four or eight input versions, analogue or digital, and with Windows 95 or NT-based control it's easy to see what makes Magic DaVE so special. Only one question remains.

How can he do it for the price?
As everyone knows, solid-state devices have slowly but surely been taking over the high-power RF business. In fact, a generation of engineers exists who have never heard of a screen grid or enjoyed the lovely blue glow of a mercury vapor rectifier. However, the old phyrts (derived from the Greek and meaning “learned gentleman”) have been able to console themselves with the knowledge that high-power UHF remained the realm of devices with filaments and grids. The idea that the more exotic of those devices required magnets and had cavities around them was acceptable as long as everyone knew that somewhere deep inside was a vacuum with little electrons swarming in streams as opposed to holes moving about.

**For solid-state devices, a huge number of devices are involved.**

**Becoming solid-state**

Until the advent of LPTV, even low-power UHF transmitters were primarily tube users, although some solid-state 1kW translators were being sold. The boom in sales for RF amplifiers of that size caused the rapid development of solid-state amplifier modules typically rated at 200W to 250W peak power. Those early units were fairly inefficient but that was acceptable, because the total power involved wasn’t significant.

The 5kW and 10kW systems still primarily used tetrodes — albeit with solid-state driver stages. Again, solid-state transmitters at those levels did start to appear, but they were costly items. At the higher levels, the tube du jour went through phases — starting with external cavity klystrons and moving into internal cavity klystrons, klystrodes, MSDC klystrons and the IOT. Grids were added or removed, cooling varied from air to distilled water with some stages in between. A couple of years ago, Thomson developed a tube that worked well at 60kW peak power output and a number of those units are in use today.

This year’s NAB still was primarily oriented toward IOT or Diacor transmitters at the higher power levels with one notable exception. Harris was showing its new Diamond(CD) series DTV transmitter that is totally solid-state up to 25kW average power (125kW peak). Before this article is taken as a Harris advertisement, it should be realized that other manufacturers will soon be following along the solid-state road for high-power systems; an example would be the new transmitter shown by Continental Electronics. Working with Telefunken, Continental has developed a solid-state transmitter for up to 5kW average power. It states that higher-power units are coming with the real limiting factor at this time being price. However, Harris does have to be given credit for having such a device ready for sale. In fact, the one on the floor had a banner attestng to the fact that it had been sold. The new Harris transmitter uses LD-MOS FET devices in the RF amplifiers. Each PA cabinet is capable of 5kW average power (20kW peak) and up to five cabinets can be joined to reach 25kW average power. A power supply is added for each two RF modules.
The DPS-470 Serial Digital AV Synchronizer

The DPS-470 serial digital component AV synchronizer is the ideal choice for broadcasters transitioning to DTV. Available in video and audio/video configurations, the DPS-470 bridges the gap between analog and digital production facilities. 10 bit ITU-R 601 component processing and adaptive comb filter decoding provide maximum signal transparency. A built-in auto sense TBC and digital test pattern generator round out the features.

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Look At LeBLANC Broadcast Inc.
Handling 5.1 audio in production

BY KENNETH HUNOLD

If TV audio has been the “poor step-child” of TV production, it is now destined for a long-overdue upgrade in status. The new ATSC digital TV system can deliver five channels of 20kHz audio — and then some — all the way to the home. The “5.1” nomenclature refers to left, center, right and two (stereo) surround channels. The “.1” channel is a bandwidth-limited low-frequency effects channel (LFE), which is commonly (but incorrectly) referred to as the subwoofer channel. I’ll explain the difference shortly.

The left and right channels are used for the stereo music soundtrack, as well as for creating a sonic perspective that matches the visual perspective. The center channel is used for dialog and other elements that you want to lock to the center of the screen. The two surround speakers are usually placed behind the mixer (and viewer) for stereo effects.

Separating the channels

Now let’s look at the confusion surrounding the terms LFE and subwoofer. The five full-bandwidth channels are perfectly capable of delivering audio down to 20Hz for music, dialog and effects. However, the LFE channel was specifically designed for low-end stuff, like the roar, rumble and other earth-shaking effects that would otherwise eat up headroom if carried by a full-bandwidth channel. The frequency response of the LFE channel in the Dolby Digital (AC-3) system used in DTV broadcasting is from 3Hz to 120Hz.

A subwoofer is a speaker not a discrete audio channel. There is no subwoofer channel with Dolby AC-3 audio transmission. Subwoofers are typically used in home and professional monitoring systems to reproduce all low frequencies below about 100Hz, either replacing or augmenting the low-frequency response of the system’s main channel loudspeakers.

Creating 5.1 audio

With the exception of some “soundfield” recording techniques that try to recreate the 360° panorama of the ambient sound, almost all 5.1 audio heard today is assembled from discrete, primarily mono elements. This means that the place where you begin to handle 5.1 audio is in the post-production process.

The 5.1 audio system delivers six discrete audio channels all the way to the home. Six separate, individual channels of information need to be assembled, monitored and recorded. These signals can be assembled and monitored on elaborate multichannel mixing and panning systems, but often such elaborate hardware can be emulated through creative use of aux busses and creative panning assignments.

Current “soundfield” formats rely on a phase-shifting technique to encode four channels of information into a stereo pair. Unfortunately, this effect can be unpredictable and, therefore, it is common to mix surround digital television.

Recording 5.1 audio

Perhaps the biggest problem for broadcasters who want to produce 5.1 audio is figuring out how to store the six channels of audio after they’ve been created. Broadcast videotape recorders typically have at most four channels of audio. Only the most expensive HDTV recorders have more, typically eight or 10 channels.

GTN, Detroit, MI, an audio/video production and post house installed two Solid State Logic Aysis digital 64-channel mixing systems to provide 5.1 surround-sound mixing capability. The new equipment affords users 144 hours of shared storage in combination with the facility’s networked SSL DiskTrack and ScreenSound digital editor and VisionTrack.
For over 50 years, we’ve focused our whole company on the area where a read/write head passes over a recording surface. This point of contact between data and machine is the center of everything we do. With this technology as a core, we’ve earned over 7000 patents. Including a number of advances that have literally made the broadcast industry what it is today. And now, we think you’ll be interested in our latest breakthrough. The scalable Ampex DST family of products. Digital video archives with accessibility that nobody else can match. In fact, we can archive or restore files up to 6x faster than any other device on the market. And there’s a good reason our technology is so far ahead. Because we’ve put the full weight of our experience behind digital archiving since 1991. So if you want a company that can take you into the next generation of video technology, that’s us. Because that’s what we’ve been doing for the last 50 years. To know more, call 1-800-752-7590, or go to www.ampex.com
The music industry often records 16, 24 or 48 channels of audio on their audio-only recorders. Few TV stations will have this kind of equipment.

Another solution is to use eight-channel DTRS or ADAT digital audio recorders that use consumer videotape for storing the six channels of 5.1 audio. These recorders are inexpensive and provide a high-quality solution to the recording dilemma. In addition, the eight-channel recording systems mean there are two extra channels for other uses.

These two extra channels could be used to record a second audio program such as descriptive video service for the visually impaired, a second language dialog track or a composite stereo mix of the first six channels. A problem for this dual system scenario, in addition to synchronizing the two sources, is the additional complication of transporting these six or eight channels of audio throughout the broadcast facility.

It is sometimes suggested that the six-channel, 5.1 audio signal be pre-encoded and stored in compressed form on a standard (digital) videotape machine.

The data rate of the audio signal specified by the ATSC is certainly low enough to be recorded on a digital video recorder. However, the 5.1 coding algorithm (Dolby Digital AC-3 in this case) and data rate were designed and optimized for use in the final transmission link to the home. The low data rate chosen for ATSC broadcasts will not survive the multiple encode/decode cycles that could occur in the typical post-production environment. Therefore, you could do it, but at what cost to final audio quality?

Various solutions have been proposed to some of these problems, including a higher bit-rate version of the AC-3 coding algorithm. At NAB, there were demonstrations of a multichannel compression adapter for digital VTRs. Also, a 12-channel (uncompressed) variation of the AES-3 interface standard was submitted to SMPTE for standardization.

So, for you pioneers out there, you’ll have to make do with the equipment available and develop your own solutions. Like the need for data transmission and electronic program guide standards, the products and techniques for “systemizing” all of these new elements to DTV have yet to be defined. Fortunately, elegant and transportable solutions will evolve over the coming months as equipment manufacturers solve the problems of transporting 5.1 audio signals throughout a DTV facility.

Broadcast videotape recorders typically have at most, four channels of audio.

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Kenneth Hunold is an audio/video project engineer for the ABC Engineering Laboratory, New York.
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Collaboration and coordination are the keys

TV's adoption of "squeezes" and five-second sponsor intros and "outros," Broadway's adoption of rock concert technology and the world wide web's hypertext interaction are all indications of the media industry's common interest in maximum efficiency. This integration of broadcast, live performance and interactive media has spawned a bevy of multipurpose facilities requiring a new level of planning and coordination. The redeveloping Times Square area of New York City alone is host to several facilities that are defining this new facility approach and MTV Networks' new teleproduction facility is leading the way.

It's not about what emerging technologies your facility has, it's about building a facility that is so solidly designed that you can adapt those technologies to suit your unique approach to

Photo: The MTV Green Room overlooks the renovated Broadway district of downtown New York.

BY STEVE KAUFMAN AND SCOTT GRIFFIN

Broadcast Engineering May 1998
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broadcast. MTV viewers expect innovation and evolution and these new facilities in Times Square deliver.

MTV is often credited with the pioneering of short-form, multi-image, creative programming. The music video concept is inherently based on commercial promotion as much as artistic expression, and the production techniques that have evolved from this concept have influenced many related media disciplines. Facilities that support the creation and delivery of programming that incorporate the many sources of information, entertainment, interactivity and immediacy must be planned with the required connectivity and spatial flexibility. At the same time, the successful design and implementation must still include careful attention to the bottom line.

Working with the client

Close collaboration with the client in the planning stages is what makes or breaks a project. Development of equipment and labor schedules that connect the right resource for the task at hand need to be established with the end product being the true driving force. Bottom-line costs need to be balanced against challenging project time lines in order to truly identify the most cost-effective solutions to a client’s needs.

The MTV studios in Times Square include production studios, graphics facilities and transmission connectivity that allow for a multitude of shooting environments, as well as a real-time monitor on the pulse of the world’s media capital. Two studios and a green room area support more than six sets. There is a glass wall separating these performance spaces from the backdrop of Times Square. Corridors and hallways that connect studios and operations areas have been equipped with lighting and broadcast support connectivity to allow ad hoc production setups for interviews and VJs spots. These additional production setups allow for literally dozens of different looks on air.

Ironically, the one constant about facility design is change. The key to successful projects is the system integrator’s ability to accommodate the changing needs of the client within the basic infrastructure of the design. MTV productions require the integration of a wide variety of technologies so one of the goals was to design systems with built-in flexibility and cost-effective upgrade paths.

Equipment solutions

The teleproduction facilities were designed around high-powered, work-
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Collaboration and coordination are the keys

horse products to accommodate operator familiarity while maintaining broadcast quality. The main production control room is based on a Grass Valley Group 4000-3 switcher, a two-channel Scitex DV Bison, a transform-optimized Chyron Max! character generator and a two-channel Leitch Stillfile with its second simultaneous user frame buffer dedicated to the graphics operation.

Three producer positions provide support for remote coordination, caller screening and web browsing allowing real-time integration of field and Internet elements into productions. In addition, there is a second “insert” control room that is used for secondary production support based on a GVG 1200, a small Soundcraft K3 mixing console and a second Chyron Max.

Both rooms are supported by a 16-machine tape room that includes analog and digital Betacam, D-2, three-quarter inch and VHS playback, record and dubbing.

An audio control room is centered on a 48-input SSL 8000 G series console. DAT, Digi.Date and cassette playback were laid out to support production, as well as mix-down duties for live and multitracked projects.

A video control room supports four Ikegami HK-388 cameras, one HL-25 camera and Telex microwave cameras. There are also two roof-mounted, robotically controlled Ikegami HC-240 cameras, allowing for coverage of studio, as well as street-level productions and beauty shots.

The graphics facility is located on the 10th floor and includes two Quantum Paintboxes, a Hal, a Harriet, six Power PC Macintosh paint stations and an additional Chyron Max! with Transform.

Connectivity issues

Aside from the space efficient, multi-look performance spaces, the real power of the facility is in its connectivity. The teleproduction performance and operations facilities are located on the second floor of the Viacom building, a 58-floor office tower that houses the Minskoff Theatre lobby and several production and assembly spaces where shoots may occasionally be staged. The building has a multimode fiber data-com backbone already in place. Early on, the design team determined that the flexibility attached to using that infrastructure would justify the additional cost of the fiber interface equipment. Fiber transceivers from Fiber Options and Telecast are used to carry audio, video, data and references between production, post-production, the graphics facilities, as well as to out-of-house transport gear from Nynex and Vyvx.

In addition, MTV engineering can use this fiber infrastructure to provide a full complement of remote production connectivity on fiber patch to any office, conference room or assembly space in the building. With this flexibility, a connection can be made to the main production core from virtually anywhere in the building with minimal advanced notice.
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- Satellite Broadcasting Systems
- Multiplex Broadcasting Systems
- Virtual Sets
- Video Servers
- Nonlinear Editing Systems
- CG Systems
- Multimedia Systems
- Other Related Items
Collaboration and coordination are the keys

Taking advantage of the building's fiber backbone and the use of the portable conversion gear was a tremendous boon to the production possibilities. After studying the versatility and cost-effectiveness of a fiber-based system, it became the obvious choice for connectivity between studios, technical areas and remote camera locations.

In keeping with the concept of flexible connectivity, all key points in the production chain, from camera output to record machine input are routable on a GVG 7000-series seven-level routing switcher. Two inbound and two outbound transmission lines are fed via frame sync to and from the routing switcher. This allows for the acquisition of feeds from or transmission to Viacom's Long Island-based Network Operations Center, as well as sources and destinations available through Vyvx and The Switch. Live coverage transmission and after-hours feed playback are easily accommodated at the touch of a button.

All primary microphones and communications in the facility are wireless to accommodate the dynamic construction of a "cyber wall" in the green room space and the integration of on-line question-and-answer segments represent the first steps toward interactive productions at MTV Networks. The cyber wall facilitates the integration of VJ or guest web surfing and video game playing into the production environment.

The combinations of the different media contribute to the creative as well as to the newsworthy aspects of MTV productions by allowing the latest developments in virtual imag-
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**Why does my signal need to be spotless in the new digital era?**

Digital TV could impress your viewers with enhanced picture quality. But going digital calls for new standards of signal conditioning. Any noise or decoding artifacts such as cross-luminance and cross-chrominance that remain in your video signal will be encoded and transmitted along with the picture. As well as using up expensive bandwidth, these will be magnified if the picture is upconverted to HD. The solution is precision decoding and signal conditioning.

What am I missing with my current decoders? Your racks may be full of decoders, but for the high-end decoding that is essential in the transition to digital you need a quantum leap forward in quality. The best approach is to use intelligent decoders that analyze the picture on a pixel-by-pixel basis and change the decoding parameters as appropriate. You also need to be sure that your decoder is using the best possible algorithms to guide its processing decisions.

Will my archives be able to match these new digital quality standards? In the digital era, much of the program content will be archive material. Because this will often be mixed with digitally originated sources, it’s vital that you use high quality signal processing when you retrieve it. Without precision decoding and really comprehensive signal conditioning, differences in quality will be clearly visible to the eye of the viewer.
What sort of filter do I need to remove different types of noise?

There is no single filter that can handle all types of noise. Transmission systems such as satellites can cause random broadband noise and impulsive noise like "sparkles", depending on atmospheric conditions. Analog recording onto videotape can produce noise and dropout. And then there are the scratches, dirt or grain found on film transfers. Good signal conditioning will offer combinations of recursive, spatial, median and linear filters, designed and sequenced to deal appropriately with these problems in any particular environment.

Can cleaner signals help me to save money?

Yes. Dirty, noisy signals mean inefficient compressors. That's because compression encoders cannot distinguish between noise and the real image. Worse than that, noise, being random, occupies even more of the compression bandwidth than predictable picture differences. If you clean up your signals thoroughly, you can either broadcast more channels at the same bitrate or provide your viewers with much better quality pictures.
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MTV’s extensive use of microwave cameras and wireless communications for street-level productions in Times Square needed to be coordinated with other broadcasters. MTV and The Systems Group (TSG) engineers conducted several RF sweeps of the area at different times when productions would be critical and coordinated with several rental and production groups to ensure that the base system wireless and microwave frequencies were clear and published.

Ironically, the Minkskoff Theatre was loading in a new show the same weekend as MTV’s Video Music Awards production. It was decided that because of a large number (18 channels) of one-time use wireless microphones that were needed to support three-band setups in the MTV main studio, the sound department of the show at the Minkskoff Theatre would wait a day before testing its wireless gear. This level of cooperation between disciplines has proven essential as the number of multipurpose facilities increases.

It’s a team effort

Of course, the management of base building construction efforts is always a concern. Proper planning for air conditioning, cable access and electrical service in a facility that includes broadcast equipment, studio lighting, high-end computer equipment and robotics is a challenge. The MTV project engineering team carefully coordinated architectural, engineering, lighting, scenic and systems integration efforts on this project. The production requirements that today’s multipurpose facilities demand are extensive and include support for many diverse and complementary media. Through a disciplined project management plan and a cooperative implementation effort, project goals can be achieved.

Augmentation is a new way to extend both the life and load-bearing capacity of towers. Although it may not solve every TV station’s need for a new DTV tower, it certainly is worth considering for those who want to maintain their current location for both
Collaboration and coordination are the keys

Building a network control center complete with audio and video studios proved to be a real challenge to designers. The innovative horseshoe shape of the facility keeps major traffic away from production areas, yet makes access easy to crew and artists.

NTSC and DTV transmissions. It may also offer the answer for tower owners who want to increase the structure’s capacity in order to rent that “vertical real estate.”

Photography by Brian Rose, New York.

Steve Kaufman is vice president of technical operations at MTV, New York and Scott Griffin is manager of engineering at The Systems Group, Hoboken, NJ.

**Design Team:**

**MTV project team:** Steve Kaufman, vice president, technical operations; Mike Bivona, chief engineer of production technologies; Ellen Albert, vice president, planning design resource manager, Sonya Moro, resource manager

**Broadcast systems integrator:** The Systems Group, Hoboken, NJ; Paul Catterson, project engineer; Joseph Policastro, project manager

**Set designer:** Jeremy Conway

**Lighting designer:** Bill Berner

**Architect:** Gensler & Associates

**Mechanical and electrical:** Flack & Kurtz

**Acoustical consultant:** Shen, Milson, Wilke
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Collaboration and coordination are the keys

RF coordination in the Times Square area
BY SCOTT GRIFFIN

The Times Square area is one of the fastest growing centers for TV and entertainment production and the need for technical coordination of the many divergent disciplines has reached an all-time high. The concentration of long-standing Broadway theaters and newly constructed performance spaces has been augmented by TV studios and teleproduction centers and RF spectrum has been eaten up like never before. With these new operations comes the co-location and, in some cases, the mixing of technologies that are sometimes conflicting and always deserving of special attention during the facility and systems design process.

The challenge
The major challenge is peaceful coexistence. Broadway’s systems have traditionally been integrated and maintained by a handful of sound shops and RF coordination has been a challenging, yet manageable, task amongst those groups. In the past few years, the sophistication of typical large-scale Broadway productions has increased in technical complexity by leaps and bounds. The houses in the area of Times Square proper are among the largest theaters in the Theater District, and shows staged in the Marquis, Minskoff, Schubert and Booth theaters have included some of the most complex audio reinforcement, stage mechanics and lighting systems to date. Wireless microphone, intercom and hearing-impaired systems have been joined by in-ear monitoring systems, RF control systems and extensive scenic automation that produce its own EMI and RFI interference. In addition, spatial simulation and sound source localization processors have increased the demands on needed spectrum and added to the noise floor in the district considerably. Broadcasters, such as MTV and ABC, have recently turned their attention to Times Square for interactive programs and the new dynamic afforded by the venue. The desire for remotely controlled microwave point-of-view cameras by other broadcasters has added to the already saturated spectrum that is frequented by ENG vehicles and special performance stages. The coordination of local tenants and casual users is a growing concern to both industries.

Typical systems and rigs
Although individual system rigs differ from show to show, the typical complement of equipment to support a large-scale Broadway production can include 20 to 50 channels of wireless microphones (Sennheiser equipment is typical), two to four channels of wireless in-ear monitoring (Garwood and Comtech are typical), two to...
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KGO-TV, San Francisco, relies on a Tektronix EditStar non-linear editing system, providing Fibre Channel storage, shared media and fast access to the station's news staff.
Fibre Channel and storage area networks .................. 90
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As facilities transition to networked storage, the network must be robust and capable of supporting the necessary traffic.

By Brian Cashman
cher the last several years, broadcast and post facilities have begun to enjoy the bene-

fis of digital non-linear editing (NLE). Lower life cycle costs are but one of the advantages of this digital computer-based approach. NLE technology has developed from stand-alone stations to today's networked systems with multiple seats (users). New technology offers even more benefits. Using Fibre Channel to develop storage area networks (SANs), facility-wide access can be made available to every user on the system.

Shared media work groups are now a reality as Fibre Channel technology becomes the fundamental building block for shared media systems. Robust broadcast solutions will follow as the other key requirements are addressed — namely, media content management, fault tolerance and management software.

Fibre Channel and SANs

So, how does this networking technology promise to change the way broadcasters perform their everyday tasks? Simply stated, Fibre Channel is more than just another networking technology. The defining difference is that storage vendors have wholeheartedly embraced Fibre Channel as their next-generation disk access technology. One of today's hottest industry buzz words is SAN or storage area network. SANs are high-speed subnets that establish a direct connection between storage resources and the servers or workstations that use these resources. Because resources can be shared, this approach lowers the overall cost of hardware and can lead to lower administrative costs through the economies inherent in centralized management.

Higher performance and lower cost of ownership each attract attention. When combined, however, they presage the potential Fibre Channel has to revolutionize approaches to the issues of content storage and networking.

Fibre Channel is the name assigned to an integrated set of ANSI hardware and software standards. The motivation was to eliminate the limitations of existing communications technologies that were either too slow, offered too short an operating distance, too large a footprint or were inflexible in terms of topology. Rather than create yet another communications interface, however, the goal was to take advantage of software already in place. By supporting existing software (i.e., communications protocols), legacy applications could move forward flawlessly with this new standard. By incorporating key functionality in hardware, Fibre Channel can move large and small amounts of data (today, at 100MB/s) over long distances. In essence, Fibre Channel has created a new paradigm in communications: channel networking.

Channels vs. networks

Channels have traditionally operated in closed, proprietary environments where all of the connected devices are configured in advance. Efficient communications in these environments comes at the expense of flexibility, cost and distance. Expensive licenses and substantial development are required to connect a non-proprietary device to one of these channels.

Networks are quite different. They are flexible in terms of topology, distance and protocol support. The main drawback of networks is the bandwidth wasted while the host processor performs many networking tasks that are embodied in software. For example, error detection and recovery are performed on a packet-by-packet basis in the host, leading to high overhead costs and ultimately lower network performance.

Fibre Channel was designed up-front to combine the speed and reliability of channel communications with the flexibility and extent of networks. Fibre Channel provides high-performance, reliable communication over distances up to 10km.

Figure 1 shows how a Fibre Channel network could be used within a typical broadcast installation. Because broadcasters have a sizable investment in legacy equipment, most will likely introduce these technologies incrementally through the introduction of special-purpose workgroups, such as connecting the editing and playback systems within news production. Gateways to wide area networks and existing station routers can provide the required investment protection.

Fibre Channel Architecture

Although the details of the Fibre Channel layers may appear daunting (see Figure 2), the good news is that Fibre Channel was designed as a "plug-and-play" technology. Users do not need to worry about any of these details, but it is worth pointing out some of the features of this architecture.

The FC-4 Fibre Channel layer was intended to accommodate a range of protocols and standards. It includes channel and networking protocols.

Channels:

- Intelligent peripheral interface (IPI) permits legacy magnetic tape equipment to be introduced into an FC environment.
- Small computer systems interconnect (SCSI) provides accommodation for standard SCSI storage devices.
- High-performance parallel interface (HIPPI) enables FC to carry payloads from HIPPI networks.

Networks:

- 802.2 or IEEE media access control layer to enable Ethernet, token ring and FDDI protocol packets to be moved over the FC infrastructure.
- Internet protocol (IP) accommodates standard TCP/IP traffic.
- Asynchronous transfer mode (ATM) to allow attachment to local or wide area ATM networks.

This means that investments in Fibre Channel technology will continue to be viable into the future. It is protocol-agnostic: It does not care what is being conveyed, markedly simplifying the wiring facility.

Layers FC-2 and FC-1 along with software and firmware provided by
Non-linear editing: A REALITY CHECK

that which their pocketbooks can handle. As in any other pursuit, the dream of complete editing freedom is fleeting as the price tag descends. For example, according to almost every purveyor of NL gear, everything’s “real time.” Here’s the first thing to watch out for when you’re considering NL equipment: Not all real time is created equal. With many less-expensive products like Truevision Targa cards running Adobe Premiere, you can do x and y, but you can’t do x and y at the same time. Many of the lower-priced units touting real-time operation can dissolve from one shot to the next without rendering, but if you want to key text over that video, you’ll have to wait a while — sometimes a long while, depending on the speed of your computer. Real-time transitions tend to stretch the technology to its limits and sometimes beyond. Rendering transitions does take longer, but in the lower-priced dual-stream cards, sometimes rendering turns out to be the more dependable route. Real time is notoriously oversold. You can do it, but for it to truly work every time, it’ll cost you a lot of money. At the end of the day, on the low end it would be better to render than cope with dropped frames on a hit-or-miss basis. Only when you get into the high-end systems like the million-dollar Quantel Henry will you be able to put together an eight-layer composition and watch it all play back instantly. Some systems like the Scitex StrataSphere ($570K) have struck a compromise here, allowing you to construct a heavily layered effect and then look at individual frames for evaluation. The strength of the StrataSphere is its ability to put together that 50-layer monster in one pass so you can look at all those layers in one frame. Then, you can see it play back after it renders. If you’re not happy with layer 32, you’re still able to go back and change that layer without destroying any of the others. But, alas, you’ll still have to render the segment again if you’ve made changes.

Making the jump: How does it feel?

Here’s an ironic twist: Some customers decry the freedom non-linear editing brings to their productions. There are some producers who wish their productions could be carved in stone. For example, an editor bites his tongue until it bleeds when it’s almost air time and the executive producer and others still want to make changes to the finished master. It’s easy to alter segments and move shots around on a daily basis, even if the editor’s finely tuned structure had taken weeks to develop. These kind of wholesale changes would never happen in a linear environment. This illustrates that sometimes too much freedom can be a bad thing. But it also makes a point in favor of the power of instant revisions. The perception that everything is easily altered allows an inexperienced editor, like an executive producer, to take the job away from more skilled editors. Sure, after a four-hour training session with an Avid Media Composer, you can cut a show together without any prior training or knowledge. But, perhaps non-linear editing is a lot like playing the saxophone: Anyone can do it . . . badly.

Another area of disappointment with non-linear editing is in a fast-paced
news shop. Here's an environment where footage is gathered on analog media, most commonly, BetaCam. Digitize? Huh? When you have a 6 p.m. newscast and you arrive at the edit bay at 5:55 with a story that needs to be on the air five minutes later, you're not going to want to digitize the footage before you begin. And, unless you're going to play back the finished product directly from your workstation to air, you'll need to spool the video back to tape again. That won't work. In this situation, it's time to deck and roll, slap the tapes in and string shots together as quickly as possible. There's no time to do anything twice. However, this scenario will change as soon as the entire production pipeline is digital, a process that's becoming more prevalent with the digital tape acquisition formats like miniDV. Using FireWire technology, the shots can be digitally transferred from camera to air master, with no digitizing required. This is where the full benefit of digital video production can be realized.

**How much will it cost?**

As a general rule, for a total system cost of $5,000, you can do basic cuts-only editing, but if you want to create lots of effects at those prices you'll be stuck with long rendering sessions. That translates into an ease-of-use deficiency — you'll lose money if you're spending that kind of time waiting around. On a low-end system, some of the effects you may have in mind could actually take weeks to render, especially if you plan to insert multiple titles throughout your production. For a practical system in a TV station environment, you'll need to spend around $20,000 for a mid-range system like a Media 100xs or Avid Xpress 2.0. For around $30,000 to $40,000, expect full broadcast quality and lots of real-time effects. Which one to choose? Above all, talk to people who already own and use the exact system you're considering.

**Beyond the hype**

No machine can improve the quality of your ideas. Even though all of the attention is focused on these delightful pieces of technology, most thoughtful producers and editors are more concerned with the message than the medium. It doesn't make any difference what you're recording on. The quality of the images and the relationship of those images to each other are what's really important.

However, many video artists are in a struggle to discover exactly what kind of creators they are, with non-linear editing technology playing the role of facilitator, not dictator. As the technology progresses, faster system speed enables users who were once only editors to become composers of elaborate collages that wouldn't have been possible a decade ago on any system. The great democratization is under way. Are you an editor telling a time story or a graphic artist depicting an instant in time?

There was an era when anything that moved was not considered art. "But wait," reasoned the ancients, "music is art — and it uses time." There was a great discovery: Art can be moving! So now this philosophical construct is playing itself out. Art moves. We're artists. Digital video makes it easier for us to express ourselves artistically in ways that weren't possible with older technology. As long as we don't get lost in the bits and bytes and keep our eyes on the content and originality of our work, the equipment will be our servant and not our master.

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Charlie White is a videotape editor at Milwaukee Public Television and a technical writer.

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**Top 10 things NLE vendors won't tell you**

1. There's a steep learning curve — none of these systems are easy to use.
2. Unless you spend lots of money on a system or edit cuts-only segments, you'll have to wait for complex layered effects to render.
3. Most of the real-time effects (beyond a dissolve) are not something you'd really want to use much.
4. You'll need lots of disk space, especially if your compression ratio is low.
5. It could be disastrous to piece together an untested non-linear system on your own.
6. Your system will be obsolete almost the minute you've learned to use it.
7. To get high-quality results, you'll have to pay some serious money.
8. Get comfortable with the idea of opening up your computer to troubleshoot bugs.
9. If you're a tweaker bordering on perfectionist, the flexibility of non-linear editing may end up costing you more time than it saves.
10. NLE systems will not make you more creative.
In 1997, the FCC mandated that analog TV systems be converted to digital in the near future. Although today's analog systems provide excellent sound and picture quality, the advantages of the digital format make it a clear choice as the technology of the future.

Digital is stable, a characteristic that significantly reduces equipment adjustments. Copies and reproductions retain the quality of the original. Signal degradation is virtually eliminated and noise immunity is greatly improved. Whether it's a radio, TV or post-production application, the advantages of digital result in improved picture and sound quality and pave the way for interactivity, pay-per-view services and personalized electronic news.

Although the digital conversion promises to revolutionize the professional video industry, it also poses challenges when it comes to designing, choosing and installing a new system. It is estimated that there may be as many as 36 different DTV formats to choose from, all of which will vary in the level of compression and transmission bandwidth. Following are some general guidelines for selecting the most appropriate cabling for audio and video in the digital studio.

Digital audio applications

The specification for digital audio was developed jointly by the Audio Engineering Society and the European Broadcast Union (AES/EBU). The two key electrical parameters in this specification that pertain to cable are the data rate of 3.072Mbits/s and impedance of 110Ω ±20% for twisted-pair constructions and 75Ω for coax designs.

Twisted-pair parameters

The AES/EBU specification, with its broad impedance tolerance, allows for cables with impedances from 88Ω to 132Ω to be used, with 110Ω being ideal. The twisted pair should be shielded and, in the case of multipair, each pair should be individually shielded. Foil shielding is recommended for permanent installs and foil plus braid for flexed applications. A single twisted pair is capable of carrying two channels of digital audio.

Cables are terminated with either XLR connectors or are punched down or soldered in patch panels. Most digital audio cables use foamed polyethylene to minimize the cable's size. Standard foam polyethylenes, however, are susceptible to crushing, which can change impedance. Some cables today use a special foam high-density polyethylene that provides exceptional crush resistance.

Digital audio over coax

The transmission of digital audio over 75Ω coax requires the use of baluns that convert the unbalanced coax signal to a 110Ω balanced transmission. This is especially popular in TV broadcast applications where coax is already used for video. Much greater transmission distances are obtainable over coax as compared to twisted pair.

The coax used should have a pure copper center conductor (no copper-covered steel or aluminum) and have good braid coverage (90% or more). The cable does not have to be precision video grade. In many TV applications, the digital audio signal is embedded in the digital video signal and run over a single coax. The digital audio signal is then split (demultiplexed) from the video signal and processed separately inside the equipment.

Digital video (SDI)

The Society of Motion Picture and Television Engineers
Handling criticism

BY KARE ANDERSON

Perhaps one of our most vulnerable moments is when someone criticizes us. Yet, as the saying goes, “What doesn’t kill us can make us stronger.” People reveal much about themselves when they praise or criticize. Praise indicates what we like about ourselves and criticism shows what we like least. How can we respond to criticism with honesty and gain insights about ourselves?

Recognize that you are under attack

Whether you are with someone you love, hate or just met, in the first moments when you are being criticized you will react the same. Your heart beats faster, skin temperature drops and you can lose peripheral vision. Because you feel under attack, your instinct is to focus on that feeling, making it more intense. You then withdraw or retaliate. These responses are akin to saying, “I don’t like your comments, therefore, I will give you more power.” Fight or flight responses leave you with fewer options. When you focus on your feelings, you will be distracted from hearing the content of the comments. You are more likely to react, rather than to choose how you want to act. Avoid a face-off. Instead, imagine a triangle of the other person, you and the topic of the criticism. Picture you both staring at the criticism rather than staring each other down where one person has to be wrong.

Look for the positive intent

You can be disarming when you compliment someone for giving you feedback. You take the wind out of their sails. Yet, your first instinct is to look for the ways you are right and the other person is wrong. When responding to criticism, defensive emotions build fast. Why? Because we focus on the smart, thoughtful and right things we are doing, while obsessing about the dumb, thoughtless and wrong things the other person is doing. This makes us feel righteous and we get rigid and listen less as the criticism continues. Stay mindful of your worst side and their best side as you respond to the criticism.

“AAA” approach to responding to criticism

Step 1: Acknowledge that you heard the person with a pause, nod or verbally. This buys time for both of you to cool off. Whether or not the criticism is justified, if you avoid discussing it, it will loom larger. Do not disagree or counter-attack. You could say, “I understand you have a concern.” Do not blame. You will only escalate the situation and harden the person into his or her position.

Step 2: Ask for more information so you can stay focused on the issue. Try to warm up to the part of the person you can respect. The more fully the other person hears, the more likely that he or she will be receptive to your response, whether it is to agree or disagree.

Step 3: If you believe the comments are accurate, then say so. If an apology is in order, give it. Then say what you plan to do differently to respond to the criticism. Ask for his or her response to your comments. The sooner you agree, if you find truth in the criticism, the more likely that you will engender respect from the other person. If you disagree with the comments say, “May I tell you my perspective?” This sets the other person up to give you permission to state your view.

More ways to respond

• Dump their stuff back in their lap. If someone is dumping on you, do not interrupt, counter or counter-attack; you will only prolong and intensify the comments. When the person has finished ask, “Is there anything else you want to add?” Then say, “What would make this situation better?” or “How can we improve this situation in a way you believe we can both accept?”

• What will make it better? Ask the person to propose a solution to the issue that has been raised. If he or she continues to complain, acknowledge that you heard them. State your view and what you would like from him or her. Move the other person from a mode of criticizing to problem solving. If the other person continues to criticize, say, “I want to find a way to resolve your concern. When do you want to talk about it next?” Then you can remove yourself from the discussion and put the other person in the position of initiating follow-up.

• Learn how personalities clash. To gain insights into the people who are most likely to criticize you and why and those you are most likely to criticize, learn more about your personality type from the Myers Briggs test. You can take an abbreviated version of the test at: www.whitman.edu/~peterscc/psych/jung.html and www.keirsey.com/cgi-bin/keirsey/newkts.cgi.

• Demonstrate goodwill upfront. Be willing to find a compromise and be genial even if you don’t like the person or the situation. Often, the best solution to a criticism leaves both parties a little unhappy, but not enough to retaliate.

• Choose your approach. Consider the other person’s perspective in how you make any request. Know that the worst way to respond to criticism is to keep it inside and fester. Your reaction will always show one way or the other.

Kare Anderson is a speaker and author. Visit her web site at www.sayitbetter.com.
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because of the ATSC encoder, and it will bring little short-term payback. It will become cost-justified for most broadcasters through the use of IL compression over existing serial routing feeding IL ports in full-bandwidth HD devices, along with the use of high-performance serial I/O broadcast video servers.

Vital role of the video domain
The likely result of typical growth through Levels 1, 2 and 3 is followed by integration of full-bandwidth HD infrastructure.

The video servers and tape machines use SDI to pass baseband video. They do not directly record or play MPEG-2. Although some video servers use MPEG-2 compression internally, they cannot directly record MPEG-2 signals. Such products may offer little or no advantage in the DTV future. It is likely that the DTV era will be built on high-performance broadcast video servers. The distinctions that will separate products will be the internal architectures and bandwidth, both of which determine to a great extent the quality of the images.

At present, HDTV production equipment is expensive with limited availability.

Despite the novelty (and cost) of some of the DTV boxes, all of the activities within a DTV station will likely parallel existing operations in contemporary facilities. This observation is not intended to underplay the staggering amount of detail that must be faced and conquered, but instead to help maintain a perspective about which course of action will leave stations best set up for making money after the dust of DTV conversion settles.

Video servers in DTV facilities
The technology that will likely make the greatest impact on station efficiency and, therefore, profitability will be the video server system. Among video server manufacturers, only ASC offers a product line designed from the ground up to build multibox, multiserver, multidepartmental, high-performance broadcast systems.

Although virtually all major video servers work fine as a single stand-alone box, legacy technologies will impose cascading handicaps as more boxes are linked and more functionality is demanded. SCSI storage technology and conventional networking architecture can create major bottlenecks when integrating multiple departments of a station, and neither is adequate in the realm of DTV data rates. Furthermore, servers that encode in any format other than 4:2:2 will compromise the station’s freedom to manipulate its signal without degradation.

In contrast, using departmental server systems built around ASC’s shared FibreDrive storage and bridging those depart-
If you were thinking the “digital revolution” has eliminated the need for crisp, clean analog signals in the headend, you’d be wrong. In fact, the quality of picture demanded by today’s subscribers is higher than ever.

That’s the very reason Standard Communication’s quest for quality has established the company as the headend specialist, leading the industry in advancing broadband RF technology.

Standard pioneered the industry’s first frequency-agile modulators for 550 MHz system architecture.

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Now digital compression is here and Standard Communications Corporation continues to establish the benchmark with advanced technology, unique design and practical features. With a reputation built on delivering advanced technology, you can be assured there is more to come.

To see more of our products and learn more about the line, visit our website at http://www.standardcomm.com.
ments together using ASC’s FibreStream direct access architecture featuring ASC’s FibreSwitch will produce an integrated system that can handle DTV’s data rates with ease, while delivering unmatched efficiency and profitability.

The FibreSwitch creates a true direct connection from all video servers to all drives across all departments in the facility. The payoff is that every operator with appropriate authority has guaranteed instant direct access to all material in the facility. This direct access, provided exclusively by FibreStream architecture, means:

- no copies;
- no transfers;
- no delays;
- no duplicate files or overhead from file maintenance;
- no priority contention;
- no access conflicts; and
- no paying for the storage of multiple copies.

Direct access across departments can provide huge speed and streamlining benefits, not only to the daily operations of on-air and news, but to all station departments.

FibreDrive storage architecture makes possible several other powerful innovations, including:

- Viable, cost-effective alternatives to full mirroring. ASC’s clean-slate, multi-box approach delivers full protection by combining software RAID with modest hardware redundancy, requiring only the purchase of a few modular components rather than purchase of a duplicate, fully mirrored system.
- Fibre Channel shared storage provides unencumbered scalability. It allows storage to be increased without buying servers, I/Os to be added without buying storage and multiple systems to be integrated without forfeiting performance.

Altogether, no other approach makes possible the efficiencies, security and savings that are offered by ASC’s video server products.

In conclusion, stations should prepare a cautious plan for multistep implementation of DTV. Considerable thought should be given about when and how to upgrade from one level of DTV commitment to the next.

Each station’s time line should include estimates of penetration of DTV and HDTV receivers in their community alongside the expense of moving from one level of DTV service to the next. Plan especially to make use of capital equipment on hand as a way to offer leadership in your market at an affordable price.

Bear in mind that while the MPEG-2 environment provides the cheapest way to fulfill your legal commitment, by its nature, it is suitable for only the most rudimentary branding operations. At least for the present, achieving refined DTV operations equal to today’s NTSC operations can be accomplished only by converting the MPEG-2 signal into baseband. Distributing baseband HD signals can become practical through the use of IL compression along with existing serial routing technology.

Do not let the massive detail required by DTV conversion distract your attention from broader issues of station efficiency and profitability. Given the unanswered nature of consumer and political support for HDTV, plan for equipment choices that will enhance efficiency and profitability in your current NTSC operations and also allow unrestricted growth in the digital domain. The integrated video server environment is a single commitment that can provide that impact on profitability. Only Fibre Channel drive architecture and Fibre Channel fabric switch integration provides a video server system with the capacity to deliver all these necessary features.

Fred Schultz is product manager for ASC in Burbank, CA.

Evaluate your DTV, MPEG-2 and broadcast server needs

- When will you be required to begin DTV broadcasts?
- Will you begin DTV broadcasting by passing-through the network feed?
- How large must your audience grow to justify the cost of local branding of DTV signals?
- When will your station begin transmitting true HDTV?
- How long will your station continue local origination in 4:3 only? When will 16:9 SDTV cameras make sense? When will HDTV cameras make sense?
- What data rate will your initial network MPEG-2 feed be?
- What data rate will your MPEG-2 transmission be?
- How will you initially record and store program material delivered in MPEG-2? Spots and promos. What quality will the recording be? How will playback be handled? How would you prefer to handle it?
- Is your current (or anticipated) server designed from the ground up to optimally perform in a large, multidepartmental broadcast operation?
- Will any of your current servers upgrade to handle DTV’s data rate at full bandwidth? At IL compression?
- Does your current server manufacturer use any SCSI technology?
- Does your current server manufacturer move video using conventional networking rather than providing direct access to the content on all drives?
- Does your current server manufacturer treat video in any way other than as 4:2:2?
- How will you route material around your station?
- What sources will continue to be baseband video for a long time?
- How will the MPEG-2 signal be timed in your facility?
- Will your station always broadcast a single program stream or do you intend to multiplex several SDTV program streams into your transport stream for broadcast?
- How will you handle multiplexing of the program information guide for your station into your transport stream?
Changing the rules of relocating and expanding by taking it all with you

BY RANDY HANSON

Audible Difference moved its recording facility from its 96th street location to a new and larger space. Although a move of this size is never easy or cheap, we managed to relocate and reconfigure our modular studio for about $7,500, considerably less than the estimate of $60,000 to make a comparable move with a conventional studio.

Audible Difference got its start in the audio business providing sound systems for live events, concerts and trade shows. Our production business, which recently merged with Sound Associates, provides sound systems for most major fashion shows, concert halls and theaters in New York City, as well as for the Macy's Thanksgiving Day parade. About a year ago we decided to expand by building a recording studio. Fortunately, at the time, we had a strong sense that this expansion would not be our last, and decided to investigate the possibility of investing in a studio that could grow and travel with us.

Going modular

The investigations turned up few attractive alternatives to conventional construction save one: modular pre-fabricated studios. At first we were leery of this concept. Modular construction is less obscure today than it was then, but at the time we held a number of misconceptions that are not uncommon to people in the industry. Early innovations in modular studios were often aesthetically unappealing. Although modular studios have always been able to offer a higher degree of sound isolation, appearance often won out over performance, particularly in the pre-digital world. This bias has lasted long past the reality and while modular studios today are still able to deliver promised STC ratings that no conventional contractor can match, they are no longer eyesores. In fact, our studio looks great and from the outset, even before the move was factored in, we were able to get better performance.
for less investment.

After exploring several manufacturers of modular studios, we selected Acoustic Systems. It offered the most flexibility in design and the sales staff was an invaluable source of ideas in helping overcome such obstacles as a concrete pillar in the middle of the studio space. Unlike other suppliers who offered the advice to find a different location, Acoustic Systems was able to come up with an efficient design that simply built around the pillar, making use of the company's distinctive ability to custom design in almost any panel size. Acoustic Systems' steel panels are a unique piece, designed to fit together easily, but in an infinite range of styles and sizes that affect everything from appearance to STC rating.

Once the initial decision to go modular had been made, the entire process was amazingly simplified. Acoustic Systems was the only company of its kind who takes such a scientific approach to acoustics (going to the extent even of maintaining an independent NVLAP accredited lab used by the likes of Dell Computers and Hunter Fans). The company's innovative technology allows them to build walls that are only four inches thick as opposed to the standard-construction eight- to 12-inch wall, so we were able to use a great deal more of the space.

The company was provided with the dimensions of the studio along with the location of doors and windows and what was needed in the way of HVAC and tone adjustments.

Developing the plan

Rather than the myriad of architectural details and specs that conventional construction would have entailed, we had one drawing and the wanted. We received a shop drawing that detailed exactly how the studio was going to be constructed. One of the options we worked out together was the installation of a set of double doors with a removable threshold. This acoustical door allows us to roll the grand piano in and out of the studio easily without having to hire piano movers and retune it each time.

With conventional construction, it's generally necessary to move slowly and to field supervise every detail of construction, so it was gratifying to learn that Acoustic Systems was able to reduce assembly to a simple twoday process, this in spite of the fact that our new facility had no freight elevator. We ended up hiring a crane for four hours and lifting the panels into the studio through the window.

Our first Acoustic Systems studio was 10x14 feet and came in under budget at only $36,000 complete with lighting and silent air handlers. It exceeded our design targets of 60dB of attenuation and quickly became one of the best sounding studios in the city. It isolated better than any studio we had ever experienced in spite of the fact that the building beside us housed a wood shop com
large number of CDs. Our largest customer, Abrams Gentile Entertainment, produces animated children's shows. Produced in a nontraditional manner, these shows all record dialog before the animations are done, with the looping process handed over to us once the animators finish their work.

On the move again
Our ability to be flexible and create quality work in a great facility led to a rapid expansion for our company. It wasn't long before the studio, which was built as a project studio, was being pressed into service as a full production studio. We were running out of space for the work we were bringing in, and so, less than a year after we'd originally contracted Acoustic Systems, we were on the phone to them again. We needed a larger shop. Under conventional circumstances, this situation would have meant abandoning our old studio and beginning all over in a new space at a cost of about $64,000 and many weeks of down time.

We found a new, spacious location on West 54th street convenient to our largest client, and needed to know whether we could move our acoustical enclosure into the new location and reconfigure it to adapt and grow. It turned out to be almost unbelievably easy. Farrar Acoustical Installations, a local company, moved the entire enclosure in only two days and reconfigured it. We did the entire thing for about 10% of what a new studio would have cost. We were making a huge move with a minimum of hassle when the New York City fire marshal stepped in with a last-minute complication. We would need one more door to meet code. Acoustic Systems shipped a SoundSecure acoustic door the day we called. In just two days the door was in place, the city was satisfied and our schedule was still intact. The studio fits the new space better with the second door.

Our new Acoustic Systems booth will house a control room and double as a video editing suite. We're looking to it to help solidify Audible Difference's reputation as the city's most flexible and technically advanced recording facility. So far, it seems to be doing just that. Our business this year is running at three times last year's rate. If this success continues, and it seems likely to, we may have to move again. This does not worry us at all. Acoustic Systems has already demonstrated the ability to provide the quality isolation we need to continue growing and the ability to move and grow with us.

Randy Hanson is president of Audible Difference Inc., New York.

Editor's note: Field Reports are an exclusive Broadcast Engineering feature for broadcasters. Each report is prepared by well-qualified staff at a broadcast, production or consulting company. The reports are performed by the industry, for the industry. Manufacturer's support is limited to providing loan equipment and to aiding the author if requested.

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May 1998 Broadcast Engineering 121

www.americanradiohistory.com
MPEG encoding is almost considered blasé, today. Although there are numerous encoding products available, each approaches the task with different features and options.

The first challenge when considering MPEG encoding is application. For what applications will the product be used? If the system will be used for facility/device interconnection, what data rates are involved? The encoder must output data in both a format and rate that can be accepted by whatever pipeline you’re using for interconnect.

If the system isn’t a closed-loop, then compatibility becomes a paramount issue. If the link involves satellite transmission, ask if the product meets the International Satellite Operating Group (ISOG) tests. A number of products do meet these tests, which guarantees that your signal can be processed by another company’s decoder. There are a few caveats here, but they are clearly outlined in the test procedures.

The following product information was supplied by the respective vendors in response to a questionnaire supplied by BE staff editors.
<table>
<thead>
<tr>
<th>Mfg/Model</th>
<th>Model</th>
<th>Application</th>
<th>Data rates supported</th>
<th>MPEG standards supported</th>
<th>Profiles/Levels supported</th>
<th>Output signal format</th>
<th>MPEG encoding time</th>
<th>Require matching decoder?</th>
<th>Meet ISOG compatibility standards?</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitsubishi Electric America RS# 356</td>
<td>MH1100E</td>
<td>ATSC encoding of HD signals</td>
<td>up to 100Mb/s</td>
<td>MPEG-2</td>
<td>MP@HL</td>
<td>Transmission Stream: DVB-ASI, DVB-SP, SMPTE310M, DS-3 (option), OC-3 (option)</td>
<td>Realtime</td>
<td>No</td>
<td>N/A</td>
<td>Standalone</td>
</tr>
<tr>
<td>Mitsubishi Electric America RS# 357</td>
<td>BC-1100E</td>
<td>ATSC encoding of standard-definition TV signals</td>
<td>3-15Mb/s</td>
<td>MPEG-2</td>
<td>MP@ML</td>
<td>Transmission Stream: DVB-SP, DVB-ASI (option)</td>
<td>Realtime</td>
<td>No</td>
<td>N/A</td>
<td>Standalone</td>
</tr>
<tr>
<td>LNR Communications RS# 358</td>
<td>Digital Video Exciter</td>
<td>DSNG, HUB uplinks, Video distribution</td>
<td>1-15Mb/s</td>
<td>MPEG-2</td>
<td>MP@ML</td>
<td>QPSK@L C, or Ku-Band</td>
<td>400-700ms</td>
<td>No</td>
<td>Yes</td>
<td>Standalone</td>
</tr>
<tr>
<td>Harris RS# 359</td>
<td>FlexiCoder</td>
<td>ATSC Broadcast Transmission, Program and network contribution encoding</td>
<td>1.4-40Mb/s per program up to 140Mb/s total output</td>
<td>MPEG-2</td>
<td>Standard definition MP@ML and PP, High definition MP@ML</td>
<td>ATSC (SMPTE 310), DS-3/ES, OC-3 Fiber and DVB-ASI</td>
<td>Realtime</td>
<td>Fully ATSC compliant and compatible with ATSC decoders and receivers</td>
<td>Yes</td>
<td>Plug-in modules that fit into 21-slot equipment enclosure</td>
</tr>
<tr>
<td>NDS Americas RS# 360</td>
<td>Series 5000</td>
<td>Contribution, broadcast quality distribution</td>
<td>Variable</td>
<td>MPEG-2, ATSC, DVB</td>
<td>All ATSC Table 3 formats</td>
<td>ATSC, QPSK, OQAM, B/VS, BPSK, ATM</td>
<td>Realtime</td>
<td>No</td>
<td>Yes</td>
<td>Standalone</td>
</tr>
<tr>
<td>Heurist-Pulitzer RS# 361</td>
<td>MPEG Power Professional - DVD</td>
<td>Works directly with nonlinear editing systems to convert digital files into MPEG-1 or MPEG-2 for standalone or DVD applications</td>
<td>CBR and VBR adjustable up to 15Mb/s</td>
<td>MPEG-1, MPEG-2</td>
<td>MP, ML</td>
<td>Creates a file compatible with most computer authoring systems including major DVD authoring systems</td>
<td>Nonrealtime</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Thomson Broadcast RS# 362</td>
<td>DBE 4100</td>
<td>DSNG and contribution</td>
<td>1.5 - 50Mb/s</td>
<td>MPEG-2/ DVB MPEG-1 Layer II, Musicam for audio compression</td>
<td>4:2:2 P@ML and MP@ML</td>
<td>3 DVB-ASI outputs/ATM interface in contribution configuration</td>
<td>Realtime</td>
<td>No</td>
<td>NA</td>
<td>Standalone plug-in</td>
</tr>
<tr>
<td>Tiernan RS# 363</td>
<td>THE-1, THE-10</td>
<td>Over-the-air broadcast, network contribution, distribution</td>
<td>up to 70Mb/s</td>
<td>MPEG-2, ATSC</td>
<td>MP@HL, MP@ML, SMpte 310M, DVB-ASI</td>
<td>Realtime</td>
<td>THE-1, THE-10 are ATSC compliant</td>
<td>Yes</td>
<td>Standalone</td>
<td></td>
</tr>
</tbody>
</table>
New Products

Digital mixer
Panasonic DA7: this 32-input, eight-bus, six aux digital mixer includes 24-bit I/O capability, surround-sound mixing capabilities, dynamic and snapshot automation and one-function/one-step screen layer operation; an easy-to-read display in the upper right-hand corner of the mixer allows you to quickly access all mix, processing, routing, time-code and surround parameters without paging through layers of parameter screens; the display of channel settings and parameters is quickly accessible via a touch of the assignable control buttons and the amount or type of data to be displayed on the screen can be user adjusted; some indicators, such as a SMPTE time-code readout, are present on all screens; 714-373-7277; fax 714-373-7903
Circle (250) on Free Info Card

Aspect ratio conversion
Snell & Wilcox ARC150: the compact all-digital 10-bit aspect ratio converter provides bidirectional aspect ratio conversion between 16:9 and 4:3, as well as intermediate formats; the ARC150 provides a unique spatio temporal filtering algorithm for transparent alias-free re-sizing; other features include all-digital 10-bit operation control of picture size and position, a variety of preset aspect ratios with 14:9 eight user memories for custom aspect ratios; +44 181 607 9455; fax +44 181 607 9466; www.snellwilcox.com; info@snellwilcox.com
Circle (313) on Free Info Card

Automated school closing system
Broadcast Software Solutions SchoolTouch: an automated school closings system that allows the school administrator to display to the public the affected school condition when severe weather or other emergencies strike; a Windows 95/NT program uses the latest technology and up to four phone lines; SchoolTouch offers connectivity to master control through the use of WinMasterCG software from BSS; the system uses Object Database Connectivity (ODBC) over a local area network (LAN) to allow several users to update school-closing conditions; updating and adding additional database entries may be done simultaneously over the LAN; 800-273-4033 or 561-776-8462; fax 561-776-8464
Circle (253) on Free Info Card

Conversion product
Miranda Stellar DTV/HDTV series: a modular series that allows broadcasters and post-production facilities to mix and match different functional modules in order to build DTV/HDTV system solutions for upconversion, downconversion, noise reduction, detail enhancement, color correction and image resizing in 4RU of space; a total of 12 processing modules and 12 rear connector modules can be accommodated in each 4RU Stellar housing frame; scaleable upconversion systems or Constellations for the Stellar 4RU frame will also be introduced including the Carina upconverter (upconverts interlaced 16:9 4:2:2 signals to 480 progressive), the Aquila upconverter (upconverts interlaced 4:3 or 16:9 4:2:2 signals to 16:9, 480p, 720p or 1080i), the Auriga upconverter (upconverts interlaced 4:3 or 16:9 signals to 16:9, 480p, 720p or 1080i); 514-333-1772; fax 514-333-9828
Circle (251) on Free Info Card

Large-display studio production timers
Microframe Corporation model 6200: these studio production timers feature two independent count up/down timers that are visible on large remote displays; they can be viewed simultaneously on the LCD displays at the control keypad that may be connected to multiple large model 940 displays showing four digits of either timer with 5.5-inch characters; the 6200 keypad may also be connected to multiple model 4600 displays that will show all six digits (hours, minutes, seconds) of both timers simultaneously with 2.2-inch characters; 918-258-4839; fax 918-251-3292;
www.microframecorp.com
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**Boeckeler Instruments Pointmaker PVI-64:** this unit allows users to draw and point on details of video images; features include key signal output, program and preview output, timing adjustments, playback options and video pass-through; it is compatible with composite video and S-video (Y/C); users can choose between 12 positionable pointers and three line thicknesses with or without shadows and outlines; up to three colors, selectable from a palette of 14 primary and pastel colors, can be displayed on screen at any time; drawing and pointing is accomplished with a digitizing tablet; two tablets can be installed at different news stations; an optional light pen allows users to draw and point directly on a monitor or preview monitor; 520-745-0001; 800-552-2262; info@boeckeler.com

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**Software for Abekas products**

**Scitex Digital Video version 6, version 3.5:** version 6 software for the Abekas Dveous DVE delivers the looks of OrbitalFX; this effects-creation method applies oscillators to image parameters, providing more flexibility than the traditional key-framing approach; version 6 software for the Abekas Brutus DVE also provides OrbitalFX capabilities to this DVE with eight simultaneous video streams; version 3.5 software for the Abekas 8150 switcher features support for the lomega Jaz drive and enhanced control from edit controllers; 410-783-0600; fax 410-783-0606

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**D/A converter**

**Audio Intervisual Design DA924:** this 96kHz product converts incoming digital inputs to 24-bit analog audio signals; a triple segmented design improves the accuracy of the 10 most significant bits over resistor weighing architecture; features include 96kHz, 88.2kHz, 48kHz and 44.1kHz conversion frequencies, a true 120dB noise floor, 0.00009% total harmonic distortion + noise, automatic calibration, increased low-level accuracy, digital jitter removal, professional and consumer inputs and outputs, an optional SDIF interface and support of the high-density I/O standard; 213-845-1155; fax 213-845-1170

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**Remote-control system**

**Davicom Technologies Mini-MAC:** powerful remote control and monitoring for small sites; MACNET provides control management for MAC remote control units and DSRD-01 fault detector for SA digital satellite receivers; 819-370-4343; fax 819-370-4353; fobitaille@davicom.com; www.davicom.com

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**Electronic newsroom production system with Windows/Mac/Unix compatibility**

**NewsMaker Systems NEN:** this JAVA-based system allows each workstation to access news production elements and desktop through a local internet or intranet or via the Internet; it runs with all major operating systems such as MS-DOS, Windows 95, Windows NT, Windows 98, System 7, Mac's OS8, and Unix Lenux; NEN² features the capability of simultaneous multiple platform operability and is capable of running within a web browser or a network computer; it is typically configured on a PC with Internet Explorer, Navigator or a JAVA-based browser; 818-879-0000; fax 818-865-1421; info@newsmaker.net

Circle (252) on Free Info Card
**Rack slide kit**

Winsted F8203: this kit is designed specifically for the Panasonic DVCPRO VTR models AJ-D640/650 and AJ-D750; features include heavy-duty chassis support brackets, Accuride ball-bearing slides and pivoting rear finger brackets for mounting in sloping or vertical racks; large chrome handles with extruded aluminum handle brackets and slide rails are custom-punched to the VTR's equipment specs; 612-944-9050, fax 612-944-1546; www.winsted.com; racks@winsted.com

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**Windows prompter**

Listec Video A-6WIN: these 11-inch, 12-inch and 14-inch displays are available with fold-down or traditional trapezoidal mirror/hood assemblies; the unit weighs 10 pounds and includes push-button settings for operator control of brightness, contrast, color saturation and image position; 612-683-3002; fax 612-683-7336

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**Bendable light**

Cool-Lux Pan-EL-Lite: this lighting system is made up of flexible, translucent material half the thickness of a credit card and available in widths from 1/4-inch to 44-inches and any length; a control panel allows the brightness level to be adjusted; brightest continuity is 150 feet; at full strength, brightness remains steady for 1,000 hours, then loses 10% every 2,000 hours thereafter; 818-865-1616; fax 818-865-1757

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**Character generators**

Pinnacle Systems enhanced DEKO family: new options are now available for the Deko character generators which are BroadNeT compliant and designed to enhance the workflow content creation for on-air broadcasts; new options include Chyron file conversion, Deko SportsWare for easy insertion of text on-air, SportWare and StillDeko option with Lightning Browse Integration that allows access to Lightning Browse image management tools to store and retrieve CG files; all prior versions of are upgradeable to the 3.1 version of Deko software; 650-526-1600; www.pinnaclesys.com; www

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Telecine

Cintel URSA Diamond: this unit incorporates Diamond Set, the company's Diamond Technology Front End, which offers improved image noise performance over the URSA Gold and virtually eliminates PEC drift; features include the Diamond Clear anti-aliasing system, which scans the film image at a higher line rate and converts 525/625 to virtually eliminate aliasing artifacts, the Diamond Glow CRT burn and grain-reduction system and the Meta-Speed servo system, which has an extended multiple speed range that includes technology to allow the transfer of three-perf film with a four-perf gate; two additional rollers improve film wind and packing for 16mm and 35mm stock, and a modified 35mm lens barrel allows correct centering of the optics to the 535 film frame; 805-294-2310; fax 805-294-1019

Circle (288) on Free Info Card

Surge protection component

Lightning Eliminators & Consultants sandwich block: this unit provides a high-speed, direct bus interface between the components in the block, allowing each MOV's full face to see current at the same time while handling multiple and continuous high-energy impulses; energy-handling capabilities range from 25kJ to more than 50kJ; the unit is available in configurations from 120V to 4,160V in single-, split- and three-phase devices up to 500,000 surge current amps per phase; 800-521-6101;

www.lightningeliminators.com

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Lighting console

ETC Obsession II: this console features an ergonomic design and a hardware platform designed to be compatible with future technological advancements predicted by the industry; it can control up to 3,072 channels and 3,072 dimmers, with the capacity for up to 126 concurrently running fades; the user can choose single or dual processors and the option of three different control surfaces; all processors and control surfaces are connected via Ethernet, so transfers to backup systems do not require user intervention or a separate console; multi-user control allows several operators to work simultaneously and up to five riggers' remotes to be used; 608-831-4116; fax 608-836-1736;

www.etcconnect.com

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**Universal fiber-optic interface**

**Telecast Fiber Systems Cobra System:** a fiber-optic triaxial extender for TV broadcast cameras; the modular Cobra family interconnects most triax-equipped cameras to their base stations using ultralightweight fiber-optic cable; distances are increased, signals remain clear and installation effort and costs are reduced; the system uses plug-in "personality" modules specific to classes of popular cameras from a variety of manufacturers including Ikegami, Philips and Sony; the Cobra interfaces with standard and new wideband digital camera families, as well as super slow-motion cameras; 508-754-4858; fax 508-752-1520

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**Scheduling system**

**Evolving Video Technologies COMPASS:** this on-air scheduling solution can be used to enter the sidebar copy, over-the-shoulder, squeeze & tease shots; you can also see a preview of formatted graphics on a PC; on-air playback via EVT's Antero Ascent software; 303-465-1556; fax 303-465-2012;

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**Digital video disk recorders and accessories**

**Sierra Design Labs HD360:** the Quickframe HD360 option for the Quickframe video disk recorders (VDRs) turns any Quickframe unit into an HDTV video recording, playback and editing system; the upgrade is compatible with Panasonic's AJ-HDP-500 HDTV 1080i digital recording processor; the Quickframe video recording systems allow users to record in standard 601 or uncompressed DTV/HDTV video; using four of these units with an HD processor allows users to record up to 120 minutes of uncompressed HDTV video; used separately, each Quickframe unit delivers standard D-1/ITU-R BT6012-4 video; 702-831-7837; fax 702-831-5710; www.sdlabs.com

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**Mux-adapter**

**Viewgraphics Dynamo MediaPump:** this MPEG-2 mux-adapter is designed for broadcast server systems, commercial insertion, VOD, time-shifting, head-end distribution and multichannel satellite transmission; the MediaPump is a single-slot PCI card supported under Windows NT and Silicon Graphics IRIX; 650-903-4900; fax 650-969-6388;

www.viewgraphics.com

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**Uninterruptible power supplies**

**MGE UPS SYSTEMS Comet line:** 100kVA, 125kVA and 150kVA units have been added to the Comet line of three-phase, on-line, solid-state UPSs that offer up to 95% efficiency; these models feature a PWM inverter design using insulated gate bipolar transistors (IGBTs) combined with the company's Digital Power Quality (DPQ) logic microcircuitry to maximize operating efficiency and output power quality; the units are rated for 100% step loads and offer an output voltage THD of less than 3.5%, even for non-linear loads with a crest factor up to 3.5; 714-557-1636; fax 714-557-3256; www.mgeups.com

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**ToneJack**

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**Digital broadcast maximizer**
ATTO Technology DBMAXII: this digital broadcast maximizer features 24-bit A-D and D-A converters, an auto hardware analog signal bypass function (allowing signals to pass through even if the unit is off), a new EQ with a multiband clipper function, five bands of expansion, compression limiting and a new adaptive automatic gain controller; in addition, it has the ability to simultaneously insert multiple signal processing functions both pre and post; it is TV and DAB compatible and shipped to conform to all major standards worldwide; 805-373-1828; fax 805-379-2648; info@attotech.com; www.attotech.com

**HDTV product**
VAS Group HD105g: an HDTV tri-level sync generator with the ability to lock its tri-level HDTV sync to 525 house sync to ensure that both HD and SD systems are in phase; this is useful when downconverting HD material to standard-definition video and also facilitates synchronizing digital audio between HD and NTSC systems; the HD-105g generates a tri-level sync for 1080i and 1035i HDTV systems and is also available in 720p (SMPTE 296m); it can generate an HDTV tri-level sync at a 59.94Hz or 60Hz; 818-843-4831; fax 818-843-6544; info@vasgroup.com; www.vasgroup.com

**Fiber channel bridge**
ATTO Technology FibreBridge: this intelligent fiber channel to UltraSCSI conversion bridge allows integrators to attach any existing SCSI product to the technology of fiber channel; the product provides fiber-channel performance of full-duplex 1.0625 gigabit (200MB/s) transfer rates coupled with two independent 40MB/s UltraSCSI ports; transfers, full-duplex 1.0625 gigabit (200MB/s) fiber-channel performance, and media interface adapter (MIA) compliant ports; 716-691-1999; www.attotech.com

**Automation computer**
Philips Automation MC-2098: this computer features a 233MHz Pentium II microprocessor and 128MB of RAM; it can accommodate more than 20 on-air program channels, up to eight regional feeds and four cache channels; as many as 16 virtual terminals can be logged into the unit, allowing operators to do prep work, while the main automation program is running; the unit is housed in the company’s CE-certified industrial chassis; 408-866-9373; fax 408-370-4861

**Amp for satellite uplink**
CPI Satcom Division VZU-6995AY: this compact 500W traveling wave tube amplifier operates across the 17.3GHz to 18.4GHz DBS spectrum; a microprocessor-based system performs all monitor and control functions, and Flash RAM-based program instructions can be updated through a serial port using a PC; features include power factor correction (0.95 min), EN-60215 safety requirement certification, dual-collector TWTA technology for power efficiency, modular line replaceable units and fault reporting and diagnostic procedures; the RF subsystem offers an optional internal linearizer that improves linearity; 650-846-3700; fax 650-424-1744

**Disk array**
MegaDrive Systems Enterprise E-8: this eight-slot disk array provides 80MB/s, dual-bus Ultra Wide SCSI performance and the fault-tolerance of software-based RAID levels 0 and 1; capacity ranges from 2GB to 188GB per tower (with 5.25-inch 47GB drive modules) with the ability to daisy-chain towers for multiple terabytes of on-line storage; single-ended, differential or SGI-specific versions are available; the unit can be upgraded into hardware-based RAID systems; 818-700-7600; fax 818-700-7601; sales@megadrive.com; www.megadrive.com

**Encoder**
Thomson Broadcast Systems DBE 4100: an encoder that incorporates the functions of composite signal decoding, video compression to the MPEG-2 4:2:2 P standard, audio compression, multiplexing and scrambling of the components of a TV service (video, audio and data), as well as interfacing with PDH or SDH telecom networks using ATM technology; +33 1 3420 7000; fax +33 1 3420 7047; www.thomsonbroad.com; sales@thomsonbroad.com

**Products now shipping**

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www.americanradiohistory.com
**UHF power amplifier**

Richardson Electronics power amplifier: manufactured by RF Gain; a class A 50W UHF solid-state power amplifier; rated for 470-860MHz; designed for solid-state amplifiers or driver for high-power tubes; 10dB gain; 800-348-5580; fax 530-208-2550; info@rell.com; www.rell.com

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**Router**

Videotek SDR matrix routers: complete family of analog and digital matrix routers; introducing the SDR-616 16x16 matrix router with integral master control panel; programmable eight-alpha-numeric character display; systems available with either analog or 601 digital sources; 610-327-2292; fax 610-327-9295; sales@videotek.com; www.videotek.com

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**Plug-ins for Adobe After Effects**

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Business

Battison receives NAB engineering award

John Battison, contributing writer to Broadcast Engineering, former editor of BE and now RF technical editor for BE’s sister publication, BE Radio, received the NAB’s Radio Engineering Achievement award at the NAB convention in Las Vegas. Battison, a 52-year veteran of broadcast engineering, is the founder and first president of the Society of Broadcast Engineers (SBE), and is a recognized authority on RF and AM directional antennas.

During his career he has served as director of engineering for the telecommunications Department at Ohio State University, has taught at American University and New York University, and has presented papers at conferences all over the world. Since retiring, John has focused his energies toward his consulting business and writing for BE and BE Radio magazines.

“I’m absolutely thrilled,” Battison says of the honor. “I just retired this year and this is about 1,000dB better than getting a gold watch, that’s for sure.”

When asked to look back over his career and pick his proudest achievement, Battison says without a pause, “The formation of the SBE. That was probably the best.”

The Associated Press has been awarded the contract to provide its electronic news production system (ENPS) to the sports TV programming station, ESPN. ENPS features a fully integrated search engine, complete off-line and remote access capabilities for field staff and the ability to work in any language. With the system, the station will be able to manage every phase of its news production, from story assignments to live broadcasts.

MegaDrive Systems Inc. will begin operating under the name DataDirect Networks Inc. This announcement accompanies the public statement of a strategic repositioning to address the network data access needs of high-performance, image-intensive computing environments. The name is designed to more accurately reflect the company’s broad technology mix, high-speed networking focus and integrated solutions orientation.

Crawford Satellite Services plans to expand its transportable satellite fleet and coverage area. The company will expand the fleet to eight and has added a remote base in Dallas for quick response to Midwest locations. The satellite truck fleet expansion and re-tooling includes the addition of a fully redundant C-band truck and a fully configured Ku-band uplink/production truck with three cameras, ADO, still-store and B-MAC encryption.

Tiernan Communications Inc. has moved to its new world headquarters in San Diego. Recently, TeleGlobe Incorporated Corporation selected Tiernan’s TE5 4:2:2 studio profile encoder and TR600 IRD for its transcontinental and intercontinental MPEG-2 digital TV services. Tiernan’s equipment, combined with TeleGlobe’s ATM network, allowed TeleGlobe to be one of the first major international carriers to offer the MPEG-2 4:2:2 studio profile and ATM networking. More than 500 Tiernan digital TV systems are presently operating in approximately 25 countries.

Harrison announced that NBC affiliate WSMV-TV, Nashville’s Channel 4 has purchased the TV950 broadcast audio mixing console. The TV950 is a 52-wide frame featuring 24 mono mic/line input modules, 16 stereo line input modules, four stereo group modules, a comprehensive patchbay, 14 mix-minus modules, a control room, communications and studio module.

Comark Digital Services (CDS) and LIN Television Corporation broadcast the Texas Rangers opening day baseball game vs. the Chicago White Sox live in HDTV from Arlington. The broadcast featured pre-game ceremonies and the game in its entirety. Six high-definition TV cameras were used to shoot the game with the live images broadcasted locally on KXAS-TV in the Dallas, Ft. Worth area. In addition, the signal was transmitted via fiber and satellite to Washington, DC, where it was broadcast from WHD-TV through a Comark digital transmitter and viewed in HDTV on Capitol Hill by members of the Texas congressional delegation and other invited guests.

Thomson Broadcast Systems and Sarnoff Corporation have entered into a
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May 1998

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cooperative agreement to provide DTV and HDTV compression encoders to U.S. broadcasters, beginning with the Thomson model HDE 5100. The model HDE 5100 encoder is built around a compression chipset that handles all of the ATSC transmission formats specified in the U.S. digital TV standard. It can be used for terrestrial and direct satellite broadcasts and in links between broadcasting facilities.

Panasonic has announced that in an effort to begin upgrading to digital news operations, Meredith Broadcast Group's CBS affiliate station WFSB-TV, in Hartford, CT, has invested in the DVCPRO format. The purchase includes 14 AJ-D750 studio editing VTRs, five AJ-D650 studio editing VTRs, seven AJ-D230 desktop VTRs and six AG-A850 multi-event edit controllers. The equipment will be used for news editing and news playback to air.

Hamlet Video International Ltd. has sold 21 Digi Scopes and 30 Stereo Scopes to Sony Systems Integrations in Basingstoke. The equipment has been installed in Italy for a key Middle Eastern satellite broadcaster as part of a large automation project. Both the Digi Scopes and the Stereo Scopes are being used to monitor incoming and outgoing satellite circuits in the master control area. The Digi Scope was designed for all serial digital monitoring and measuring situations, providing digital data information, traditional waveform, vector and audio PPM or VU traces, while the Stereo Scope is an audio monitoring device that measures level errors, phase errors and distortion.

Post Logic Studios has purchased a second Inferno visual effects system from Discreet Logic. The system adds to the company's existing Fire on-line non-linear editing system. The second Inferno was purchased due to increasing demand for commercial and feature work at the facility.

The Public Broadcasting Service has purchased a full range of imaging Symphonie housing frames, digital converters and ancillary data processors from Miranda Technologies. With the acquisition, PBS will upgrade its digital multichannel headquarters in Alexandria, VA, to digital component video. The equipment will also play a major role in PBS' early adoption of DTV multicasting late this year. A major factor in the purchase was the introduction of Miranda's Symphonie 4RU housing frame. Symphonie offers a flexible mix and match of up to 16 digital video and/or audio imaging series conversion, encoder and decoder modules.

Sony and DG Systems announce the seamless integration of DG's ADvantage digital video playback system (DVPS) with Sony's library management system (LMS) multicassette system and FlexSys transmission system. In an effort to improve station efficiency and advertising flexibility, the companies will integrate digital MPEG-2 commercial delivery with TV station storage and playback devices. The equipment integration will fully automate the process of transferring commercials from the DG ADvantage DVPS to Sony's LMS and FlexSys storage and playback devices.

People

Sennheiser Electronic Corporation, Old Lyme, CT, has promoted Joe Ciaudelli to the newly created position of director of marketing. Bruce Mosca has been promoted to RF applications engineer.

Stuart DeMarais has been appointed to the board of Solid State Logic Ltd., Begbroke, UK, where he will serve as sales director.

Maxell Corporation of America, Fair Lawn, NJ, has promoted Tom McCarthy to director of sales and John Selvaggio as national sales manager. McCarthy will oversee all direct and dealer network sales, as well as marketing and pricing of Maxell's professional media products. Selvaggio will concentrate on supporting and strengthening Maxell's professional media business.

Keystone International, Pittston, PA, has named Ron Fries as the chief engineer for the DTV Express joint venture of Harris Corporation and PBS Network.

Long-time broadcast engineer Charles Hallinan died on April 22. He was well-known in radio circles, having begun his career by graduating from the RCA Institute, NYC in 1938. He was a radio consultant to more than 40 radio stations and instrumental in the startup of WKOP and WNR in Braghamton, NY. Charlie was a member of AES and senior and charter member of SBE.

Brad Dick, editor of Broadcast Engineering documented the early history of the society of Broadcast Engineers. In his 1983 Master's thesis, he writes of Hallinan's long-term effect on the SBE. "Hallinan served only two terms as president of the society, yet he was instrumental in guiding the fledging organization from conception to national notoriety. His skilled hand continued to be felt for many years, not only with the organizational procedures he established, but also with his leadership in other positions within the organization."
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Sachtler Fluid Heads and Tripods

Sachtler's Fluid 2000 offers a compact 2000 series Fluid head designed for ENG, EFP, ENG/EFP, ENG/EFP cameras. It features a smooth, fluid-damped motion control, a Quick Release Plate, and a Bubble Level. The Fluid 2000 is available in 75mm and 100mm base models, providing maximum flexibility for a wide range of camera applications.

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MILLER Fluid Heads and Tripods

**MILLER 20-Series II Fluid Head**

- **Model:** FP-114
- **Description:** Fluid head designed for ENG, EFP, and ENG/EFP cameras. It features a smooth, fluid-damped motion control, a Quick Release Plate, and a Bubble Level. The Fluid 2000 is available in 75mm and 100mm base models, providing maximum flexibility for a wide range of camera applications.

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Vision Two Stage ENG and LT Carbon Fibre ENG Tripods

Vision Two Stage ENG and LT Carbon Fibre ENG Tripods are designed for ENG, EFP, and ENG/EFP cameras. They feature a quick release plate, a bubble level, and a fluid head for smooth, fluid-damped motion control. The Tripods are available in 75mm and 100mm base models, providing maximum flexibility for a wide range of camera applications.

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Vinten Vision Two Stage EN&G and LT Carbon Fibre ENG Tripods

Vinten Vision Two Stage EN&G and LT Carbon Fibre ENG Tripods are designed for ENG, EFP, and ENG/EFP cameras. They feature a quick release plate, a bubble level, and a fluid head for smooth, fluid-damped motion control. The Tripods are available in 75mm and 100mm base models, providing maximum flexibility for a wide range of camera applications.

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PC-CODI Software:
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**TELEVISION MAINTENANCE ENGINEER**

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**SENIOR MAINTENANCE ENGINEER** immediate full time position available. Must have 3-5 years experience in broadcast industry, electronics degree, and computer knowledge. Requires repair and maintenance of large inventories including: electronics, video wall engines, audio, CRT and light valve projectors. Competitive salary and benefits. Send resume to: Susan Morgan, AVTS Inc., 1358 Stillman Street, St. Paul, MN 55107. FAX 414-259-8732. EOE.

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**KMIZ-TV AND FOX 11** are expanding again! We have an immediate opening for a Full-Time transmission/maintenance technician. Experience in UHF/VHF transmitters, microwave equipment and computer/LAN systems required. Send resume to: Personnel Manager, KMIZ TV, 501 Business Loop 70 East, Columbia, MO 65201. Equal Opportunity Employer. Beneck Broadcasting Corp.

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Supervise maintenance engineers for TV, radio, and building maintenance and repairs. Procure parts and supplies, maintain safety and orderly shop. Maintain engineering documentation. Send resume and cover letter to: Turner Broadcasting Systems Human Resources, WMFE Monticello Plaza, 5012 East Colonial Dr., Orlando, FL 32817 or fax to: 407-296-2791. Deadline: 5/29/98, or later if not filled by that date.

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**MAINTENANCE ENGINEER**

Performs Engineering maintenance, including studio equipment, microwave equipment, ENG equipment and transmitter. Experience in electronic maintenance or four years of technical television engineering experience. Knowledge of computer operations and maintenance plus. Ability to troubleshoot, repair, and maintain electronic systems and equipment. Send resume to: KATV, LLC, P.O. Box 77, Little Rock, AR 72203 or apply in person at 401 Main Street, Little Rock, Arkansas. No telephone calls please. EOE.
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With hands-on maintenance experience, thorough knowledge of studio equipment repair, computer friendly and strong customer skills needed. Please forward resume to P.O. Box 4492, Hollywood, California 91607.

MAINTENANCE ENGINEER

Qualified candidates must have experience repairing and maintaining a TV broadcast facility and can troubleshoot to component level. Experience with UHF plus FCC or SBE certification preferred. Candidate must be a self motivated person. We are a very progressive station, preparing for the digital future. Our friendly community has a high quality of life. Send resume, cover letter and references to Chief Engineer, WLFI TV18, 2605 Yeager Road, West Lafayette, IN 47906. EOE Employer.

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ENGINEERING SUPERVISOR KENS-TV in San Antonio, Texas, a subsidiary of the A.H. Belo Corporation, has an immediate opening for an Engineering Supervisor. Applicant is required to have an Associated Degree in Electronics or equivalent experience and preferably hold either a General FCC License or SBE Certification. The applicant needs prior experience with preventative and corrective maintenance on the machines, computers, microwave systems, ENG trucks, SNG trucks, etc. and should have a minimum of 5 years experience in Broadcast Televisions. This position will require an individual who works well with the News Department and has good communication skills. Applicants should send resume to Personnel Director (reference position #86410401) at P.O. Box TV5, San Antonio, Texas 78200. We are an Equal Opportunity Employer.

MAINTENANCE REMOTE ENGINEER

Repair and adjust television radio equipment, assist in construction of new equipment or modification of existing facilities, and frequently assist remote production team in an engineering capacity at remote site. Back-up drive for mobile unit. FCC Radiotelephone Operator License, General Class or other certification and background in analog and digital troubleshooting required. Television UHF and FM radio transmitter experience desirable. Possess valid CDL Driver License or obtain within three months of employment and have driving record acceptable to WMFE insurance provider. Resume to: Human Resources, WMFE, 11518 E. Colonial Dr., Orlando, FL 32817 or fax to 407-206-2791. Deadline: 5/29/98, or later if not filled by that date.

SENIOR VIDEO ENGINEER

Cox Communications in Phoenix is looking for an experienced remote production engineer. Applicant should have a minimum 5 years experience in broadcast television maintenance and repair, both in studio and truck operations. Main responsibilities include facility design, system calibration, equipment repair and maintenance, both on the bench and in the field. Able to set-up remote production trucks, power hook-up, patching, timing and troubleshooting. Strong problem solving and options/resolution skills. Should be knowledgeable in both analog and digital equipment and technology. MAC based edit system experience a plus. Varied hours with minimal travel. Strong team environment and excellent benefit package. Send resume to Cox Communications. Human Resources, 17602 N. Black Canyon Hwy., Phoenix, AZ 85023. EOE.

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It was reported that NHK tried to persuade Panasonic not to demonstrate 720p at this year’s NAB. The reasons seem to be rooted in the public TV giant’s belief that everything should be centered on 1,080i, feeling it has a proprietary interest in showing that its scan count at least opposite direction to try and stop terrestrial implementation. It has estimated that the costs, starting in the year 2000, would be $5.3 billion and that this investment would slash the profits of most stations from about 9% to 2%, and “small-scale broadcasters would sink into the red and remain many people benefited from his hard work, his diligence and his patience. He was also a family man, married for nearly 30 years and the father of three.

After 14 years at Tektronix, John co-founded Magni Systems and worked long and hard to bring the company into the technology limelight; the company won two Emmys during that time. It was only recently that John returned to Tektronix to re-absorb himself in the work he loved. He was a hands-on engineer who had to prove that it worked, had to see it, had to measure it. If he made a mistake, everybody knew about it because he declared it as soon as he could. Offstage at trade shows, he put everything into seeing that it all worked, whatever the time and sleep costs, and during show hours, he was one of the best demonstrators ever.

Yet, John was approachable, never involving himself with office or founder politics. You could go to his cubicle at Magni and get yourself straightened out. He would leave any of his own tasks to help someone else. And, when he explained something, he did so with the most incredible patience. If they didn’t get it, he would start the explanation all over again without even a sigh.

John died March 10, 1998, of a heart attack. This great man and engineers’ engineer will be badly missed.

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