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MAY 1998

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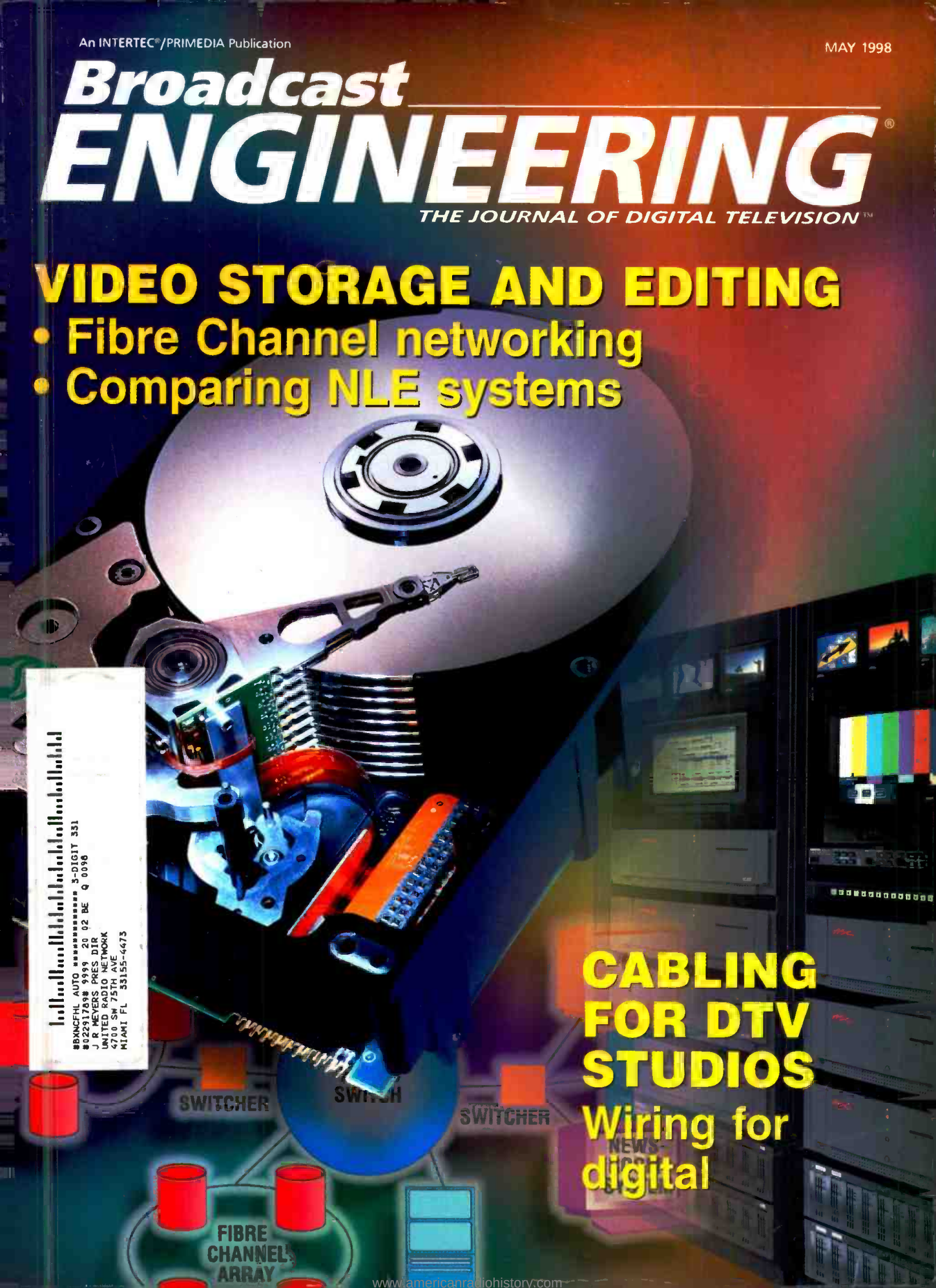
- Fibre Channel networking
- Comparing NLE systems



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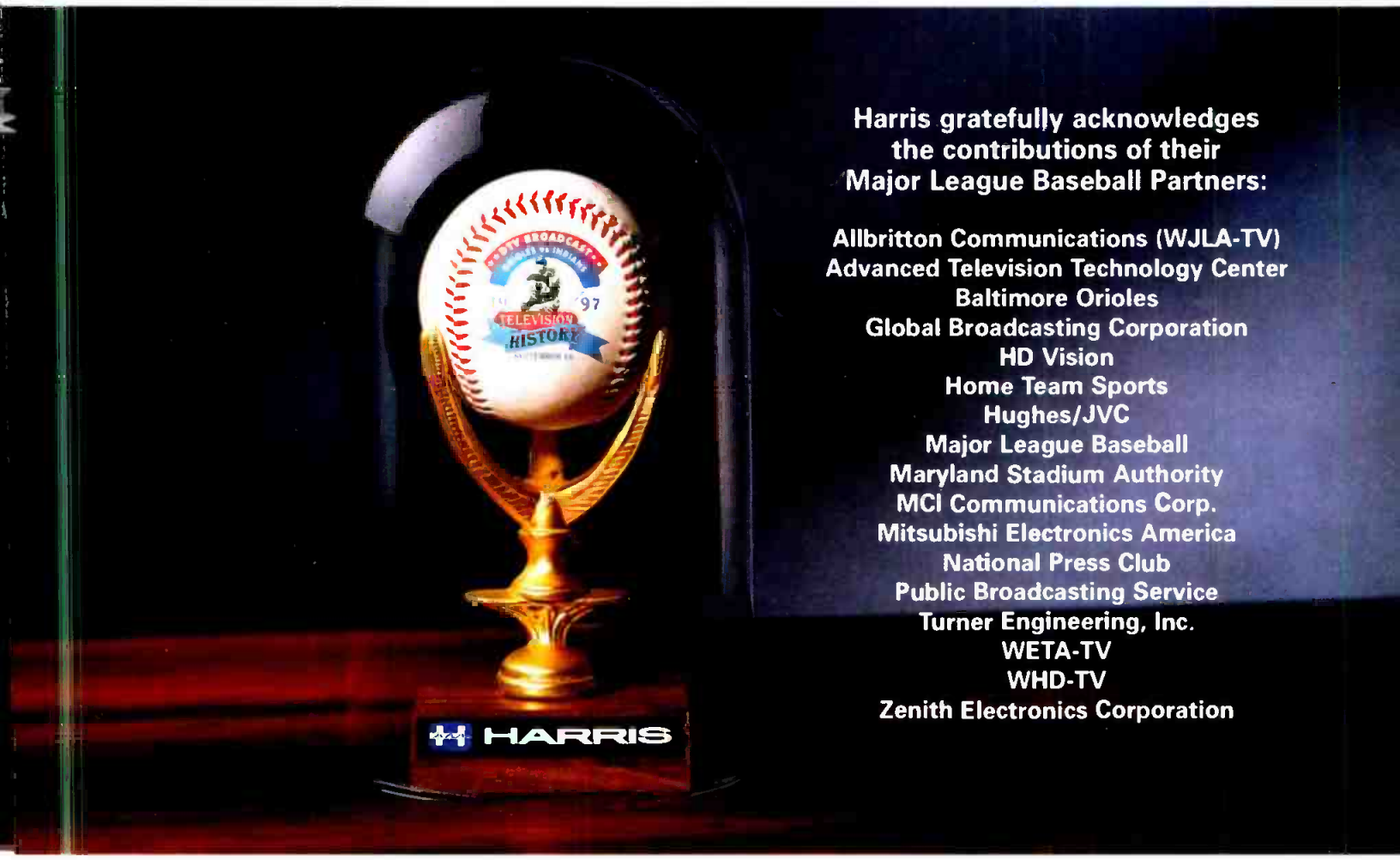

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May 1998
Volume 40
Number 5

Broadcast ENGINEERING
THE JOURNAL OF DIGITAL TELEVISION

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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 Ananko, Scranton, PA — "Orban Optimod 9200, Sennheiser MKH2-80 mic, Clear-Com Tel-14"

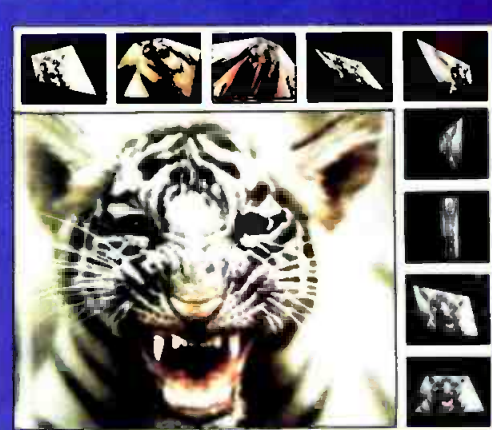
Brian McCaffrey, Watertown, MA — "Harris exhibit"

FREEZE FRAME

A look at the technology that shaped this industry.

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?



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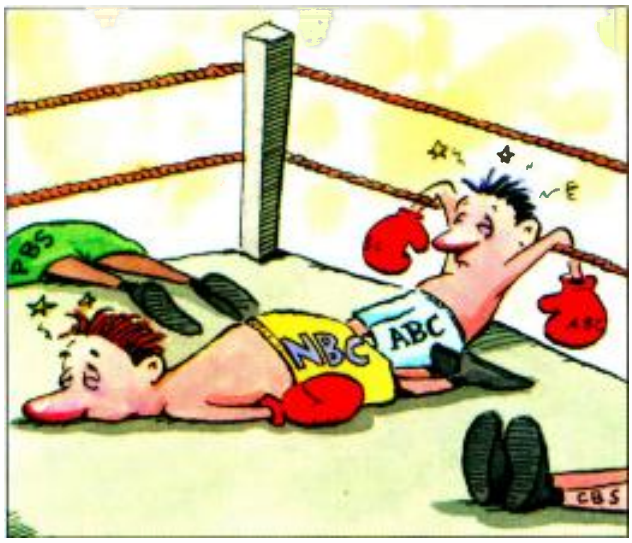
Editorial

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

Brad Dick, editor

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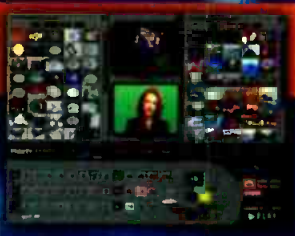

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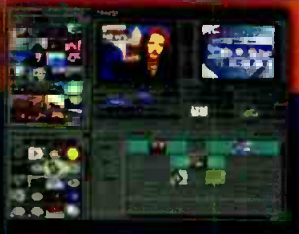

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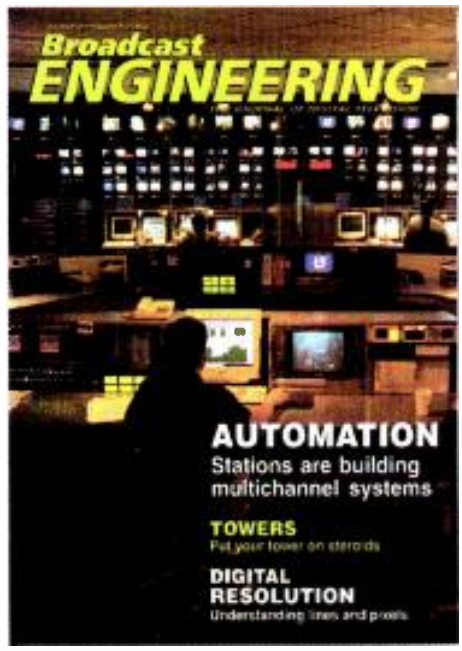
Reader Feedback

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.



The TCI facility relies on Alamar automation from Philips.

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 facilities, 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 that 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.

JERROD 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 STAROBIN
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 KAUFFMAN
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 Szkudlarek, Sinclaire 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 sMicrosoft 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 (WNCN) 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 Broadcast & Television Systems Company (PBTSC) by this September in time for ABC's DTV launch two months later.

One argument opponents use for not going to 720p is a supposed lack of equipment. To that issue Padden said, "We are grateful that Panasonic has elected to support all of the ATSC formats and has accelerated its 720p product line to fulfill our ambitious plans." 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 PBDSC. ABC will also purchase 720p studio cameras, monitors and other support equipment for use in future HD programming origination.

Robert Mueller, president, PBDSC, 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 interpolate 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 repsonse to Malone's statement said it looks like the cable industry just fired on Fort Sumpter. "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.

Aurelio Arce and Dan Mahoney (far left) blow whistles as they protest against Disney/ABC outside the Shrine over NABET's exclusion from the Academy Awards production. A crowd of NABET-CWA members and supporters lined the street with signs and red balloons stating, "It's our work." More than 250 people attended the protest.

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 Award 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 roll 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 roll 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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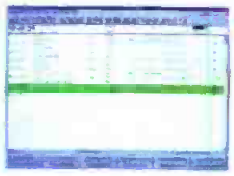

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about member training. He said, "In fact, NABET does not have a national training program, but many locals have programs and incentives for SBE certification and vendor specific training. But regardless of the availability of training programs, our 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.

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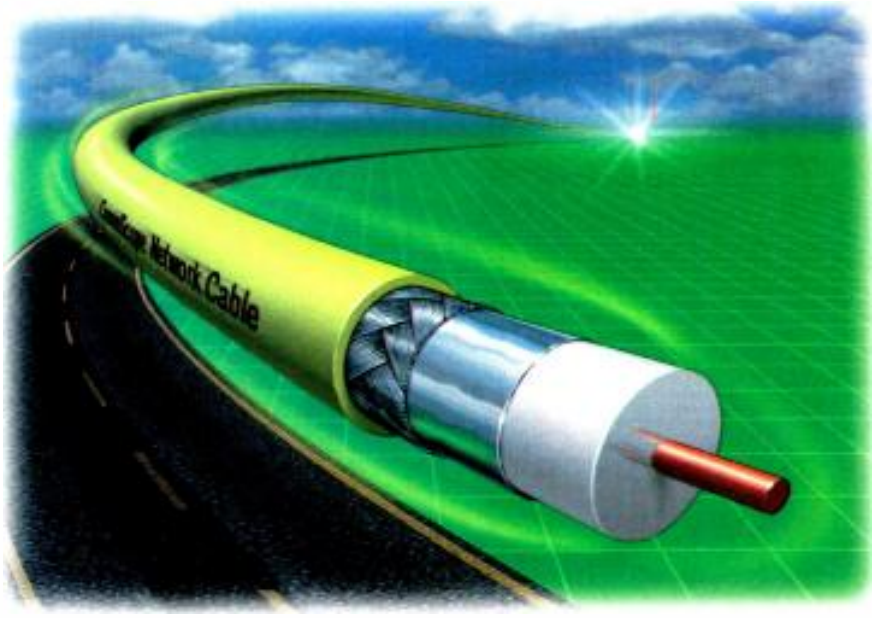

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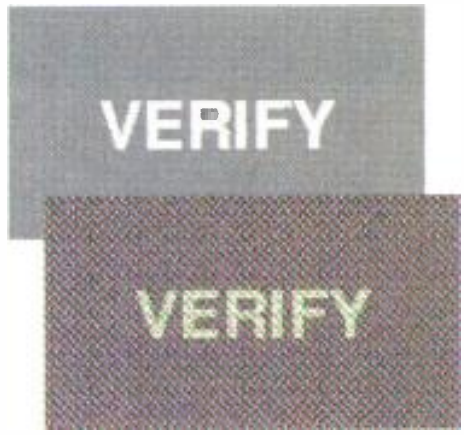

Screen 2 (at top). When a receiver is properly decoding a DTV or HDTV signal, the ATSC compliance bitstream displays the word "Verify" on a gray background. The format being tested here is a 1,920x1,080 HDTV signal broadcast at 30fps. Screen 3 (bottom). Here is the same signal being processed by a non-compliant decoder. The scrambled background alerts testers that the decoder is not properly interpreting MPEG-2 information. A title screen announces which decoder functon 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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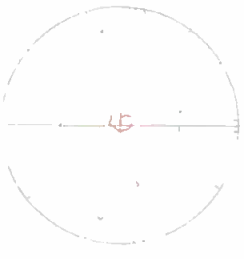

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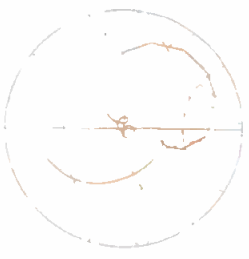

The impedance performance of the [illegible] competitive jacks [illegible]

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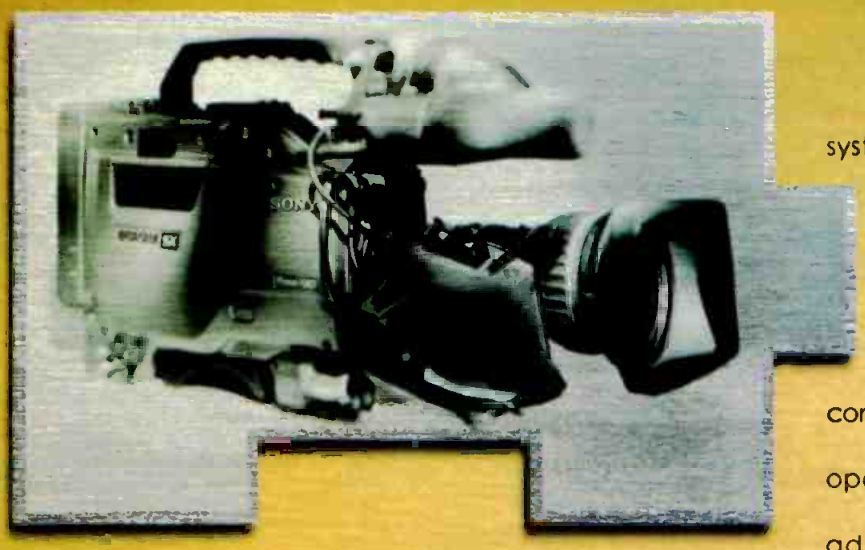

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New for 1998 is the DNW-A75 VTR. Adding to our extensive line of SX Hybrid Recorders and Players, the A75 offers frame-accurate video and audio insert editing on Betacam SX tape.

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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.

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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 cuing 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 sytems allow easy integration of analog Betacam material into your work.

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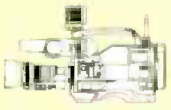
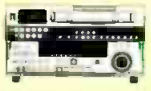


Camcorders

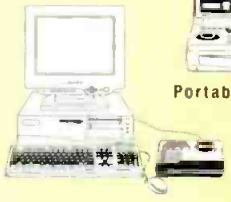
Dockable Recorder

Production

Linear Editors



Hybrid Recorders



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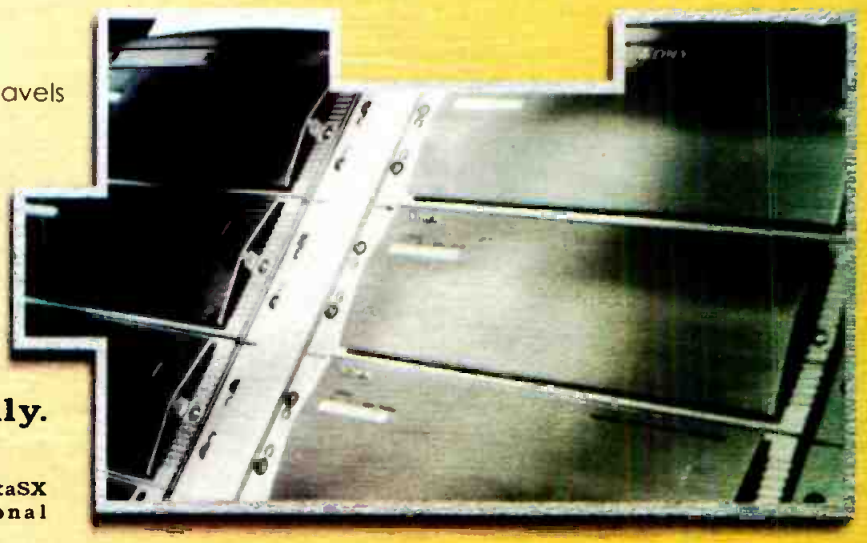

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includes four sets of tests, each one targeting a specific area of performance.

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, Ft. 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.

One of the HD-Vision cameras at the ball park.

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 wn until you get a screen rger than 35 inches. The ıme was be transmitted live, sing the new Comark "Adıntage" digital transmitter, well as on Channel 5 in andard-definition NTSC. For sports fans not lucky ıough to be at the ball game, ey were able to check out ıe new technology at desigıted Circuit City locations the Dallas-Ft. Worth area. ircuit City's participation arks 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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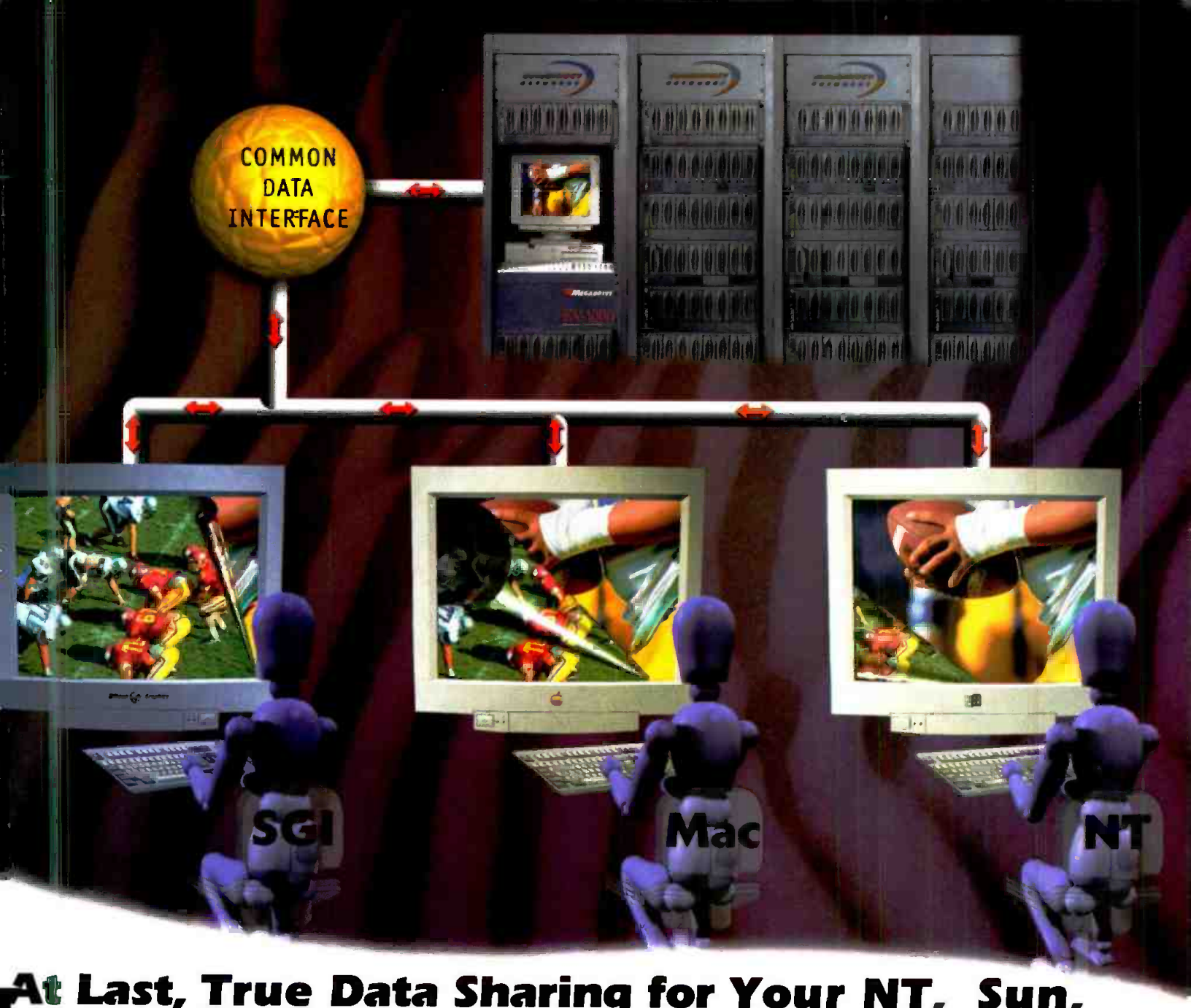

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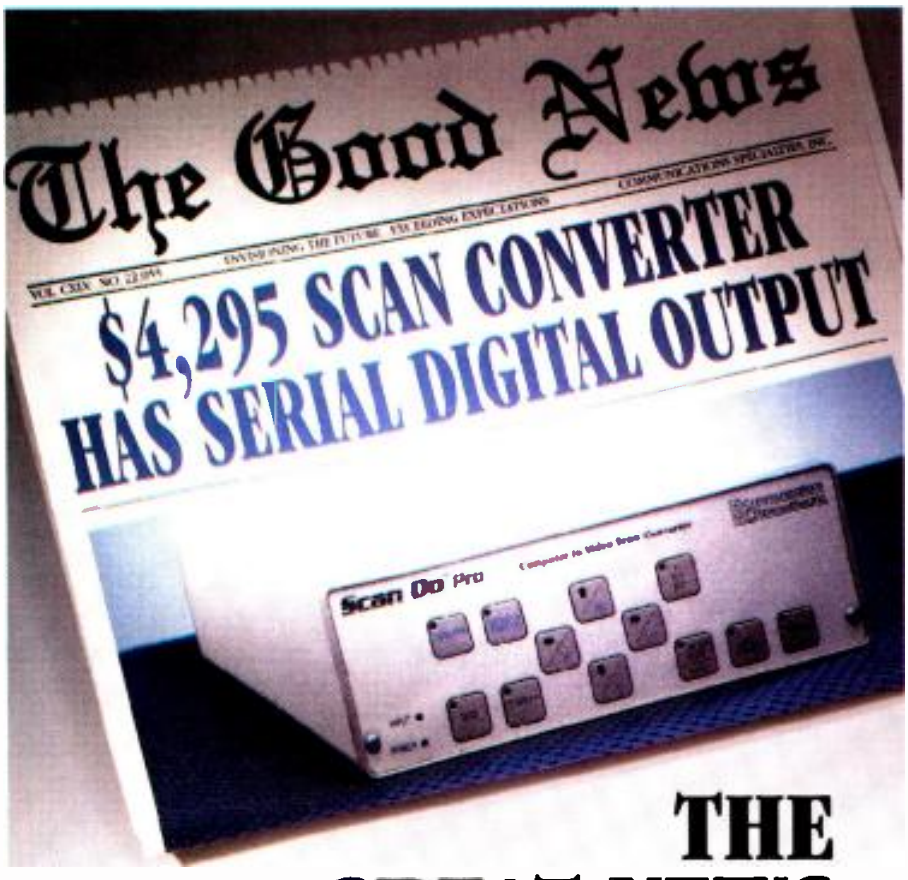

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will drive sports enthusiasts to electronics stores in droves, even at today's introductory prices."

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 groundbreaking 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

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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 Steward 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.

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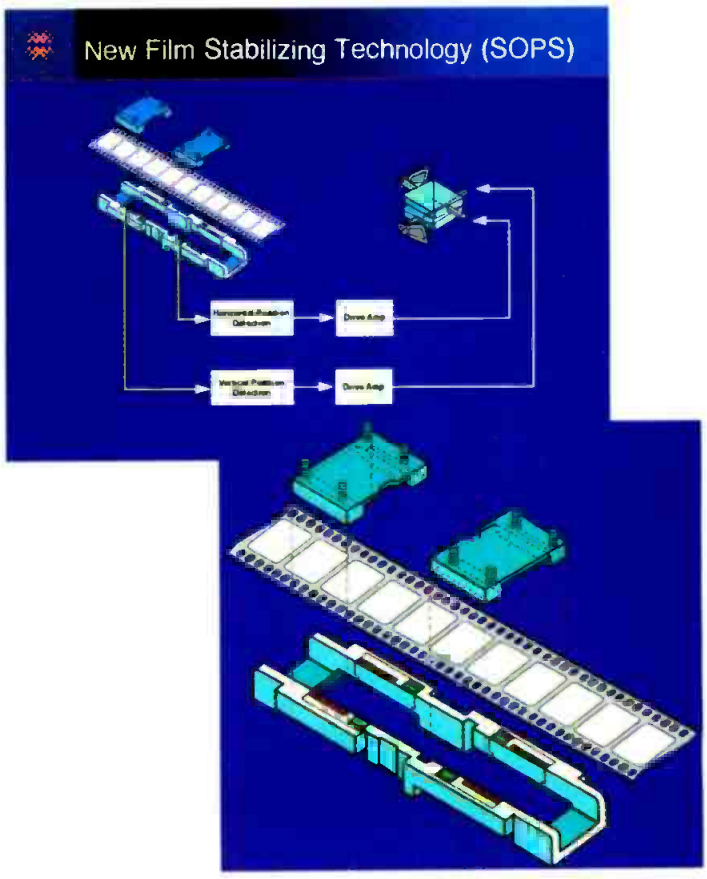
Sony throws its hat into the telecine ring

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



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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 telecines 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 telecines 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 dealof 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 telecine. Film frames are progressively scanned out of the 16x9 format images and then interpolatively 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 Phythyon, 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 realloaction may spell trouble for LPTV stations

The clock is ticking for those more than 14,000 low-power TV (LTPTV) 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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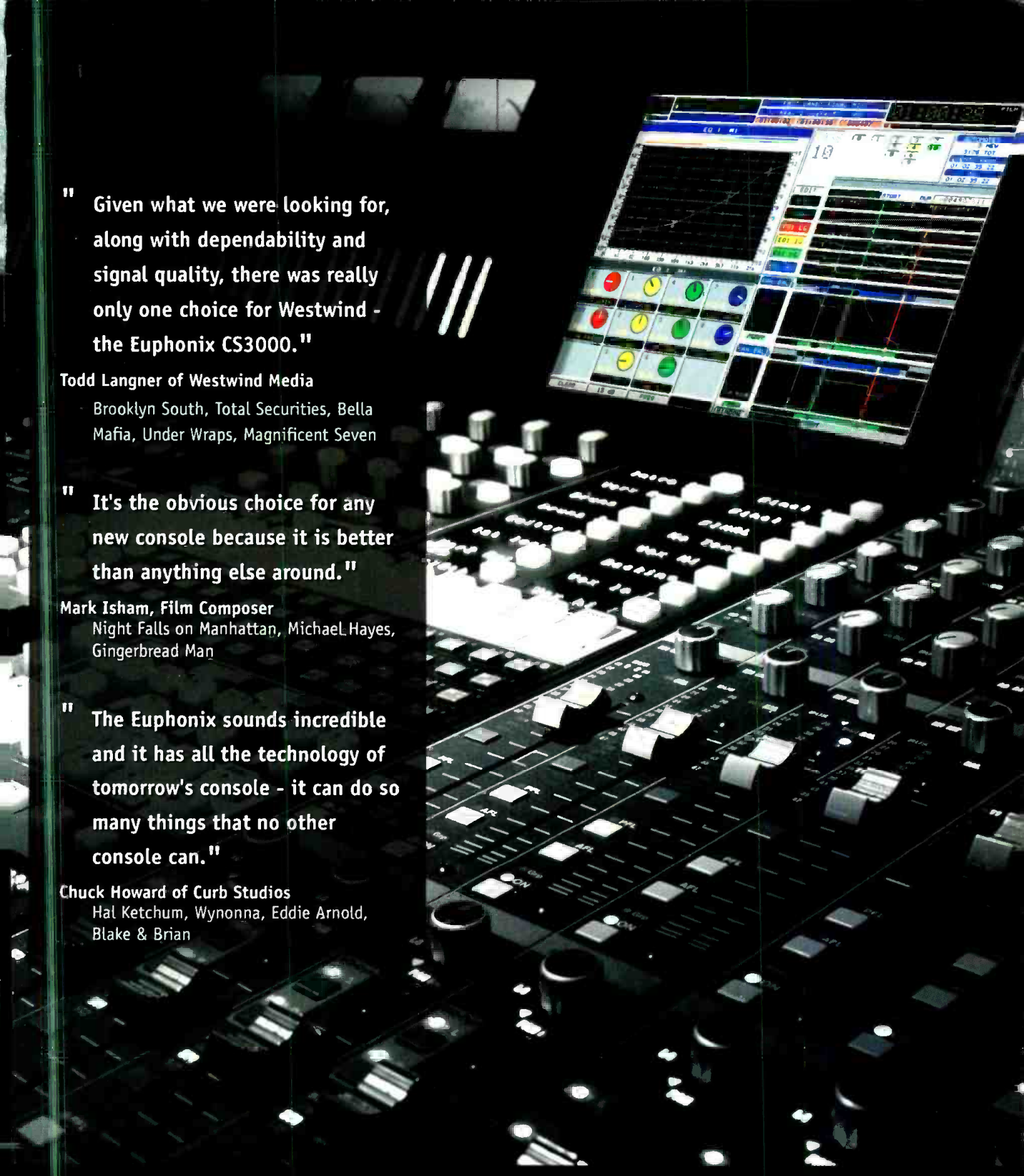

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FCC Update

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.L.C., Rosslyn, VA.

Dateline

TV, TV translators and LPTV stations in California, Kansas and Nebraska must file for renewal by Aug. 3, 1998. Commercial TV stations in the following states must file their annual ownership reports on or before Aug. 3, 1998: North Carolina, South Carolina, Illinois, Wisconsin and California. Tower owners in Texas must register with the FCC before June 30, 1998.

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DTV Update

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.

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

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 1/60th 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 leap-frog 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. On the surface, it looked like a war that ended in a draw. In reality, the consumers won because they will be ensured of the best pictures. The ATSC has given the industry an assortment of related formats offering good flexibility, and it will take a few years for the field to universally adopt production formats more closely related. ■

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?

EXPERT

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.

Nat Ostroff, vice president, new technology, Sinclair Broadcast Group.

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. ■

VENDOR

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.

Thomas A. Jordan, vice president, sales/ regional accounts, Leitch Inc.

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. ■

READER FEEDBACK

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Transition to Digital

The challenge of component video in North America

BY MICHAEL ROBIN

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 100/0/100/0. The dotted lines represent a fully saturated color bars signal with a 75% amplitude referred to as 75/0/75/0.

• 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 75/0/75/0 signal except that the luminance bar has an amplitude of 100%. This signal is sometimes erroneously referred to as 100% color bars.

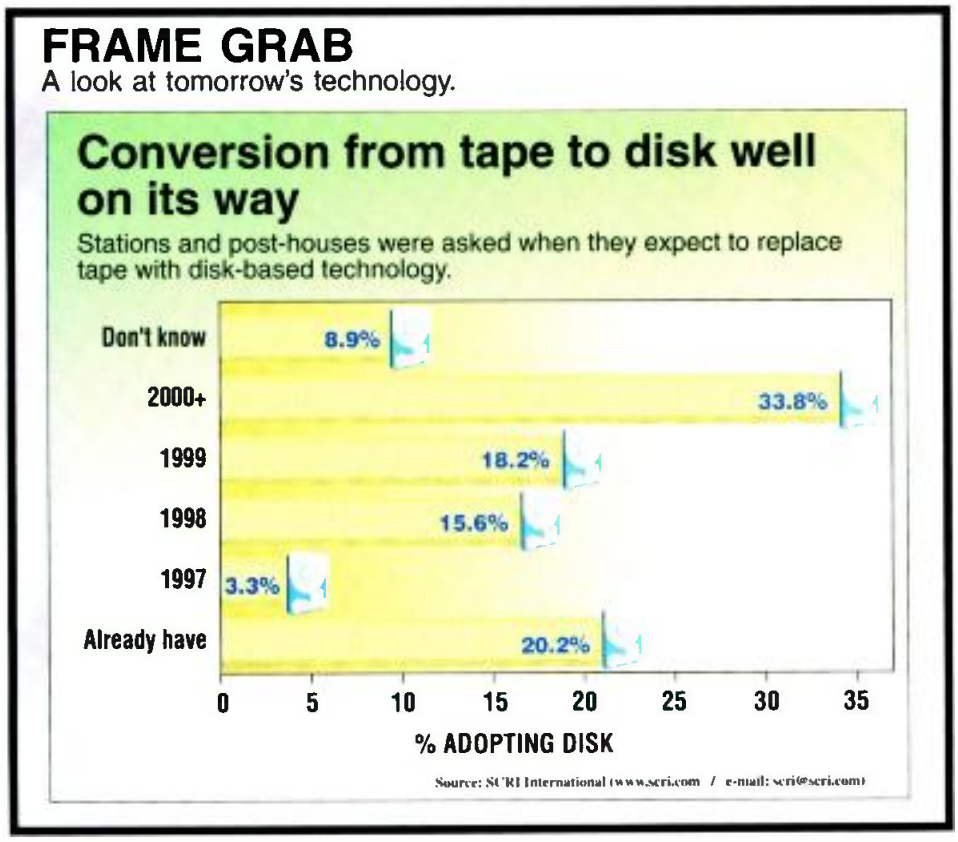
• The third row presents a fully saturated color bars signal with a maximum signal level of 100% and a minimum signal level of 7.5%, referred to as 100/7.5/100/7.5. The dotted lines represent a fully saturated color bars signal with a 75% amplitude referred to as 75/7.5/75/7.5.

• 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



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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.

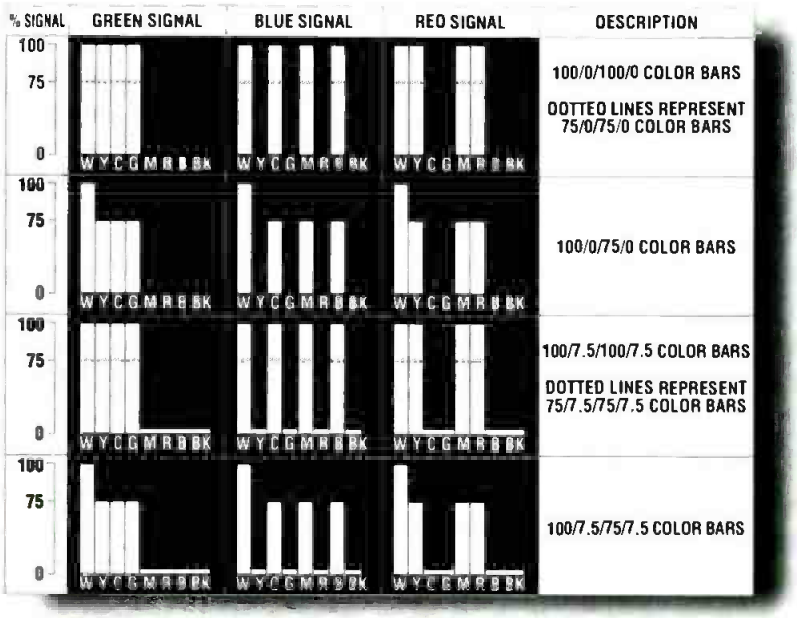

Figure 1. Relative amplitudes of color bars components.

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.

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

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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:

$E'_B - E'_Y = -0.587\ E'_G + 0.889\ E'_B - 0.299\ E'_R$

and

$E'_R - E'_Y = -0.587\ E'_G - 0.114\ E'_B + 0.701\ E'_R$

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.

WAVEFORM		NTSC	EBU N10	BETACAM	M II
Y SIGNAL	PEAK WHITE	714.3mV	700mV	714.3mV	700mV
	SETUP	53.57mV	0mV	53.57mV	0mV
	BLKG	0mV	0mV	0mV	0mV
	SYNC				
B-Y SIGNAL	SCALING FACTOR	.493	.564	.75	.522
	POSITIVE PEAK	+313.54mV	+350mV	+466.65mV	+324mV
		0mV	0mV	0mV	0mV
	NEGATIVE PEAK	-313.54mV	-350mV	-466.65mV	-324mV
R-Y SIGNAL	SCALING FACTOR	.877	.713	.95	.66
	POSITIVE PEAK	+438.5mV	+350mV	+466.65mV	+324mV
		0mV	0mV	0mV	0mV
	NEGATIVE PEAK	-438.5mV	-350mV	-466.65mV	-324mV

Figure 2. Analog component Y, B-Y, R-Y signal characteristics and scaling factors for 100% color bars.

• 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-

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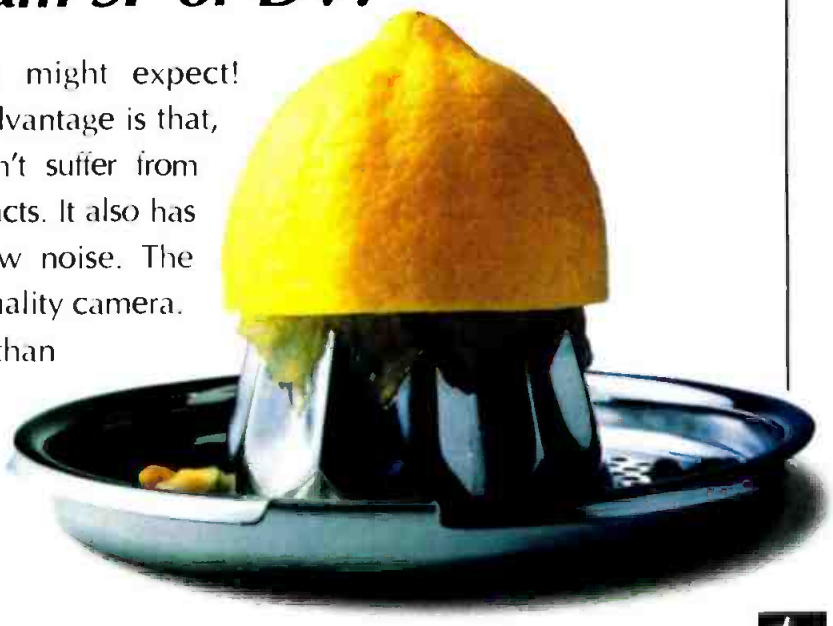
Q. *My budget doesn't allow 1080i. Can I squeeze good quality upconversions from Betacam SP or DV?*

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'_{CB} and E'_{CR}. The same signals are known in North America as P_B and P_R. 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 270Mb/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 composite 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 100/7.5/75/7.5 color 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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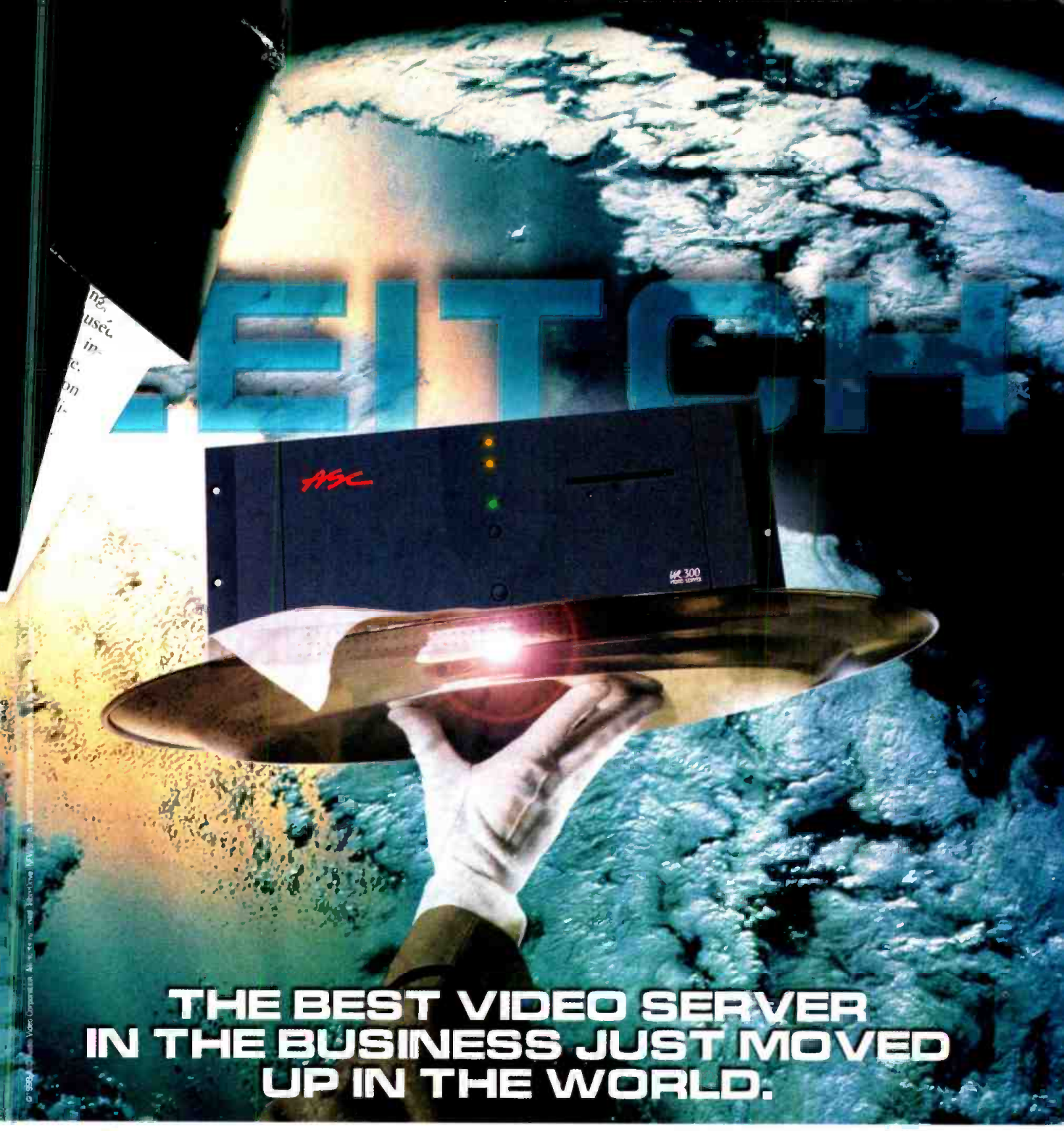

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Windows NT in broadcast applications

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.xx 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 older 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.

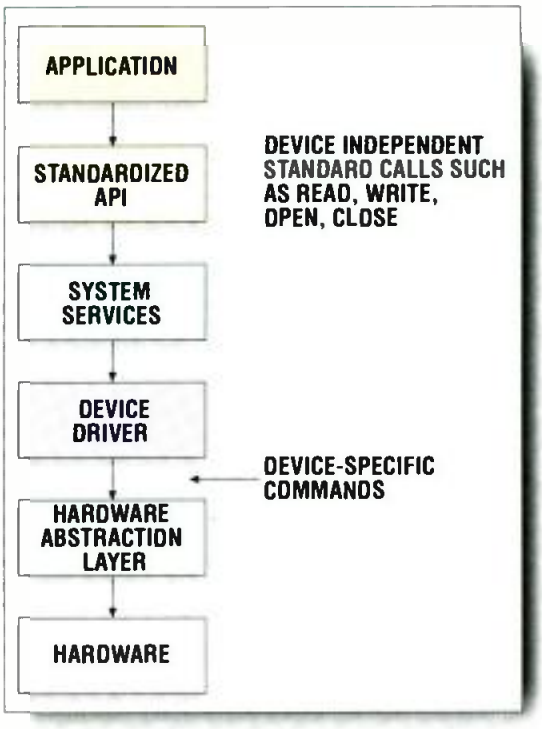

Figure1. Windows NT device driver model.

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, applicati to be rewritten as devices ch This was extremely costly and c headaches for users caught wit compatible hardware and softwa

In the new model, the applicat speaks through a standardized ap cation-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 level, 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 allows manufacturers to develop products in just about any programming language you can imagine.

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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

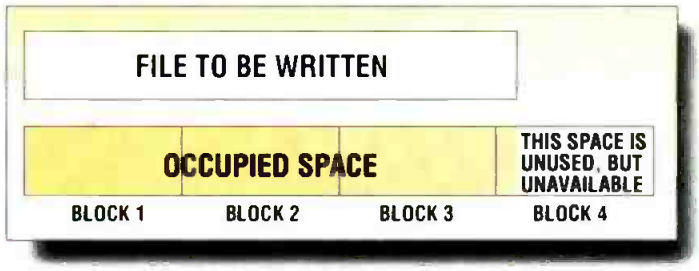

Figure 2. Fixed block allocation wastes disk space.

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 fit 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.

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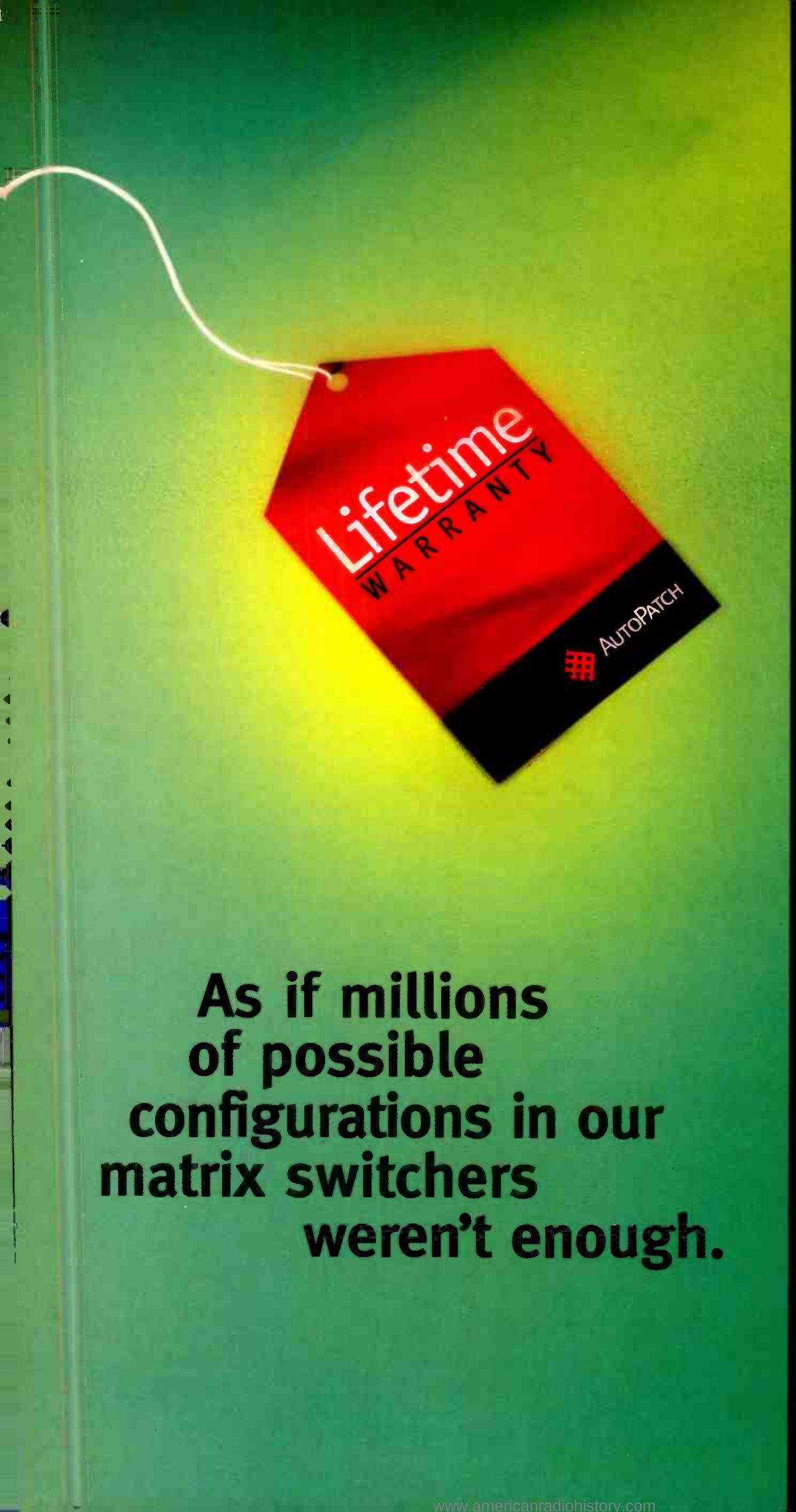

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Ask Dr. Digital

Airport neighbors

BY STEVE EPSTEIN, TECHNICAL EDITOR

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?

Zulfiqar 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 Wilhite 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 155Mb/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 muxed, 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 wideband 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. ■

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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-II 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. ■

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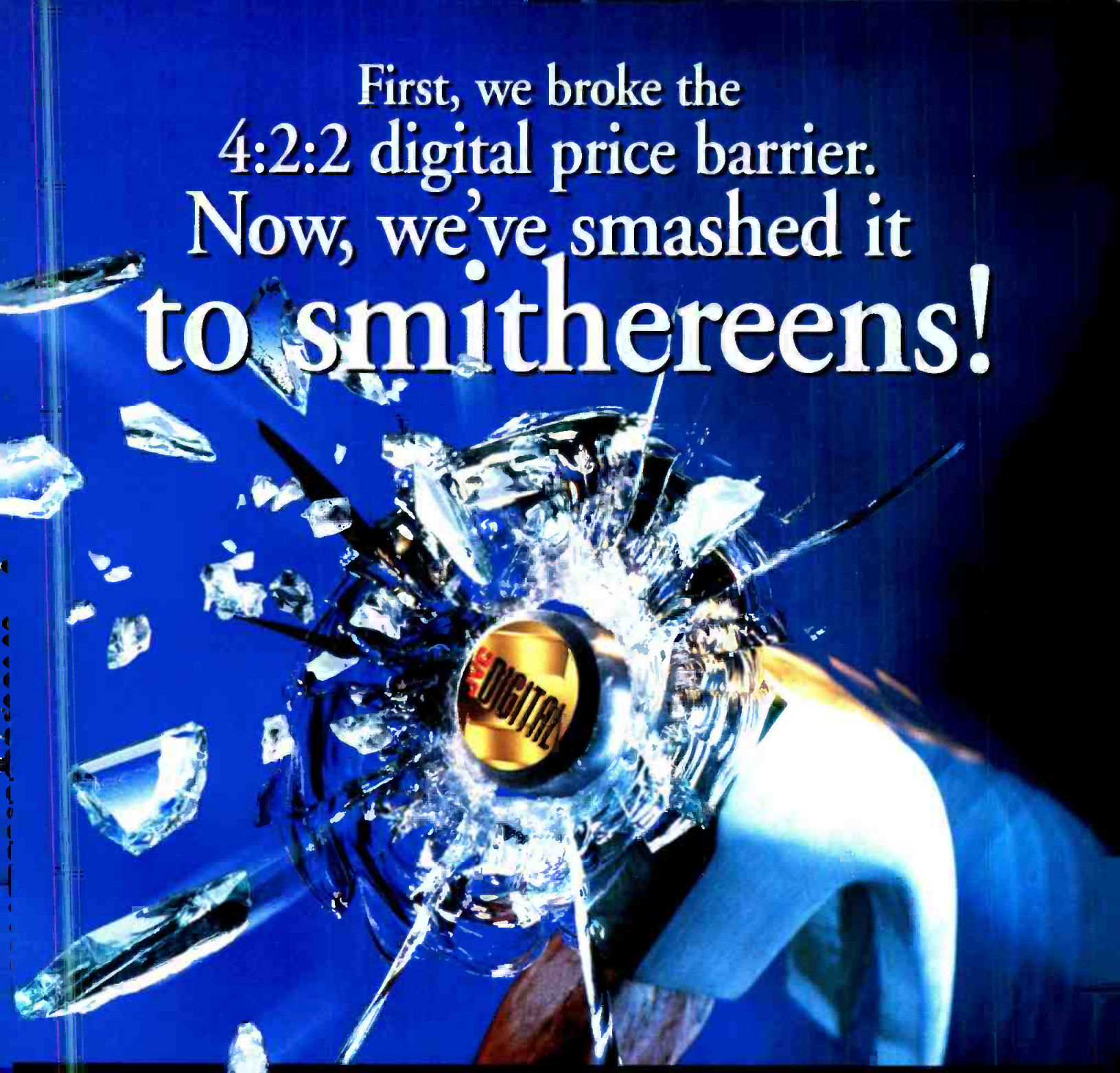

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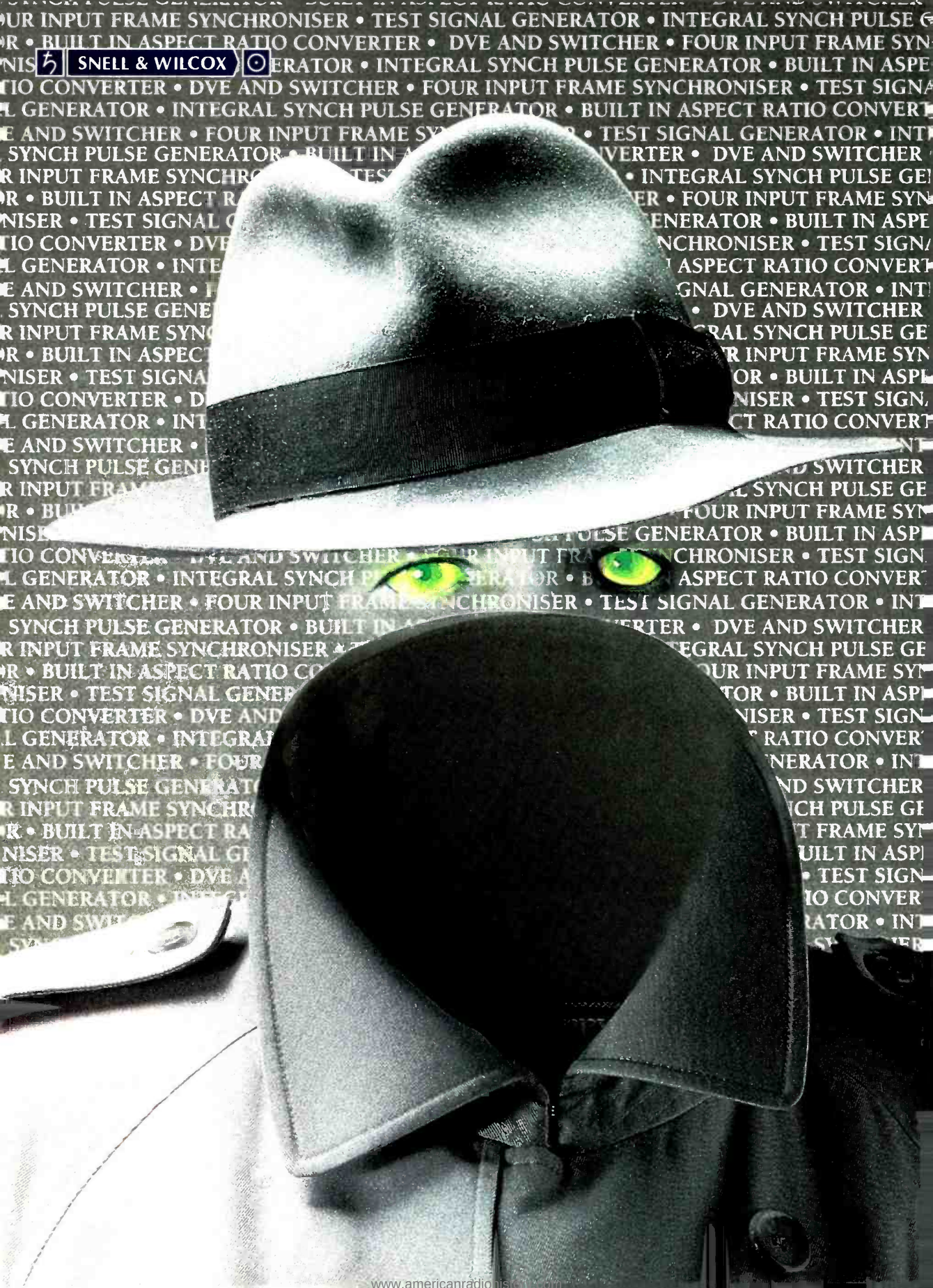
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Transmission & Distribution

Solid-state vs. tubes: The big day may have arrived

BY DON MARKLEY

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.

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.

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

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 Diacrode transmitters at the higher power levels with one notable exception. Harris was showing its new DiamondCD 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 attesting to the fact that it had been sold.

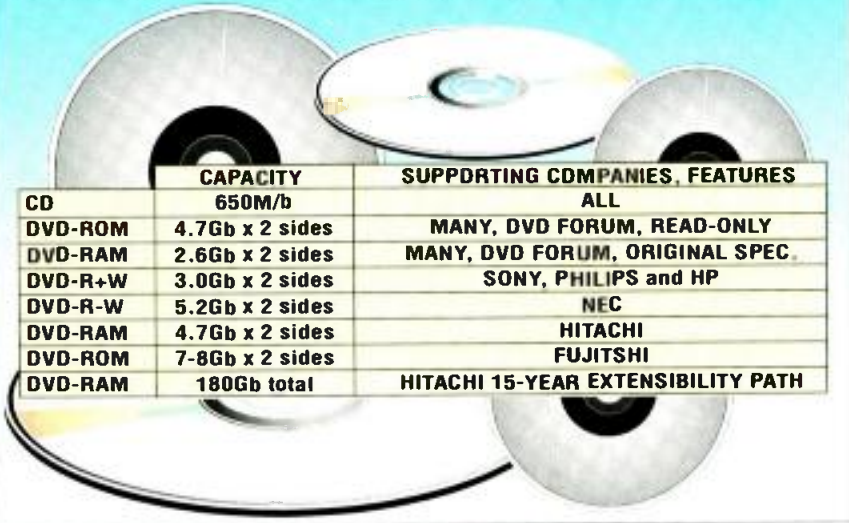
The new Harris transmitter uses LDMOS FET devices in the RF amplifiers. Each PA cabinet is capable of 5kW average power (20kW peak) and up to five cabinets can be joined to reach 25kW average power. A power supply is added for each two RF modules.

FRAME GRAB

A look at the consumer side of DTV.

DVD—storage's future or failure

Because DVD is being offered in different and incompatible "flavors," consumers are slow to adopt the technology. Experts say this confusion on the storage issue could affect DTV implementation.



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CD	650M/b	ALL
DVD-ROM	4.7Gb x 2 sides	MANY, DVD FORUM, READ-ONLY
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DVD-R+W	3.0Gb x 2 sides	SONY, PHILIPS and HP
DVD-R-W	5.2Gb x 2 sides	NEC
DVD-RAM	4.7Gb x 2 sides	HITACHI
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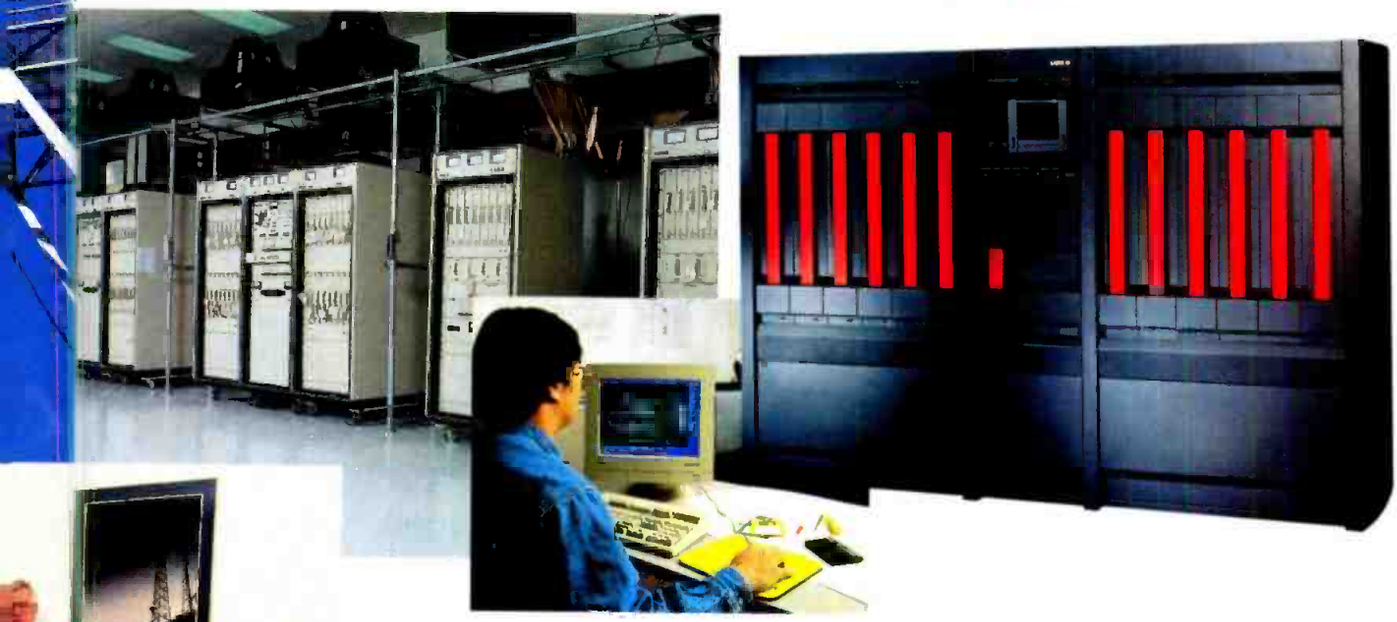

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Production Clips

Handling 5.1 audio in production

BY KENNETH HUNOLD

If TV audio has been the "poor stepchild" 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 buses and creative panning assignments.

Current "surround-sound" 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 sound by monitoring the output of a reference decoder. However, because the 5.1 system uses six discrete channels that are not mixed or matrixed into other channels, it is no longer necessary to monitor the encoded signal. For cost considerations, this is a good thing.

Handling six channels of audio adds another step in an already complex process of getting DTV on the air. So, while the capability of live 5.1 audio production exists today, most networks and broadcasters will limit their audio production to stereo, at least in the introductory phase of digital television.

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.

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.

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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?

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

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. ■

Kenneth Hunold is an audio/video project engineer for the ABC Engineering Laboratory, New York.

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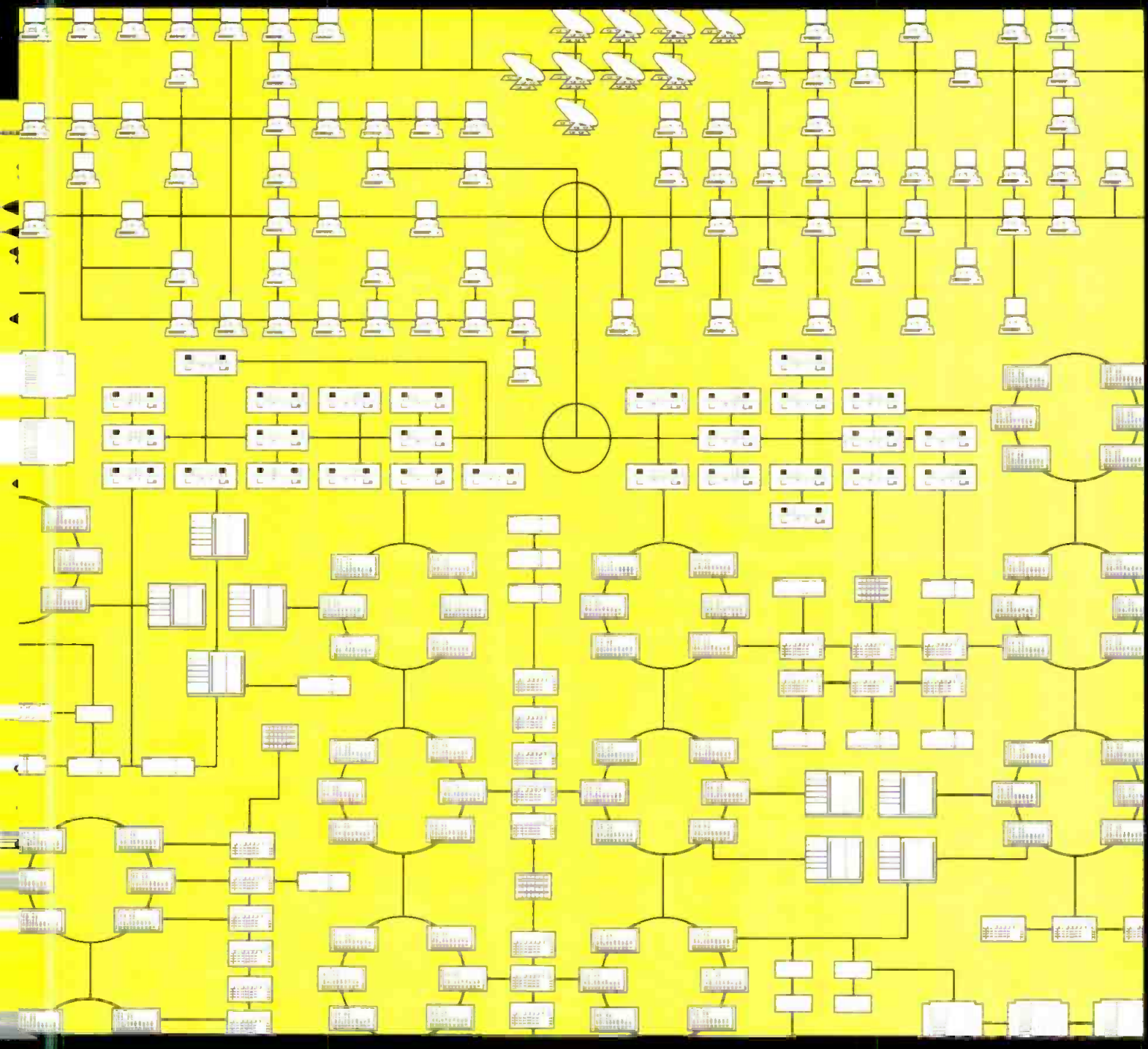

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Collaboration and coordination are the keys

BY STEVE KAUFMAN AND SCOTT GRIFFIN

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.

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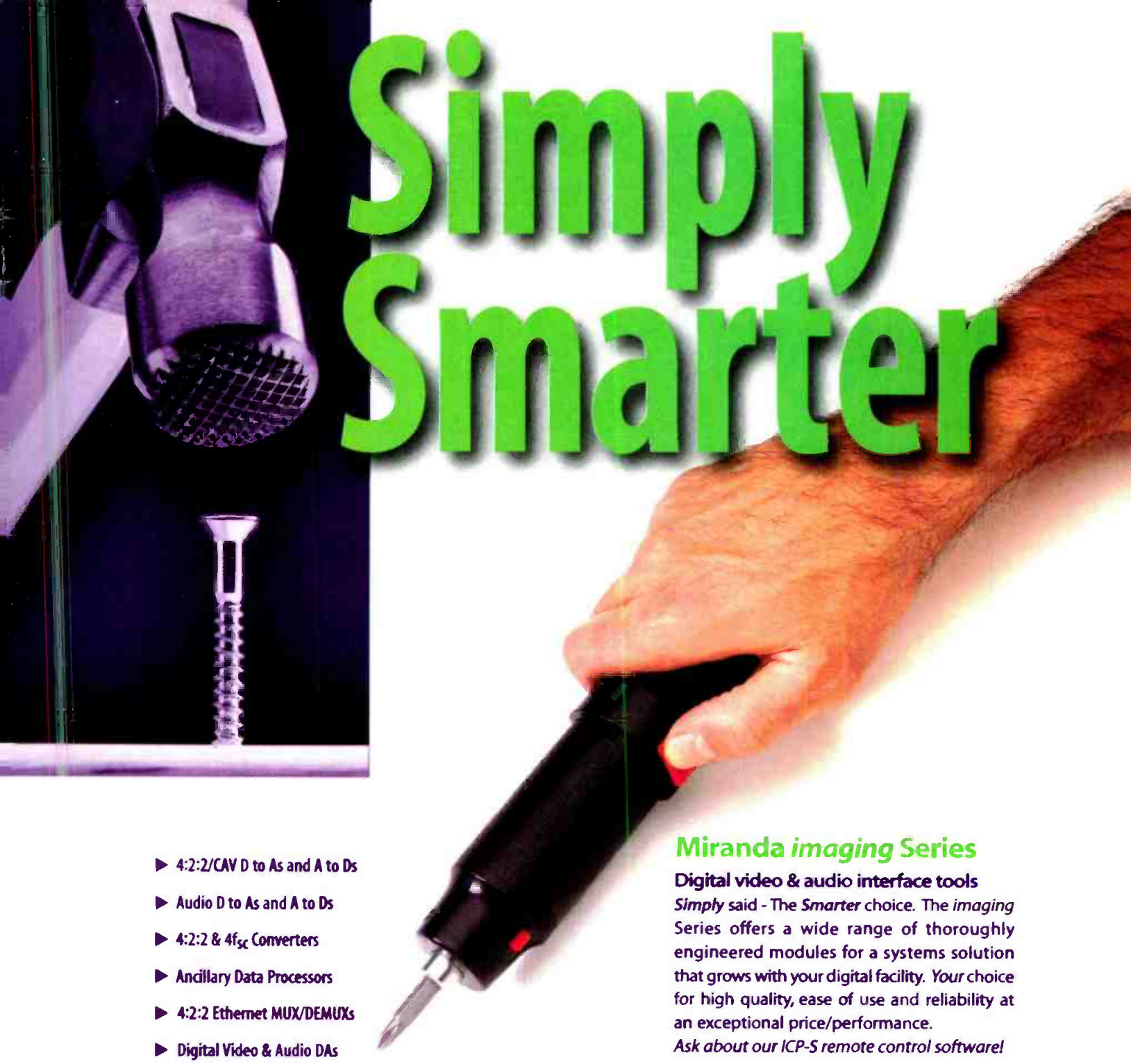
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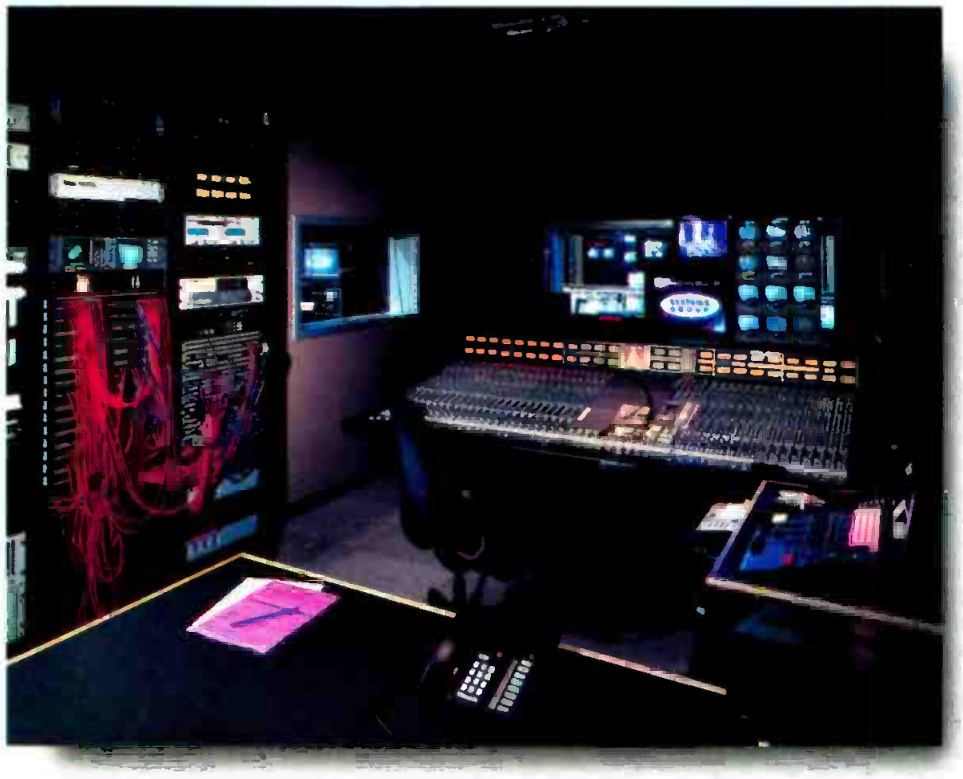
broadcast. MTV viewers expect innovation and evolution and these new facilities in Times Square deliver.

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.



The audio control room uses a Solid State Logic 8000 G series 48x8x4 console. The room is supported by 360 Systems DigiCart, Tascam DAT Denon CD and a Sony 16x8x4x2 digital mix-down console.

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 VJ 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 accomodate 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.

The control room is based on a Grass Valley Group 4000 digital switcher with access to five studio cameras and three remote cameras. The work area provides space for a director, technical director and three producers.

Equipment solutions

The teleproduction facilities were designed around high-powered, work-

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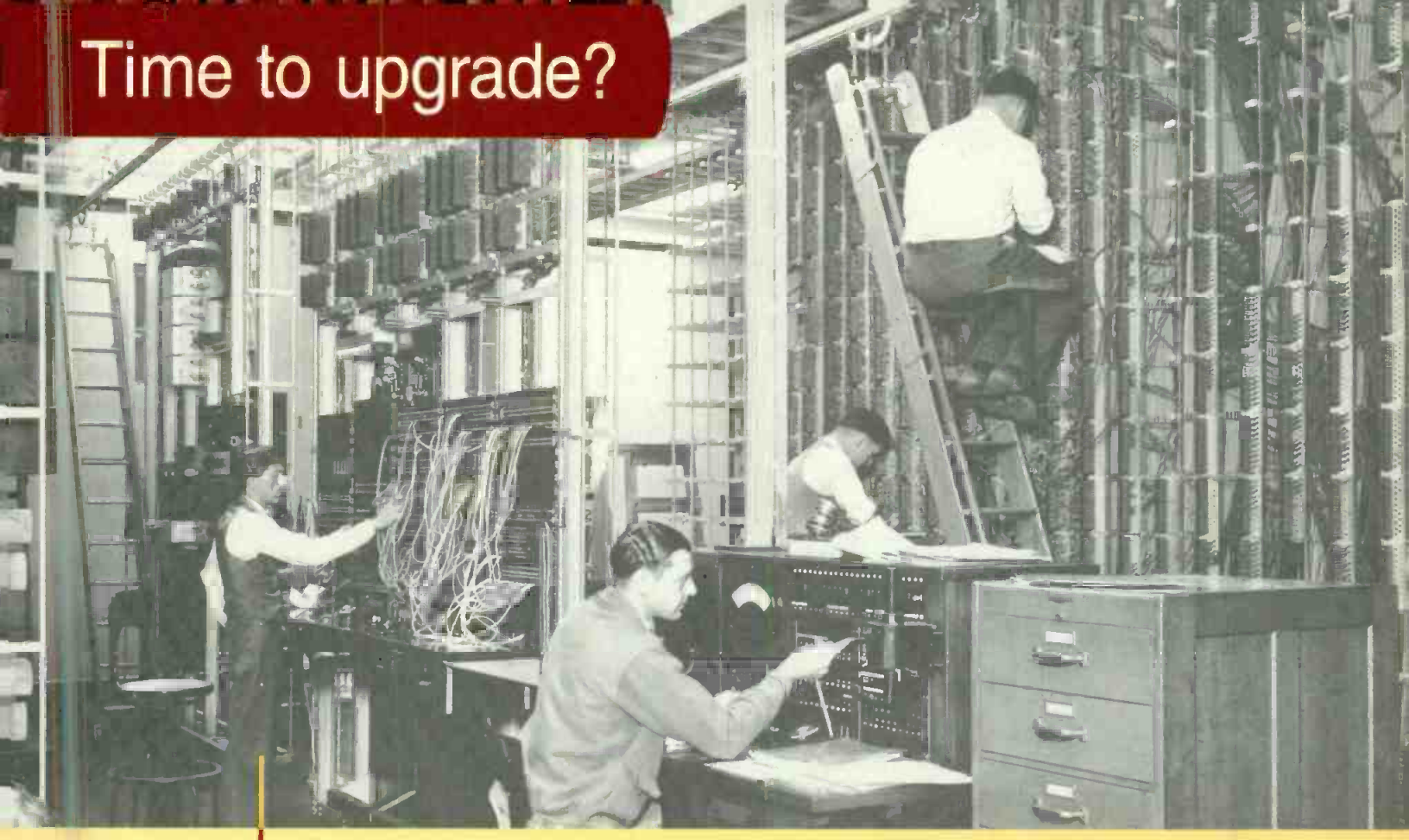
Time to upgrade?



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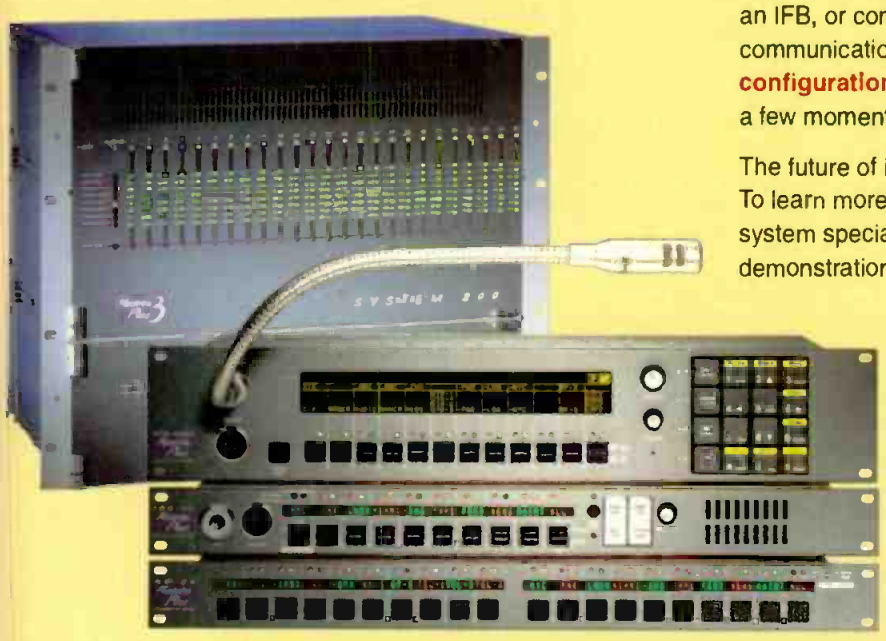

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Collaboration and coordination are the keys

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 DVEous, a transform-optioned 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, Digicart, CD 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-55 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 Quantel 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, multilook 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 datacom 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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34th International Broadcast Equipment Exhibition

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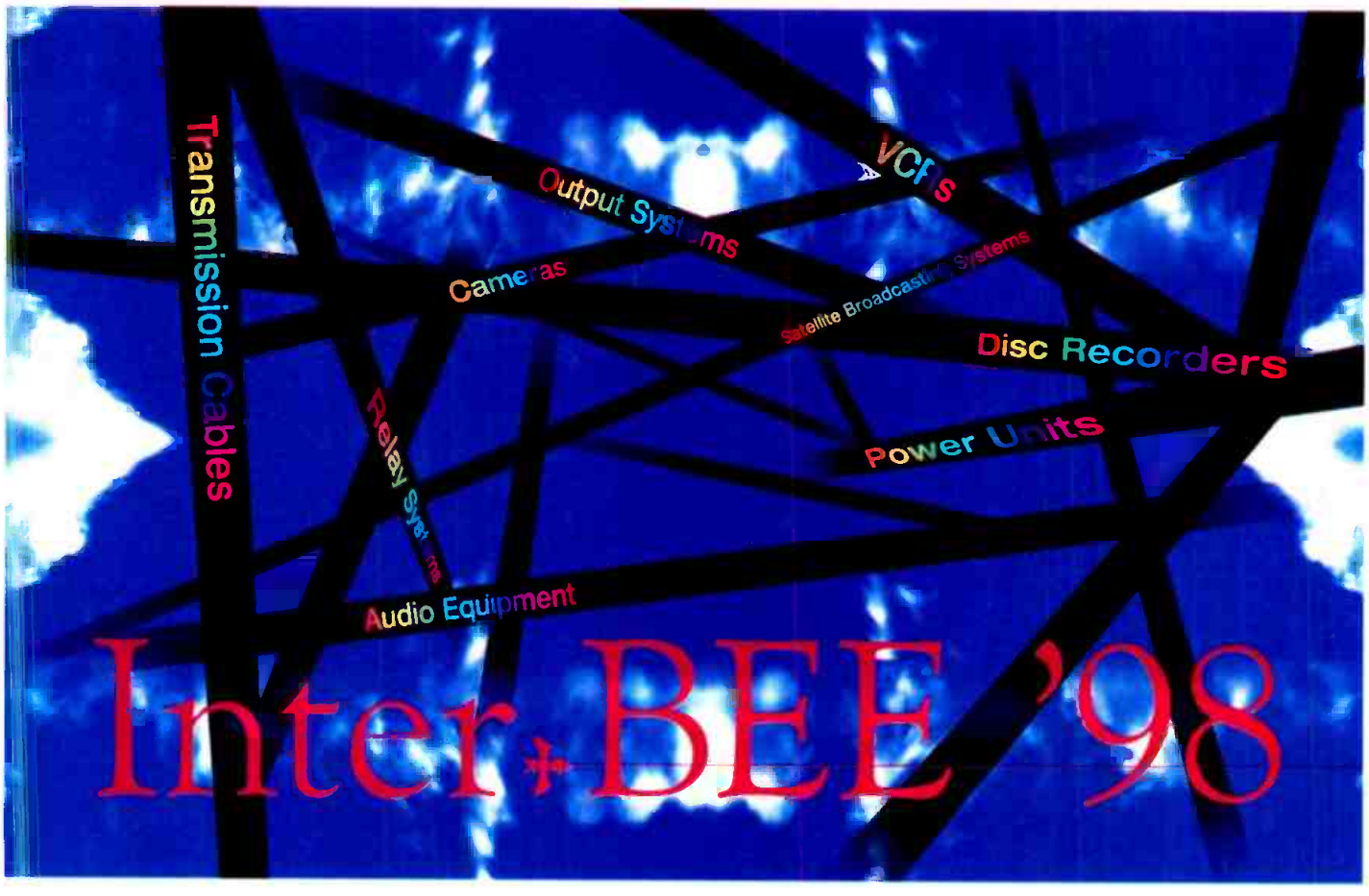

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Taking advantage of the building's fiber backbone and the use of the portable conversion gear was a tremendous boon to the production possibilities. After studying the versatility and cost-effectiveness of a fiber-based system, it became the obvious 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 syncs 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 production style. A reconfigurable RTS ADAM intercom matrix system allows coordination, as well as IFB communications via connector panel, RF, fiber and telephone lines for extremely flexible setup and additions.

This facility is truly 'connected.' In addition to New York City event coverage, MTV often integrates remote feeds and point-of-view shots into its many promos and program shorts. Through ST-connected, multimode fiber patching and the fiber LAN backbone of the 1515 Broadway building, there are a multitude of production environments that have yet to be used.

The integration of a web browser position at the producer's console, the 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 contributes to the creative as well as to the newsworthy aspects of MTV productions by allowing the latest developments in virtual imag-

VJ Serena Altshul and artist Fiona Apple in the MTV studio overlooking Times Square.

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DO YOUR SIGNALS PASS THE CLEANNESS TEST?

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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.

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GUIDE TO DIGITAL

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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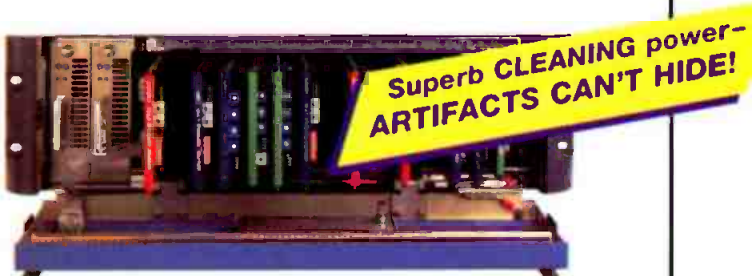

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ing to become a part of current productions. Web surfing, Internet chat room interviews and on-line call-in shows result in programming densely packed with entertainment, information and commercial bytes that maximizes the communication time and bandwidth.

An RF jungle

Even after MTV's production needs were on the table and the design plans established, the logistics of integrating one of the first broadcast facilities into an area traditionally inhabited solely by Broadway theater productions proved challenging. The 44th/45th street block between Times Square and 8th Avenue has one of the most densely occupied RF frequency bands in New York City. It is estimated that more than 240 VHF and UHF frequencies are in use every night on this block, in addition to the heavy activity seen on Wednesday afternoons, which is "Matinee Day" in the Theater District.

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.

Aumentation 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

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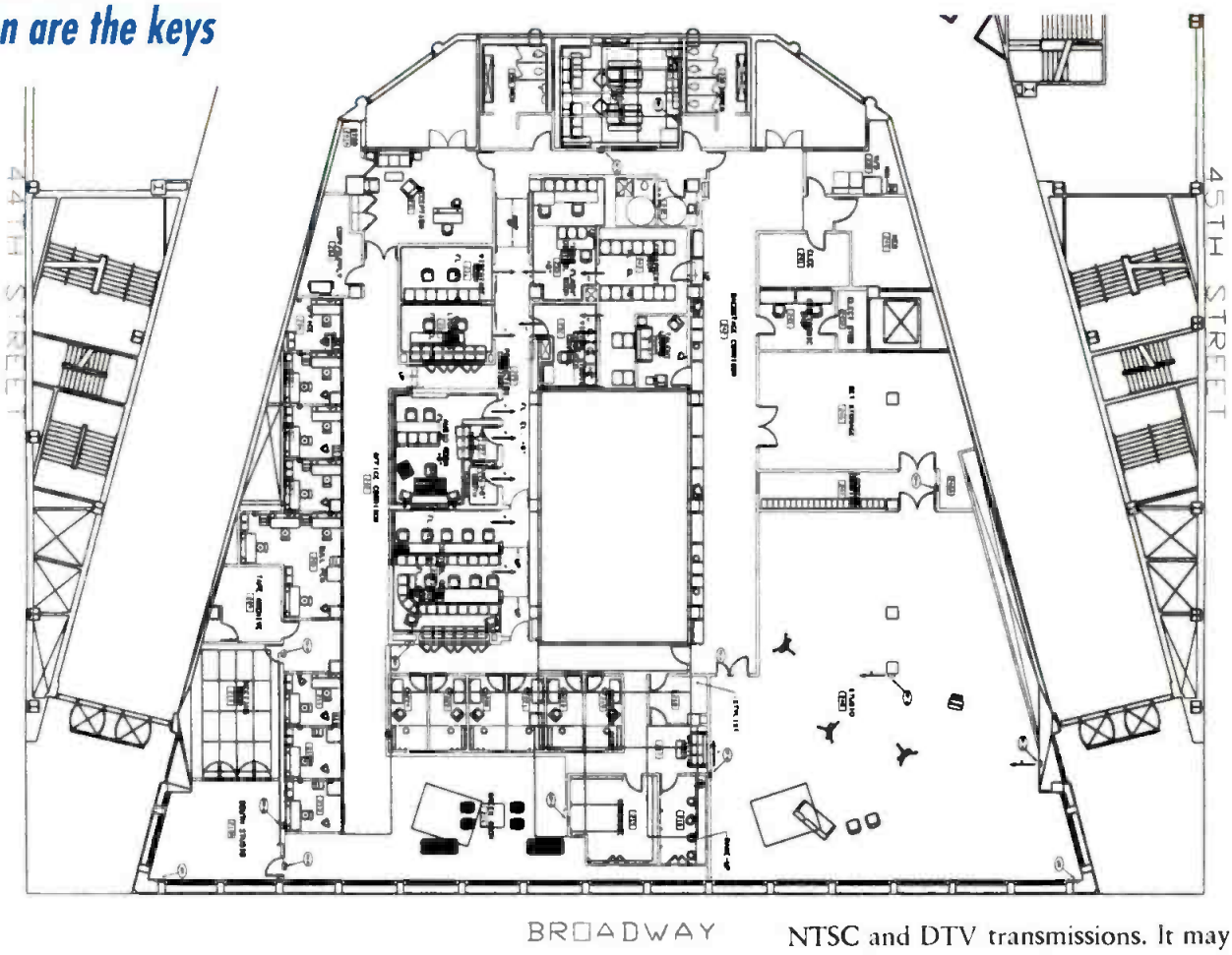
Collaboration and coordination are the keys



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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THE BIG PICTURE

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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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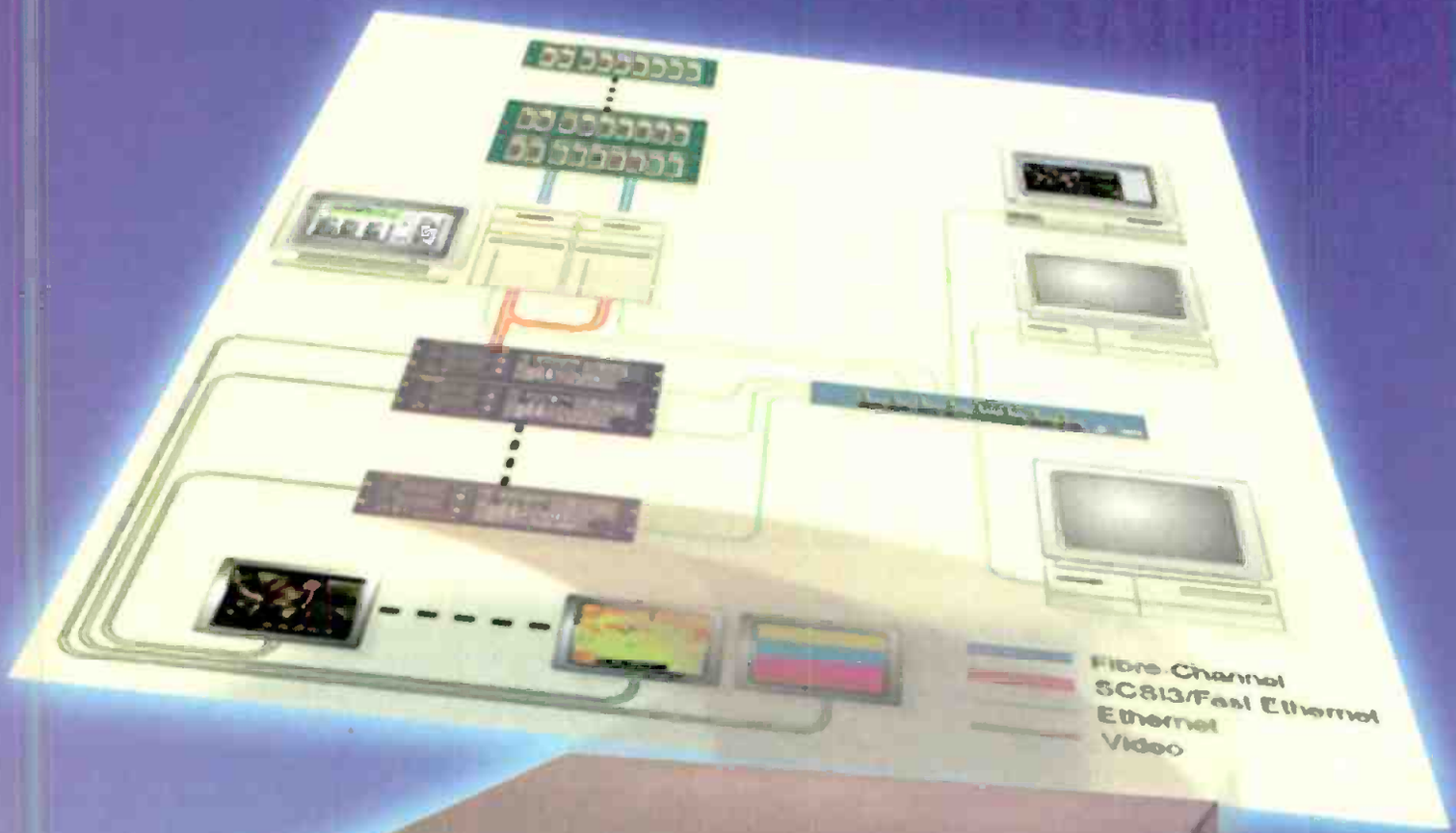

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VIDEO STORAGE and EDITING

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.

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Fibre Channel and storage area networks

As facilities transition to networked storage, the network must be robust and capable of supporting the necessary traffic.

By Brian Cashman

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Over the last several years, broadcast and post facilities have begun to enjoy the benefits 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 whole-heartedly 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.

Encoded Bit Rate	Max. Data Rate MB/s,1 Fiber
1062.5	100
531.25	50
265.625	25
131.8125	12.5

Table 1. Operating rates for Fibre Channel.

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 detraction 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

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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 ($70K) 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.

Product	Platform	Price	Capabilities	Contact
Quantel Henry V-Infinity	Proprietary	$1 million turnkey	Real time, unlimited independently editable superlayers of uncompressed video; used for most big-budget TV commercials - this is as good as it gets - everything happens instantly	Quantel Inc. 28 Thorndal Circle Darien, CT 06820 (203)656-3100 www.quantel.com
Discreet Logic SMOKE	SGI Octane	$295,500 turnkey	Uncompressed editing with instant response on two layers, add up to two more real-time layers as needed - it's a complete on-line editing system	Discreet Logic 10 rue Duke Montreal, Quebec, Canada H3C 2L7 (514)393-1616 www.discreet.com
Softimage Digital Studio	NT	$100K turnkey	Teamed with an Intergraph dual-Pentium II workstation, DS' unique interface brings the tools to the (uncompressed) video rather than the other way around; subsidiary of Microsoft, so they get the inside scoop on new NT widgets first	Softimage 3510 St-Laurent Boulevard, Suite 400 Montréal, Quebec H2X 2V2 Canada (514)840-0477 www.softimage.com
Avid Media Composer 8000	Mac	$100K turnkey	Standard of the non-linear editing industry with its classic three-point editing, now with more compositing features included in new version 7 software	Avid Technology, Inc. Metropolitan Technology Park 1 Park West Tewksbury, MA 01876 1-800-949-AVID www.avid.com
Scitex Digital Video StrataSphere	Mac	$70K turnkey	Clean video, features ability to composite 50 layers in one pass, but more than two layers still must be rendered	Scitex Digital Video 101 Galveston Drive Redwood City, CA 94063 USA (415)369-5111 www.abekas.com
Media 100xr with HDRfx	Mac	$20K, boards and software	Timeline interface, real-time effects and extremely high data rates make this unit produce video quality that many think represents the best value in the business; NT version in the works	Media 100 USA 290 Donald Lynch Blvd. Marlboro, MA 01752 (508)460-1600 www.media100.com
AVID Xpress 2.0	Mac	$10K boards/software	Although the name is changed from MCXpress, this system still has a unique way of editing layers so they're non-destructive. NT version is forthcoming	Avid Technology, Inc. Metropolitan Technology Park 1 Park West Tewksbury, MA 01876 1-800-949-AVID www.avid.com

Table 1. A representative listing of non-linear editing hardware and software. This is by no means all the systems available, but it'll give you a good idea of prices and feature sets.

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

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A Quantel Edit Box suite at Video Park, Baton Rouge, LA.

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 rock 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 compositors 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. ■

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

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.

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Cable guidelines for DIGITAL STUDIOS

Proper cable specification and selection for each application is the key to optimum performance and reliability.

By Stephen H. Lampen

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 3.072Mb/s and impedance of 110Ω ±20% for twisted-pair constructions and 75Ω for coax designs.

Photo: MSNBC — a joint venture of NBC News and Microsoft Corporation — is an around-the-clock cable news network and Internet service. The cabling installation at its broadcasting and production facility in Secaucus, NJ, required more than two million feet of digital and analog precision video coax. Some digital cable runs approach 650 feet in length.

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

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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 festering. 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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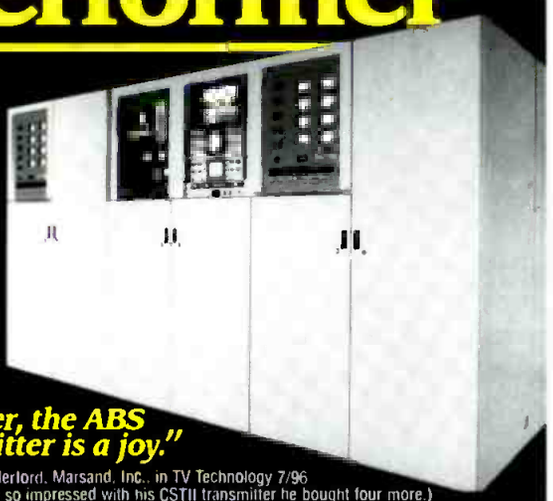

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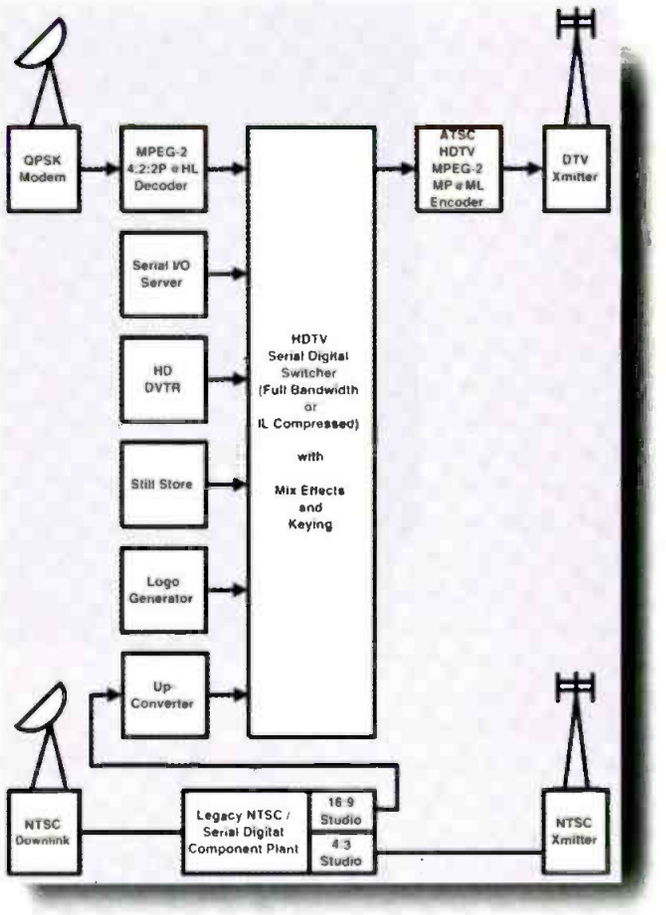
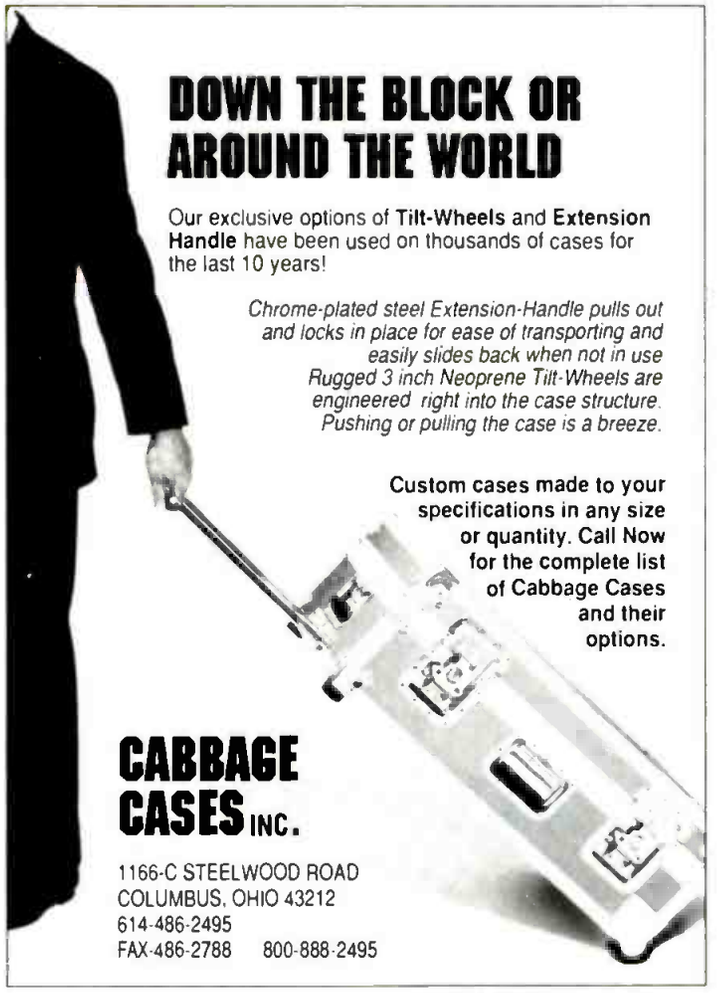


Figure 3. Level 3. Full manipulation in baseband with ATSC encoding for transmission.



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transmission. Transmission will be in the form of an ATSC MPEG-2 MP@ML transport stream at a bit rate of the broadcaster's choosing.

Stations implementing Level 3 can do full local insertion with unconstrained switch point selection, unrestricted local insertion and full-bandwidth audio processing. With the addition of an appropriate DVE they can squeeze and tease,

The technology that will likely make the greatest impact on station profitability will be the video server system.

combining local and network into the broadcast stream. The addition of an upconverter allows insertion of live local programming and news originating from the station's NTSC or PAL studio. And if the station upgrades part of its legacy serial facility to 16:9, then locally originated programming will have a clean, full-screen signal that matches the network.

Level 3 gives the broadcaster maximum quality combined with a flexibility that matches today's NTSC operations. It is by far the most expensive approach, largely

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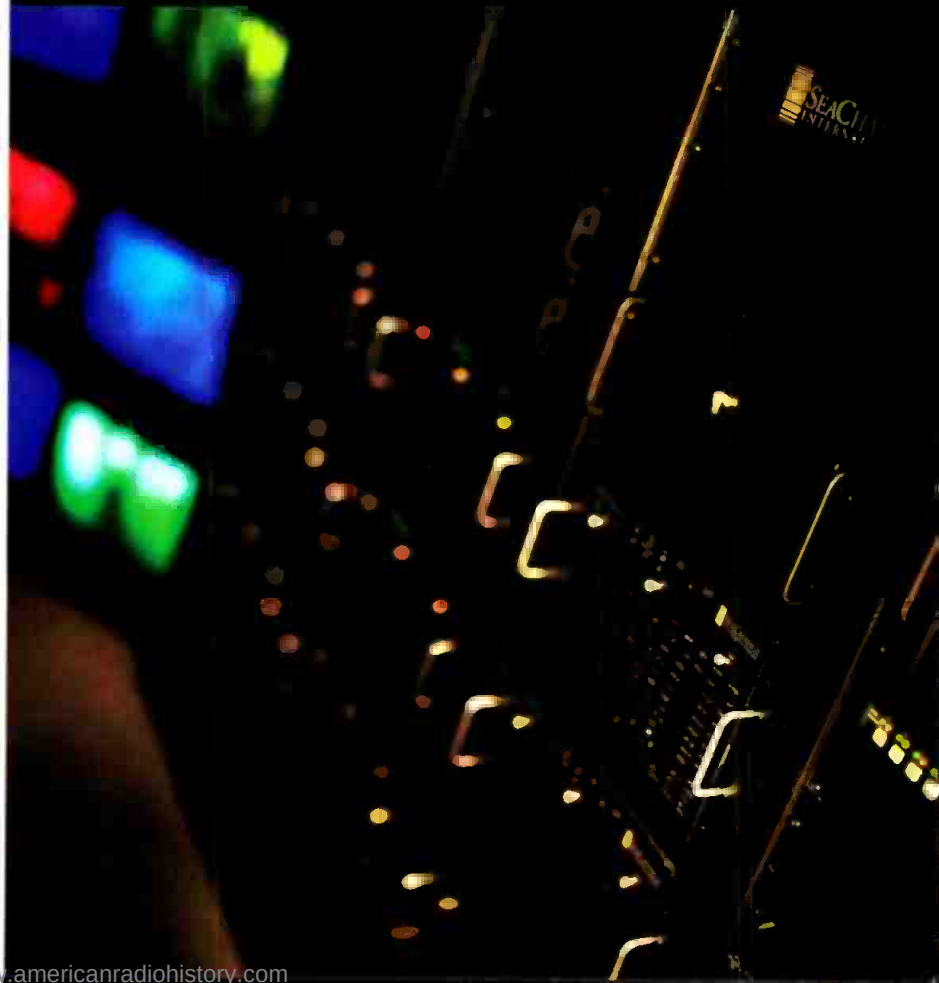

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because of the ATSC encoder, and it will bring little short-term payback. It will become cost-justified for most broadcasters through the use of IL compression over existing serial routing feeding IL ports in full-bandwidth HD devices, along with the 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-

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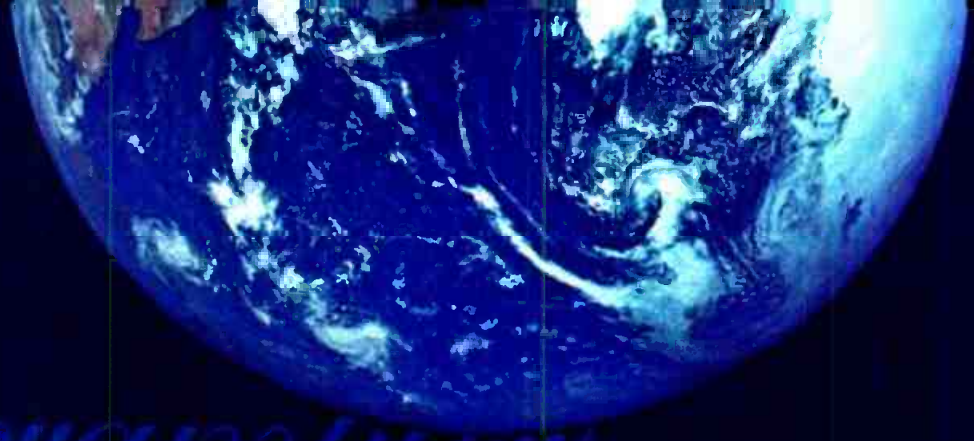

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ments together using ASC's FibreStream direct access architecture featuring ASC's FibreSwitch will produce an integrated system that can handle DTV's data rates with ease, while delivering unmatched efficiency and profitability.

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, multibox 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? ■

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Field Report

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.

Performance at a glance

- Flexibility in design
- Client can participate in studio design process
- 4-inch soundproof walls rather than eight- to 12-inch walls
- Assembly of studio only 2-day process
- Easily expanded to grow with company
- Studio moves with you to new location

Going modular

The investigations turned up few attractive alternatives to conventional construction save one: modular prefabricated 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

Audio Difference's sound studio exterior before relocation to a new building.

The sound studio exterior after the move. Acoustic Systems' steel panels are designed to fit together easily but in an infinite range of styles and sizes that affect everything from appearance to STC rating.

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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.

The interior of the sound studio before the company's relocation.

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 room was completely spaced. We wanted to have a major hand in the design of the room, and so we faxed ideas back and forth with the engineers until we had a plan of what we 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 two-day 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 complete with lathes and radial saws.

The interior of the sound studio after the move. Acoustic Systems provided the quality isolation needed to continue growing and the ability to move and grow with the company.

Due to the high performance of our studio and the money we were able to save in its construction, we had a successful first year. We produced a

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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 acoustical 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.

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MPEG encoders

BY THE *BE* STAFF

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. ■

Mfgr	Model	Primary Application	Data rates supported	MPEG standards supported	Levels supported	Output signal format	MPEG encoding time	Require matching decoder?	Meet ISOG compatibility standards?	Design
Vela Research RS# 350	Broadcast Argus	Advertising content distribution/ video storage & retrieval	800Kb/s-50Mb/s	MPEG-1, MPEG-2 FOE, MPEG-2 AFF, MPEG-2 4:2:2	MP@ ML, 4:2:2 P@ ML	N/A	Realtime	No	N/A	Standalone
Scientific-Atlanta RS# 351	Power Vu HD Encoding system	High definition encoding for satellite or broadcast transmission	up to 100Mb/s including 19Mb/s for broadcast	MPEG-2/ ISO 13818, ATSC A/56, DVB	MP@HL, 4:2:2 P@ML	ATSC, QPSK, DS-3, 8PSK, OC-3	Realtime	No	Yes	Standalone
Innovacom RS# 352	TransPEG Video Digital Recorder	Play/record with MPEG-2 video compression with MPEG editing & splicing	1-15Mb/s	MPEG-2	MP and ML	Video (component, composite, Y/C, SDI)	Realtime	Included	Yes	Standalone
BARCO RS# 353	RE 4220	Program contribution; backhaul; primary distribution	1-50Mb/s	4:2:2	MP@ML; MP@HL	DS-3; E3; ASI; SPI; ATM	Realtime	No	Yes	Standalone
LEL Computer Systems RS# 354	The Video Pipeline	Video transmission	768Kb/s-6Mb/s	MPEG-1, MPEG-2	MPEG-1 ISO 1172; MPEG-2 ISO 13818	T1/E1;	Realtime	Yes	No	Standalone
Leitch RS# 355	MCE-3600	Contribution quality program delivery	2-50Mb/s	13818-1, 13818-2, 13818-3	PP@ML (4:2:2); MP@ML (4:2:0)	DS3, E3, ATM/DS3, ASI, ATSC	Realtime	No	N/A	Standalone

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Mfgr	Model	Primary Application	Data rates supported	MPEG standards supported	Profiles/ Levels supported	Output signal format	MPEG encoding time	Require matching decoder?	Meet ISOG compat-ibility standards?	Design
Mitsubishi Electric America RS# 356	MH1100E	ATSC encoding of HD signals	up to 100Mb/s	MPEG-2	MP@HL	Transmis-sion Stream - DVB-ASI; DVB-SPI; SMPTE310M; DS-3 (option); OC-3 (option)	Realtime	No	N/A	Standalone
Mitsubishi Electric America RS# 357	BC-1100E	ATSC encoding of standard-definition TV signals	3-15Mb/s	MPEG-2	MP@ML	Transmis-sion Stream-DVB-SPI; DVB-ASI (option)	Realtime	No	N/A	Standalone
LNR Commun-ications RS# 358	Digital Video Exciter	DSNG, HUB uplinks, Video distribution	1-15Mb/s	MPEG-2	MP@ML	QPSK@L C, or Ku-Band	400-700ms	No	Yes	Standalone
Harris RS# 359	FlexiCoder	ATSC Broadcast Transmis-sion, Program and network contribution encoding	1.4-40Mb/s per program up to 140Mb/s total output	MPEG-2	Standard definition MP@ML and PP; High definition MP@HL	ATSC (SMPTE 310), DS-3/E3, OC-3 Fiber and DVB ASI	Realtime	Fully ATSC compliant and compatible with ATSC decoders and receivers	Yes	Plug-in modules that fit into 21-slot equipment enclosure
NDS Americas RS# 360	Series 5000	Contri-bution, broadcast quality distribution	Variable	MPEG-2, ATSC, DVB	All ATSC Table 3 formats	ATSC, QPSK, QUAM, 8VSB, 8PSK, ATM	Realtime	No	Yes	Standalone
Heuris-Pulitzer RS# 361	MPEG Power Professional - DVD	Works directly with nonlinear editing systems to convert digital files into MPEG-1 or MPEG-2 for standalone or DVD applications	CBR and VBR adjustable up to 15Mb/s	MPEG-1, MPEG-2	MP, ML	Creates a file compatible with most computer authoring systems including major DVD authoring systems	Nonrealtime	No	N/A	N/A
Thomson Broadcast RS# 362	DBE 4100	DSNG and contribution	1.5 - 50Mb/s	MPEG-2/ OVB MPEG-1 Layer II, Musicam for audio compression	4:2:2 P@ML and MP@HL	3 DVB-ASI outputs/ATM interface in contribution configuration	Realtime	No	NA	Standalone plug-in
Tiernan RS# 363	THE-1, THE-10	Over-the-air broadcast, network contribution, distribution	up to 70Mb/s	MPEG-2, ATSC	MP@HL, 4:2:2P@ML, MP@ML	SMPTE 310M, DVB-ASI	Realtime	THE-1, THE-10 are ATSC compliant	Yes	Standalone

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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

Circle (255) on Free Info Card

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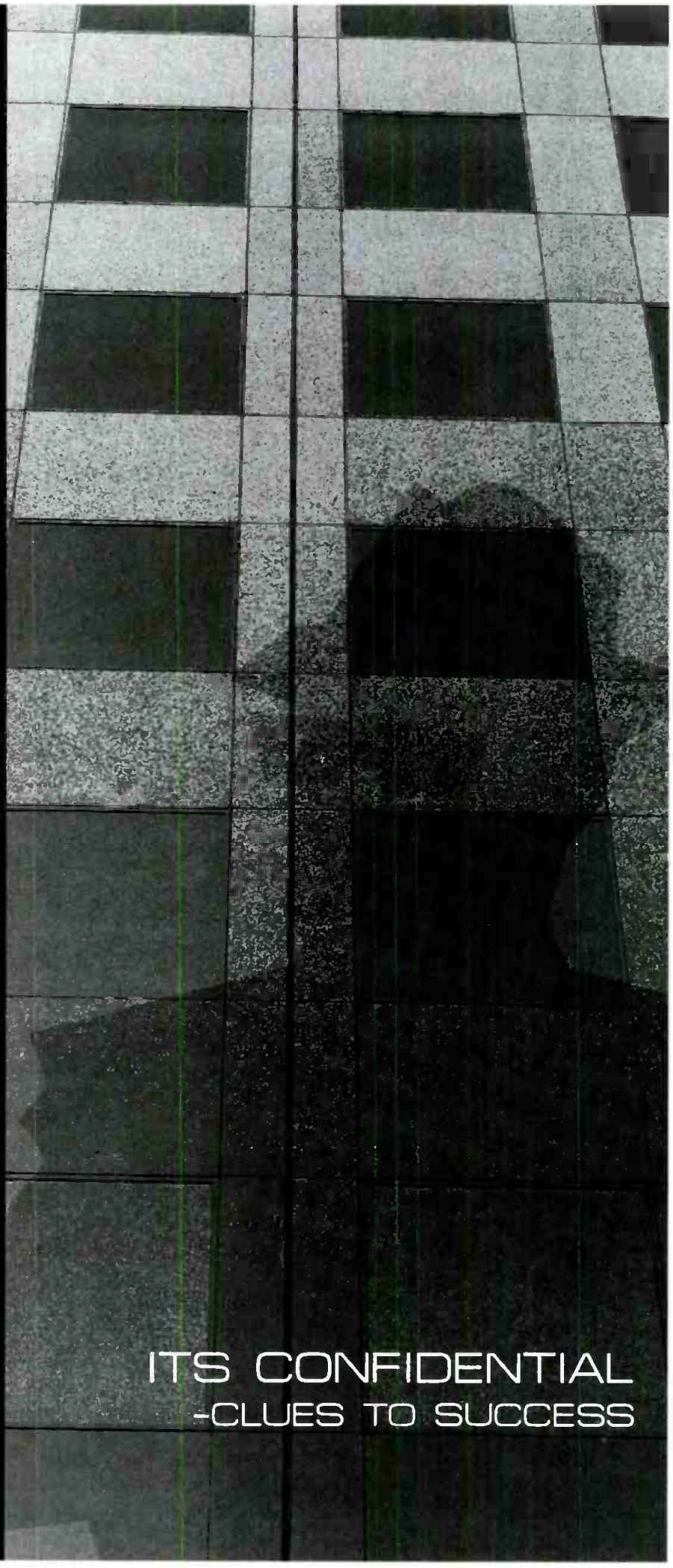

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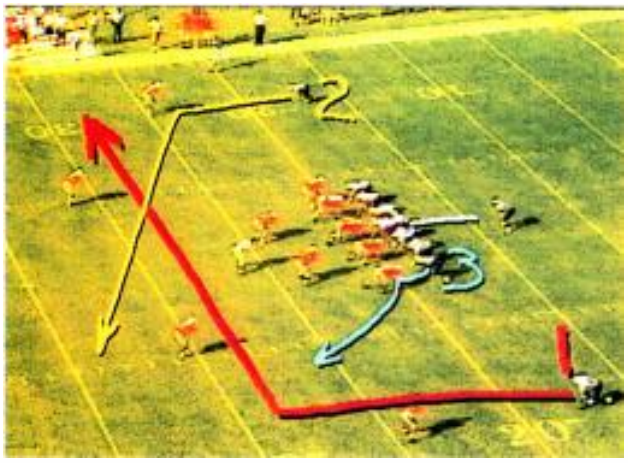

Broadcast video marker

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

Circle (279) on Free Info Card

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 Iomega Jaz drive and enhanced control from edit controllers; 410-783-0600; fax 410-783-0606

Circle (278) on Free Info Card

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

Circle (275) on Free Info Card

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

Circle (305) on Free Info Card

Electronic newsroom production system with Windows/Mac/Unix compatibility

NewsMaker Systems NEN²: 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

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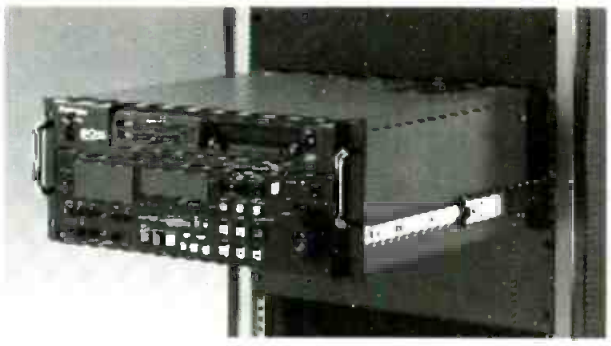

Rack slide kit

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

Circle (274) on Free Info Card

Charactergenerators

Pinnacle Systems enhanced DEKO family: new options are now available for the Deko character generaters 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

Circle (280) on Free Info Card

Windows prompter

Listec Video A-6WIN: these 11-inch, 12-inch and 14-inch dislays 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; 561-683-3002; fax 561-683-7336

Circle (282) on Free Info Card

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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GBR/component hum eliminator

Allen Avionics HEC-4000: this GBR/component hum eliminator features 60dB for 50Hz or 60Hz hum, when used in GBR or YUV systems; the die-cast metal unit has four 6-32 x 1/2-inch inserts, measures 7-7/16"x4-3/4"x3-1/16" and weighs six pounds; 516-248-8080; fax 516-747-6724

Circle (283) on Free Info Card

Converters

NVision DA4030 & DA4040: the DA4030 is a dual AES A-to-D converter with two individual stereo analog inputs and two AES outputs per stereo pair; the DA4040 is a dual AES D-to-A converter with two individual digital AES inputs and two stereo analog outputs; both units feature superior performance and 24-bit converters with sample rates from 28 to 96kHz; 916-265-1000; fax 916-265-1021; www.nvision1.com

Circle (284) on Free Info Card

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 S35 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

Circle (301) on Free Info Card

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

Circle (289) on Free Info Card

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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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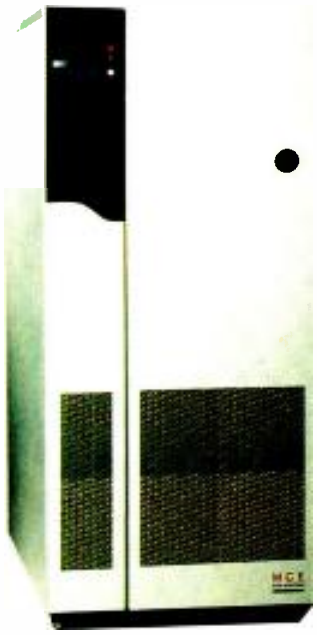

Scheduling system

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;

Circle (285) on Free Info Card

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

Circle (307) on Free Info Card

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

Circle (302) on Free Info Card

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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PRODUCTS NOW SHIPPING

Digital broadcast maximizer

TC Electronic 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@tcelectronic.com; www.tcelectronic.com

Circle (400) on Free Info Card

HDTV product

VAS Group HD10sg: 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-10sg 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

Circle (401) on Free Info Card

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

Circle (306) on Free Info Card

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

Circle (408) on Free Info Card

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 TWT 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

Circle (303) on Free Info Card

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

Circle (308) on Free Info Card

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

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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 630-208-2550; info@rell.com; www.rell.com

Circle (304) on Free Info Card

MPEG encoder

Snell & Wilcox MPE1000: a discrete hardware-based high-quality MPEG encoder that uses Phase Correlation Motion Estimation (Ph.C) technology to deliver the extremely accurate vector information resulting in a high-quality output — ordinarily about 20% better than existing MPEG encoders at given bit rates; due to the high quality and uniformity of the Ph.C motion vectors, the MPE1000 will not exhibit MPEG blocking artifacts when the signal degrades; +44 181 607 9455; fax +44 181 607 9466; www.snellwilcox.com; info@snellwilcox.com

Circle (312) on Free Info Card

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

Circle (309) on Free Info Card

Plug-ins for Adobe After Effects

Artel Boris AE 1.0: the newest addition to a collection of plug-ins for users of Adobe After Effects; Boris AE contains more than 30 comprehensive filters and picks up where the After Effects Production Bundle leaves off in the area of DVE-style picture-in-picture, cubes, page turns, partially wrapped spheres and cylinders, as well as photographic color effects that simulate color correction filters on a camera or an enlarger; 617-451-9900; www.BorisFX.com; www.artelsoft.com

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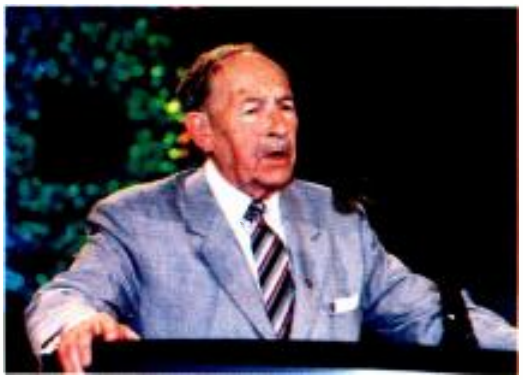
Business

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 International Corporation selected Tiernan's TE6 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** broadcasted the Texas Rangers opening day baseball game vs. the Chicago White Sox live in HDTV from Arlington. The broadcast featured pregame 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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PVW2600 (DBR27A)	$ 399	ECM55B	$ 245
PVW2650 (DBR33AR)	$1799	ECM66B	$ 275
PVW2800 (DBR25R)	$ 600	ECM77B	$ 275

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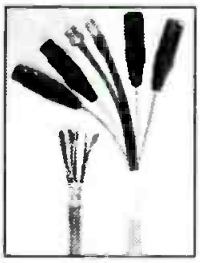

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cooperative agreement to provide DTV and HDTV compression encoders to U.S. broadcasters, beginning with the Thomson model HDE 5100. The model HDE 5100 encoder is built around a compression chipset that handles all of the ATSC transmission formats specified 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

Joe Claudelli

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

Tom McCarthy

John Selvaggio

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 WINR in Binghamton, 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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SONY

DSR-200A
3-CCD Digital (DVCAM) Camcorder

Combining a compact and lightweight body with the superior picture quality of DSP (Digital Signal Processing) and the DVCAM format, the DSR-200A is the ideal acquisition tool for video journalists, event and wedding videographers, stringers and production houses. 500 lines of horizontal resolution, 48kHz or 32kHz digital audio, three hour record time, and minimum illumination of 3 lux is only the beginning. Other features include 16:9/4:3 capability, Steady Shot, high resolution 1-inch viewfinder, time code operation, time/date superimposition and an IEEE-1394 interface for direct digital output. Offers full automatic as well as manual control of focus, iris, gain, white balance and shutter speed.

- Variable servo 10X optical power zoom lens goes from 5.9 to 59mm in 1.7 to 24 seconds. The manual zoom rocker is continuously variable right up to where the digital 20X zoom kicks in.
- Sony's Super Steady Shot reduces high frequency camera shake without compromising image quality. SteadyShot uses horizontal and vertical motion sensors that allow it to work accurately while zooming, moving (even shooting from a car), and shooting in low light conditions.
- Has digital effects including audio and video fade, overlap and Slow Shutter.
- Automatic and manual focus, iris, shutter, gain and white balance. Iris is adjustable in 12 levels from F1.6 to F11, shutter from 1/4 to 1/10,000 of a second in 12 steps. Gain from -3dB to +18dB in 8 steps.
- Zebra pattern indicator, built-in ND filter.
- Custom Preset function lets you preset, store and recall custom settings for color intensity, white balance (bluish or reddish), sharpness and brightness.
- Stores Photo, Date/Time, Shutter Speed, Iris, Gain and F-stop for easy recall. So if you have to re-shoot, you know your original settings for every scene and frame.
- Records Drop/Non-Drop Frame time code. Time code can be read either as RC time code or as SMPTE time code.
- Has a large 1-inch B&W viewfinder with 550 lines of resolution for easy focusing even in low contrast lighting situations. Separate information sub panel displays time code, battery time, tape remaining and other camcorder functions without cluttering up the viewfinder.
- Records 16-bit/48kHz audio on one stereo track or 12-bit/32kHz with two pairs of stereo tracks (L1/R 1, L2/R2), so you can add stereo music or narration.
- One-point stereo electret condenser mic for clear stereo separation. Directivity can be selected from 0°, 90° & 120°.
- Automatic & manual (20-step) audio level record controls. Monitor audio with headphones or from the LCD panel which has an active VU meter.
- XLR input connectors for mics and audio equipment.

DSR-200A Field Package:
- DSR-200A Camcorder • NPA-1000/B Battery Case Adapter
- 3 NP-F930/B 7.2v 4000 mAH Batteries
- AC-V900/B AC Adapter, Triple Battery Charger
- VCT-U14 Tripod Adapter • LC-2000CP System Case

DSR-30 DVCAM Digital VCR

The DSR-30 is an industrial grade DVCAM VCR that can be used for recording, playback and editing. DV standard 4:1:1 sampling digital component recording with a 5:1 compression ratio provides spectacular picture quality and multi-generation performance. It has a Control L interface for editing with other Control L based recorders such as the DSR-200A DVCAM Camcorder or another DSR-30. It also has a continuous auto repeat playback function making it ideal for kiosks and other point of information displays. Other features include high quality digital audio, IEEE-1394 Digital interface and external timer recording. The DSR-30 can accept both Mini and Standard DVCAM cassettes for up to 184 minutes of recording time, and can playback consumer DV tapes as well.

- Records PCM digital audio at either 48kHz (16-bit 2 channel) or 32kHz (12-bit 4 channel).
- Equipped with Control L, the DSR-30 is capable of SMPTE Time Code based accurate editing even without an edit controller. Built in editing functions include assemble and separate video and audio insert.
- By searching for either an Index point or Photo Data recorded by the DSR-200A camcorder, the DSR-30 drastically cuts the time usually required for editing. The DSR-30 can record up to 135 Index points on the Cassette Memory thanks to its 16K bits capability.
- Audio lock ensures audio is fully synchronized with the video for absolute precision when doing an insert edit.
- Built-in control tray has a jog/shuttle dial, VCR and edit function buttons. The jog/shuttle dial allows picture search at ±1/5 to 15X normal speed and controls not only the DSR-30 but also a player hooked up through its LANC interface.
- DV In/Out (IEEE 1394) for digital dubbing of video, audio and data ID with no loss in quality.
- Analog audio and video input/outputs make it fully compatible with non-digital equipment. Playback compatibility with consumer DV tapes allows you to work with footage recorded on consumer-grade equipment. Tapes recorded in the DSR-30 are also compatible with Sony's high-end DVCAM VCR's.

PVM-14N1U/14N2U & 20N1U/20N2U
13-inch and 19-inch Presentation Monitors

With high quality performance and flexibility, Sony's presentation monitors are ideal for any environment. They use Sony's legendary Trinitron CRT and Beam Current Feedback Circuit for high resolution of 500 lines as well as stable color reproduction. They also accept wide/wide video signals, have a built-in speaker and are rack mountable. The PVM-14N1U/20N1U are designed for simple picture viewing, the PVM-14N2U and 20N2U add RGB input and switchable aspect ratio.

They Feature:
- 500 lines of horizontal resolution
- They handle NTSC, NTSC 4.43, PAL, and SECAM.
- Picture (chrome, phase, contrast, brightness) and setup adjustments (volume, aspect ratio) are displayed as easy-to-read on screen menus.
- Closed captioning is available with the optional BKM-104 Caption Vision Board.

PVM-14N2U/20N2U Only:
- (Last Input Switch) - Contact closure remote control allows you to wire a remote to an existing system so that the monitor's input can be remotely controlled to switch between the last previously selected input and the current input.
- 4:3/ 16:9 switchable aspect ratio

PVM-14M2U/14M4U & 20M2U/20M4U
13-inch and 19-inch Production Monitors

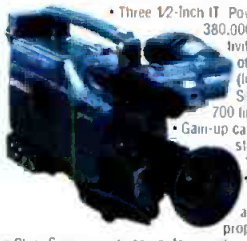
Sony's best production monitors ever, the PVM-M Series provide stunning picture quality, ease of use and a range of optional functions. They are identical except that the "M4" models incorporate Sony's state-of-the-art HR Trinitron CRT display technology and have SMPTE C phosphours instead of P22.

- HR Trinitron CRT enables the PVM-14M4U and 20M4U to display an incredible 800 lines of horizontal resolution. The PVM-14M2U and 20M2U offer 600 lines of resolution. M4 models also use SMPTE C phosphours for the most critical evaluation of any color subject.
- Dark tint for a higher contrast ratio (black to white) and crisper, sharper looking edges.
- Each has five composite, S-Video and component input (R-Y/B-Y, analog RGB). For more accurate color reproduction, the component level can be adjusted according to the input system. Optional BKM-101C (video) and BKM-102 (audio) for SMPTE 259M serial digital input.
- Beam Current Feadback Circuit
- 4:3/16:9 switchable aspect ratio.
- True multi-system monitors they handle four color system signals: NTSC, NTSC 4.43, PAL, and SECAM.
- External sync input and outputcan be set so that it will automatically switch according to the input selected.
- Switchable color temp: 6500K (broadcast), 9300K (pleasing picture), User preset.(3200K to 10000K).
- Blue gun, underscan and H/V delay capability
- On-screen menus for monitor adjustment/operation.
- Parallel remote control and Tally via 20-pin connector.

SONY

UVW-100B

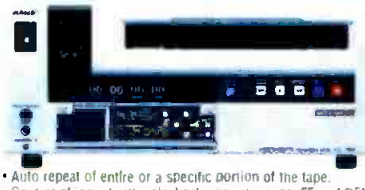
More affordable than ever, the UVW-100B offers 700 lines of horizontal resolution, 60dB S/N ratio, 26-pin VTR interface, compact design and ease of operation– making it ideal for field shooting applications.



- Three 1/2-inch IT Power HAD CCDs with 380,000 pixels attain sensitivity of F11 at 2000 lux (low light is 4 lux), S/N ratio of 60dB and 700 lines of resolution.
- Gain-up can be preset in 1dB steps from 1dB to 18dB.
- Auto Iris detects the lighting conditions and adjusts for the proper exposure.
- Clear Scan records computer monitors without horizontal bands across the screen. Shutter speed can be set from 60.4 to 200.3 Hz in 183 steps. Also has a variable high speed shutter from 1/100 to 1/2000 of a second.
- SMPTE LTC time code and UB generator/reader. Rec Run/Free Run, Preset/Regen are easily set. For multi-camera operation, genlock to an external time code is provided.
- Genlock input and built-in color bar generator.
- 26-pin VTR interface for feeding component, composite and S-Video signals to another VTR for simultaneous recording. Start/stop are controlled and external VTR status such as Rec and Tally are shown in the viewfinder.
- Diecast aluminum, 1.5-inch DXF-601 viewfinder is rugged yet comfortable while providing 600 lines of resolution.
- Large diameter eye cup reduces eye strain and simplifies focusing. Diopter adjustments (-3 to 0) compensates for differences in eye sight.
- Zebra level indicators, safety zone and center marker generator. Shows tape remaining and audio levels.
- 8-digit LCD display indicates time data, warning indications and video status. Battery status audio level are also shown in a bar graph meter.
- With Anton/Bauer Digital Batteries remaining battery power is displayed on the LCD panel and through the viewfinder.
- Weighs 15lb. with viewfinder, battery, tape and lens. Shoulder pad is adjustable, so you maintain optimum balance when using different lenses and batteries.

UVW-1200/UVW-1400A
Betacam SP Player • Player/Recorder

The UVW-1200 and UVW-1400A are non-editing VCRs which deliver Betacam SP quality and offer features for a wide range of playback and recording applications. RGB and RS-232 interface make them especially ideal for large screen, high quality video presentation, scientific research and digital video environments.



- Ideally suited for work in computer environments, because RGB signals can be converted into component signals and vice versa with minimum picture degradation.
- 25-pin serial interface allows external computer control of all VCR functions based on time code information. Baud rate can be selected from between 1200 to 38,400 bps.
- Built-in Time Base Stabilizer (TBS) locks sync and subcarrier to an external reference signal as well as providing stable pictures. High quality digital dropout compensator further ensures consistent picture performance.
- Equipped with two longitudinal audio channels.
- Both read LTC Time Code) and UB (User Bits). The UVW-1400A also generates LTC and UB (Free-Run/Rec-Run).
- Built-in character generator can display VTR status, time code, self-diagnostic messages, set-up menu, etc.
- Auto repeat of entire or a specific portion of the tape.
- Control of jog, shuttle, playback, record, pause, FF and REW with the optional SVRM-100A Remote Control Unit.
- Composite and S-Video as well as component via BNCs which are switchable to RGB output. The UVW-1400A has two switchable sync connectors and a Sync on Green.
- Built-in diagnostic function and hour meter.
- Initial set-up menu for presetting operational parameters. Settings are retained even after power is turned off.

UVW-1600/UVW-1800
Betacam SP Editing Player • Betacam SP Editing Recorder

The UVW-1600 and UVW-1800 are the other half of the UVW series. They offer the superiority of Betacam SP with sophisticated editing features. They feature an RS-422 9-pin interface, built-in TBCs and Time Code operation. In/outs/outputs include component, composite and S-Video. **All the features of the UVW-1200/1400A *PLUS*—**

- Optional BVR-50 allows remote TBC adjustment.
- RS-422 interface for editing system expansion.
- Two types of component output: via three BNC connectors or a Betacam 12-pin dub connector.
- Frame accurate editing is assured, thanks to sophisticated servo control and built-in time code operation. In the insert mode of the UVW-1800, video, audio Ch-1/2 and time code can be inserted independently or in any combination.

PVW-2600/PVW-2650/PVW-2800
BETACAM SP 2000 PRO SERIES

Whenever versatility and no compromise performance is needed, there is only one choice. Legendary reliability and comprehensive support for its many users has established the PVW series as the standard in broadcast and post production. The PVW Series includes the PVW-2600 Player, PVW-2650 Player with Dynamic Tracking and the PVW-2800 Editing Recorder. They feature built-in TBCs, LTC/VITC time code operation and RS-422 serial interface. They also offer composite, S-Video and component video inputs and outputs. Most important they are built for heavy, every day duty.

- Built-in TBCs and digital dropout compensation assure consistent picture performance. Remote TBC adjustment can be done using the optional BVR-50 TBC Remote Control.
- The PVW-2600, PVW-2650 and PVW-2800 (generates as well) read VITC/ LTC time code as well as User Bits. Ext/Int time code, Regen/Preset, or Rec-Run/ Free-Run selections.
- Built-in character generator displays time code or CTL data.
- Set-up menu for presetting many functional parameters.

PVW-2650 Only
- Dynamic Tracking (DT) playback from -1 to +3 times normal speed.
- Two longitudinal audio channels with Dolby C- type NR.
- Recognizable monochrome pictures at up to 24X normal speed in forward and reverse. Color at speeds up to 10X.
- Two types of component connection- three BNC connectors or a Betacam 12-pin dub connector. They have composite and S-Video signals as well.

PVW-2800 Only
- Built-in comprehensive editing facilities.
- Dynamic Motion Control with memory provides slow motion editing capability.

UHF WIRELESS MICROPHONE SYSTEMS

Consisting of 5 handheld and bodypack transmitters and 6 different receivers, Sony's UHF is recognized as the outstanding wireless mic system for professional applications. Operating in the 800 MHz band range, they are barely affected by external noise and interference. They incorporate a PLL (Phase Locked Loop) synthesized control system that makes it easy to choose from up to 282 operating frequencies, and with the use of Sony's pre-programmed channel plan, it is simple to choose the correct operating frequencies for simultaneous multi-channel operation. Additional features, like space diversity reception, LCD indicators, reliable and sophisticated circuit technology ensure low noise, wide dynamic range, and extremely stable signal transmission and reception. Ideal for broadcasting stations, film production facilities, and ENG work.

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Panasonic

QUICK DIAL 74

WJ-MX50 Digital A/V Mixer

- Four input switcher and any two sources can be routed to the program busses. • Two-channel digital frame synchronization permits special effects in each A/B bus.
- Combination of 7 basic patterns and other effects creates 287 wipe patterns. • External edit control input for RS-232 or RS-422 serial controls. Also has GPI input.
- Wipe boundary effects: soft/border (bold, eight background colors available). • Digital effects:strobe, still, mosaic, negative/ positive, paint, B&W, strobe, trail, and AV synchro.
- Real-Time compression - entire source image is compressed inside a wipe pattern.
- Fade-in and fade-out video, audio, titles individually or synchronously faded. • Down stream keyer with selectable sources from character generator or external camera.
- "Scene Grabber" moves a pattern while upholding the initially trimmed-in picture integrity.
- Eight separate memories enable instant recall of frequently used effects. • 8 preset effects including: Mosaic Mix, Position Stream, Corkscrew, Bounce, Flip, Shutter, Vibrate, and Satellite. • Audio mixing capability of 5 sources with 5 audio level adjustments.

Canon

IF+ Series Zoom Lenses

Canon's IF+ family of lenses are engineered to meet the needs of the next generation of broadcasting while meeting the standards of today. Besides having the widest wide angle lens available, the IF+ lens series have wider angles at shorter M.O.D. (Minimum Object Distance), provide higher MTF performance and incorporate Hi-UD glass for reduced chromatic aberration. In addition to superb optics they're all designed with Canon's "Ergonomic Grip" for fatigue-free shooting over an extended time. IF+ lenses are your assurance of unsurpassed quality and performance for today and tomorrow.

J15ax8B

A next generation internal focusing lens with the shortest MOD and widest angle of any standard lens, the J15aX8B IRS/IAS is a standard ENG lens that lets you shoot in tight or restricted areas at the closest minimum object distance ever possible and capture more of the subject. It incorporates all the great features of IF+lenses including a built-in 2X extender, high MTF performance, Hi-UD glass, square lens hood and Canon's "Ergonomic Grip".

J20ax8B IRS/IAS

Excellent for ENG, sports and production, the J20aX8B IRS/IAS lets you squeeze in shots from 8mm and still take you all the way out to 320mm with its built-in extender. Incorporates all IF+ features, plus is the only lens (besides the J9aX5.2B IRS/IAS) with aVari-Polar lens hood, enabling rotation of attached filters.

GLIDECAM INDUSTRIES

V-16 AND V-20

Camera Stabilization Systems

The V-16 and V-20 allow you to walk, run, go up and down stairs, shoot from moving vehicles and travel over uneven terrain without any camera instability or shake. The V-16 stabilizes cameras weighing from 10 to 20 pounds and the V-20 from 15 to 26 pounds. They are both perfect for shooting the type of ultra-smooth tracking shots that take your audience's and client's breath away – instantly adding high production value to every scene. Whether you are shooting commercials, industrials, documentaries, music videos, news, or full length motion pictures, the Glidecam "V" series will take you where few others have traveled.

sachtler

CADDY systems

Sachtler quality is available to low budget users. The price of a CADDY system includes the 7-step dampened CADDY fluid head, ultra-light but rugged carbon fiber tripod, lightweight spreader and either a soft bag or cover. The CADDY fluid head features an adjustable pan arm, 7-step adjustment for quick counter balance and the self-locking Sachtler Touch and Go System.

CAD 01 Single-Stage ENG Carbon Fiber System:
- CADDY Fluid Head • ENG Single-Stage Carbon Fiber Tripod
- SP 100 Lightweight Spreader • Transport Cover 100

CAD 2A 2-Stage ENG Carbon Fiber System:
- CADDY Fluid Head • ENG 2-Stage Carbon Fiber Tripod
- SP 100 Lightweight Spreader • Soft padded ENG Bag

MILLER Fluid Heads and Tripods

Miller 20 -Series II Fluid Head

- Dynamic fluid drag control
- Sliding/quick release camera platform
- Weighs 4 lbs. • handles up to 22 lbs.
- Counterbalance system compensates for nose heavy or tail heavy camera configurations and permits fingertip control of the camera throughout the tilt range.
- Includes independent pan and tilt locks, bubble level, dual pan handle carriers and integrated 75mm ball levelling.

Miller 25-Series II Fluid Head

- 100mm ball level fluid head • Robust, lightweight, low profile design
- Quick release camera platform • Weighs 7lbs.–handles up to 25 lbs
- Multi-step fluid drag system and integrated counterbalance system provide ultra-smooth, repeatable pan-and-tilt fluid control and finger-tip camer balance for ENG camcorders, industrial CCD cameras or small studio cameras

#601-Lightweight Tripod

- Weighs 4.5 lbs., supports up to 30 lbs.
- Minimum height down to 24", maximum height to 57"
- Folds down to 33" • Engineered from thermoplastic moldings, diecast alloy and hard anodized tubular alloy.
- Fast, one turn, captive leg locks
- Includes 75mm (3") ball levelling bowl

#649-2-Stage Tripod

- Two extension sections on each leg. Operates at low levels as well as normal heights without the use of mini legs
- High torsional rigidity, no pan backlash
- Weighs 6.6lbs., supports 50 lbs. • Very portable, folds to 27"
- Includes 75mm (3") ball levelling bowl

System 20 #338—Miller 20 Head, 601 Lightweight Tripod, On Ground Spreader
System 20 ENG #339—Miller 20 Head, 649 2-Stage Aluminum, On Ground Spreader
System 25 #500—Miller 25 Head, 611 Lightweight Tripod, On Ground Spreader
System 25 ENG #502—Miller 25 Head, 641 2-Stage Aluminum, On Ground Spreader

Vinten

Vision SD 12 Pan and Tilt Head with Serial Drag

The Vision SD 12 head features "Serial Drag" pan and tilt system. System consists of a unique, permanently-sealed fluid drag and an advanced lubricated friction drag. You achieve the smoothest pans and tilts regardless of speed, drag setting and ambient temperature.
- Patented spring-assisted counter-balance system permits perfect "hands-off" camera balance over full 180° of tilt.
- Instant drag system breakaway and recovery overcome inertia and friction for excellent "whip pans"
- Consistent drag levels in both pan and tilt axis.
- Flick on flick off pan and tilt caliper disc brakes.
- Greater control, precision, flexibility and "touch"
- Touch activated, time delayed illuminated level bubble.
- Working conditions from as low as -40° up to +60°C.
- SD 12 weighs 6.6 lbs and supports up to 35 lbs.

Vision 12 Systems

Vision 12 systems include #3364-3 SD 12 dual fluid & lubricated friction drag pan/tilt head, single telescoping pan bar & clamp with 100mm ball base.

SD-12A System
- SD-12 pan and tilt head
- 3518-3 Single stage ENG tripod with 100mm bowl
- 3363-3 Lightweight calibrated floor spreader

SD-12D System
- SD-12 pan and tilt head
- 3513-3 Two-stage ENG tripod with 100mm bowl
- 3314-3 Heavy-duty calibrated floor spreader

Vision Two Stage ENG and LT Carbon Fibre ENG Tripods

The ultimate in lightweight and innovative tripods, they are available with durable tubular alloy (Model #3513) or the stronger and lighter, axially & spirally wound carbon fiber construction (Model #3523). They incorporate torque sate clamps to provide fast, safe & self-adjusting leg clamps.
- "Torque Safe" requires no adjustment. Its unique design adjusts itself when required, eliminating manual adjustment and maintenance and making for a much more reliable clamping system.
- New hip joint eliminates play and adds rigidity
- They both feature 100mm levelling bowl, fold down to a compact 28", and support 45 lbs.
- #3513 weighs 6.5 lbs. • #3523 CF (Carbon Fibre) weighs 5.2 lbs.

VIN-5ST and VIN-10ST

- Compact & lightweight, they maintain vision performance and quality.
- Provide total stability and durability with payloads up to 33 lbs.
- Ideal for the latest generation of dockable and one-piece camcorders.
- Compatible with all Vision accessories.

VIN-5ST includes Vision 5LF head, single stage toggle clamp tripod, Spreader and soft case.
VIN-10ST includes Vision 10LF head, single stage toggle clamp tripod, Spreader and soft case.

anton bauer DIGITAL Gold Mount Batteries

Acknowledged to be the most advanced battery in the industry, the Logic Series DIGITAL batteries deliver the feature most requested by cameramen: a reliable and accurate indication of remaining battery power.

DIGITAL PRO PACS

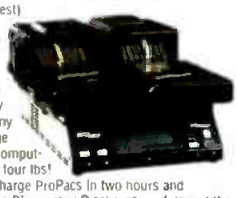
The ultimate professional video battery and recommended for all applications. The premium heavy duty Digital Pro Pac cell is designed to deliver long life and high performance even under high current loads and adverse conditions. It's size and weight creates perfect shoulder balance with all camcorders.
- **DIGITAL PRO PAC 14 LOGIC SERIES NICAD BATTERY**
  14.4v 60 Watt Hours. 5 1/8 lbs. Run time: 2 hours @ 27 watts, 3 hrs. @ 18 watts
- **DIGITAL PRO PAC 13 LOGIC SERIES NICAD BATTERY**
  13.2v 55 Watt Hours. 4 3/4 lbs. Run time: 2 hours @ 25 watts, 3 hours @ 17 watts

DIGITAL TRIMPAC

Extremely small and light weight, the Digital Trimpac still has more effective energy than two NP style slide-in batteries. High voltage design and Logic Series technology eliminate the problems that cripple conventional 12 volt slide-in type batteries. The professional choice for applications drawing less than 24 watts.
- **DIGITAL TRIMPAC 14 LOGIC SERIES NICAD BATTERY**
  14.4 v 43 Watt Hours. 2 3/4 lbs.
  Run time: 2 hours @ 20 watts, 3 hours @ 13 watts.

InterActive 2000 Power/Chargers

QUAD 2702/2401 Four-Position Power/Chargers



The lightest (and slimmest) full featured four position chargers ever. They can fast charge four Gold Mount batteries and can be expanded to charge up to eight. They also offer power from any AC main, all in a package the size of a notebook computer and weighing a mere four lbs! The 40 watt 2401 can charge ProPacs in two hours and TrimPacs in one. Add the Diagnostic/ Discharge module and the QUAD 2401 becomes an all purpose power and test system. The 70 watt QUAD 2702 bundles all Power/Charger features in the ultimate professional power system.

Dual 2702/2401 Two-Position Power/Chargers

The DUAL 2701 (70 watt) and 2401 (40 watt) are sleek, rugged and economical two position Power/Chargers that have all the features of InterActive 2000 technology including DC camera output and LCD display. The DUAL 2701 will charge any Gold Mount battery in one hour, the DUAL 2401 charges ProPac batteries in two hours and Trimpacs in one. Their compact, lightweight package design makes them the ultimate travel Power/Chargers. They can also be upgraded with the Diagnostic/Discharge Module and/or with the Expansion Charge Modules to charge up to six batteries of any type.

PROFESSIONAL VIDEO TAPES

QUICK DIAL 71

FUJI

Professional Grade VHS

PG-30	2.39	PG-60	2.59	PG-120	2.79

Broadcast Grade VHS Box

BGR-30	3.59	BGR-60	4.29	BGR-120	4.99

M471S S-VHS Double Coated

ST-30	6.99	ST-60	7.49	ST-120	7.99

M221 Hi 8 Double Coated

Metal Particles			Metal Evaporated		
P630HMP	4.99		E630HME	8.39	
P660HMP	6.49		E660HME	10.49	
P6120HMP	8.49		E6120HME	13.99	

M321SP Metal Betacam (Box)

05S	17.95	10S	18.49	20S	19.95
30S	22.95	60L	31.95	90L	49.95

DP121 DVC PRO

12M (Med.)	8.29	23M	9.79	33M	12.99
63M	22.49	64L (Lg.)	23.99	94L	33.99
123L					43.99

maxell

Hi8 Metal Particle (XRM)

P6-120 XRM	6.99

Broadcast Quality Hi8 Metal Particle

P6-30 HM 8Q	5.39	P6-60 HM 8Q	6.09
P6-120 HM 8Q			7.99

P/I PLUS VHS

T-30 Plus	1.69	T-60 Plus	1.99	T-90 Plus	2.09
T-120 Plus	2.19	T-160 Plus			2.69

HGX-PLUS VHS (Box)

HGXT-60 Plus	2.69	HGXT-120 Plus			2.99
HGXT-160 Plus					3.99

8Q Broadcast Quality VHS (Box)

T-30 8Q	5.49	T-60 8Q	6.19	T-120 8Q	7.39

8Q Professional S-VHS (In Box)

ST-31 8Q	7.19	ST-62 8Q			7.99
ST-126 8Q	8.39	ST-182 8Q			17.49

Betacam SP

B5MSP	15.75	B10MSP	17.75	B20MSP	19.75
B30MSP	16.99	B60MLSP	27.99	B90MLSP	39.99

Panasonic

Mini DV Tape

AY DVM-30	9.99	AY DVM-60	11.99

DVCPRO

AJ-P12M (Medium)	8.49	AJ-P23M			9.99
AJ-P33M	13.49	AJ-P63M			22.99
AJ-P64L (Large)	24.99	AJ-P94L			34.99
AJ-P123L					44.99

SONY

Hi-8 Professional Metal Video Cassettes

P6-30 HMPX	4.59	P6-30 HMEX			7.99
P6-60 HMPX	6.59	P6-60 HMEX			11.49
P6-120HMPX	8.89	P6-120HMEX			15.49

PR Series Professional Grade VHS

T-30PR	2.39	T-60PR	2.59	T-120PR	2.79

PM Series Premier Grade Professional VHS

T-30PM	3.49	T-60PM	3.99	T-120PM	4.79

BA Series Premier Hi-Grade Broadcast VHS (In Box)

T-308A	3.59	T-60BA	3.99	T-120BA	4.79

MQ Master Quality S-VHS (In Box)

MQST-30	7.49	MQST-60			7.99
MQST-120					8.39

BRS 3/4" U-matic Broadcast Standard (In Box)

KCS-10 BRS (mini)	8.29	KCS-20 BRS (mini)			8.99
KCA-10 BRS	8.19	KCA-20 BRS			8.69
KCA-30 BRS	9.69	KCA-60 BRS			13.39

XBR 3/4" U-matic Broadcast Master (In Box)

KCS-10 XBR (mini)	8.79	KCS-20 XBR (mini)			10.19
KCA-10 XBR	9.29	KCA-20 XBR			10.69
KCA-30 XBR	11.99	KCA-60 XBR			15.69

KSP 3/4" U-matic SP Broadcast (In Box)

KSP-S10 (mini)	9.59	KSP-S20 (mini)			11.09
KSP-10	10.09	KSP-20			11.59
KSP-30	12.99	KSP-60			16.99

BCT Metal Betacam SP Broadcast Master (Box)

BCT-5M (small)	12.29	BCT-10M (small)			13.29
BCT-20M (small)	13.99	BCT-30M (small)			14.99
BCT-30ML	21.49	BCT-60ML			23.49
BCT-90ML					34.99

Mini DV Tape

DVM-30EXM w/Chip	15.99	DVM-60EXM w/Chip			19.95
DVM-30EX "No Chip"	12.99	DVM-60EX "No Chip"			14.99
DVM-30PR "No Chip"	9.99	DVM-60PR "No Chip"			12.99

Full Size DV Tape with Memory Chip

DV-120MEM	26.95	DV-180MEM			34.95

PDV Series Professional DVCAM Tape

PDVM-12ME (Mini)	19.50	PDVM-22ME (Mini)			22.95
PDVM-32ME (Mini)	24.95	PDVM-40ME (Mini)			26.95
PDV-64ME (Standard)	34.95	PDV-94ME (Standard)			36.95
PDV-124ME (Standard)	39.95	PDV-184ME (Standard)			49.95
PDVN-64N	27.50	PDVN-124N	34.95	PDVN-184N	43.95

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NewTek

Calibar 3-Oz. Pocket-Sized Test Generator

The size of a ball point pen and running on a single battery, Calibar is an NTSC test signal generator that packs a rack mount worth of test equipment into a battery operated instrument. Calibar is the fastest, easiest and most portable way ever to calibrate video equipment. No patch bay racks. Just one cable. So besides giving you fast, accurate readings in the studio it's perfect for off-site events or trouble-shooting in the field.

- Designed for studio and field operation, it produces 24 test pattern functions at the touch of a button. 10-bit precision digital to analog conversion assures highly accurate signals.
- Calibar's combination of low cost, portability and full-featured operation makes it ideal for broadcast engineers, television production facilities and video post houses.
- Tuck Calibar in your pocket and you're ready to go. Touch the button to generate SMPTE color bars, touch it again to calibrate convergence and so on.
- With the supplied AC adapter, it also functions as a black burst generator.

CHYRON PC-CODI & PC Scribe

Text and Graphics Generator and Video Titling Software

PC-CODI incorporates a broadcast quality encoder and a wide bandwidth linear keyer for the highest quality realtime video character generation and graphics display. A video graphics software engine running under Windows 95/NT, PC Scribe offers a new approach and cost effective solution for composing titles and graphics that is ideal for video production and display applications. Combined, their a total solution for realtime character generation with the quality you expect from Chyron.

PC-CODI Hardware:

- Fully-luminased displays • Display and non-display buffers
- Less than 10 nanosecond effective pixel resolution
- 16.7 million color selections • Fast, realtime operations
- Character, Logo and PCX image transparency
- Variable edges, border, drop shadow and offset
- Full position and justify control of character and row
- User definable intercharacter spacing (squeeze & expand)
- Multiple roll/crawl speeds • Automatic character kerning
- User definable tab/template fields
- Shaded backgrounds of variable sizes and transparency
- Software controlled video timing
- User definable read effects playback, wipes, pushes, fades
- NTSC or PAL sync generator with genlock
- Board addressability for multi-channel applications
- Auto display sequencing • Local message/page memory
- Preview output with safe-title/cursor/menu overlay
- Composite and S-video input with auto-genlock select

PC-Scribe Software:

- Number of fonts is virtually unlimited. Also supports most international language character sets. Fonts load instantly and the level of anti-aliasing applied is selectable.
- Adjustable wide range of character attributes. Wide choice of composition tools.
- Characters, words, rows and fields can color flash
- Characters rolls, crawls and reveal modes. Speed is selectable and can be auto timed with pauses. Messages can be manually advanced or put into sequences along with page transitions.
- Multiple preview windows can be displayed simultaneously.
- Transitions effects include: cut, fade, push, wipe, reveal, peel, zoom, matrix, wipe, spiral, split, weave and jitter.
- Import elements to build graphics. This includes OLE objects, iNFiNiTi RGBA and TGA with alpha channel. Scribe also imports and exports TIFF, JPEG, PCX, TGA, BMP, GIF, CLP, ASCII, IMG, SGI, PICT and EPS formats.

PC-CODI and PC-Scribe Bundle 2995.00

TRUEVISION / AVID

TARGA 1000/MCXpress NT

Professional Video Production Workstation

Incorporating the award-winning TARGA 1000 video card and Avid MCXpress NT non-linear editing software, this fully-configured workstation meets the needs of production professionals, corporate communicators, educators and Internet authors.

TARGA 1000 Features:

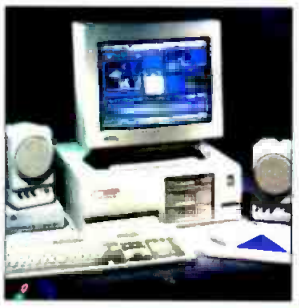
The TARGA 1000 delivers high processing speed for video and audio effects, titling and compositing. Capture, edit and playback full-motion, full-resolution 60 fields per second digital video with fully synchronized CD-quality audio

- Compression can be adjusted on the fly to optimize for image quality and/or minimum storage space. Has composite and S-video inputs/outputs. Also available with component input/output (TARGA 1000 PRO).
- Genlock using separate sync input for working in professional video suites
- Audio is digitized at 44.1KHz or 48KHz sampling rates, for professional quality stereo sound. Delivers perfectly synchronized audio and video

MCXpress Features:

The ideal tool for video and multimedia producers who require predictable project throughput and high-quality results when creating video and digital media for training, promotional/marketing material, local television and cable commercials, CD-ROM and Internet/intranet distribution. Based on Avid's industry-leading technology, it combines a robust editing functionality with a streamlined interface. Offers integration with third-party Windows applications, professional editing features, powerful media management, title tool and a plug-in effects architecture. It also features multiple output options including so you save time and money by reusing media assets across a range of video and multimedia projects.

TARGA 1000/MCXpress Turnkey Systems:



- 300-watt, 6-Bay Full Tower ATX Chassis
- Pentium ATX Motherboard with 512K Cache
- Pentium II - 300 MHz Processor
- Matrox Millenium II AGP 4MB WRAM Display Card
- 64MB 10ns 168-Pin (DIMM) S-DRAM
- Quantum Fireball 6.4GB IDE System Drive
- Seagate Barracuda External 9.1GB SCSI-3 Ultra Wide Capture Drive
- Adaptec AHA-2940UW Ultra Wide SCSI-3 Controller Card
- Teac CD-532e 32X EIDE Internal CD-ROM Drive • 3.5" Floppy Drive
- Altec-Lansing ACS-48 3-Piece Deluxe Speaker System
- Viewsonic G771 17-inch (1280 x 1024) Monitor (0.27mm dot pitch)
- Focus 2001A Keyboard • Microsoft MS Mouse
- Windows NT 4.0 Operating System Software
- Avid MCXpress for Windows NT
- Truevision TARGA 1000 or 1000 Pro Video Capture Card

With TARGA 1000 ..... $7495.00
With TARGA 1000 Pro (component input/output) $7995.00

KNOX VIDEO

RS4x4/8x8/16x16/16x8/12x2

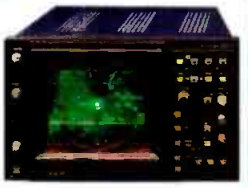
Video/Audio Matrix Routing Switchers

Knox's family of high performance, 3-channel routing switchers are extremely versatile, easy-to-use and very affordable. Housed in an ultra-thin rackmount chassis they accept and route (on the vertical interval) virtually any video signal, including off-the-air and non-timebase corrected video. They also route balanced or unbalanced stereo audio. The audio follows the video or you can route the audio separately (breakaway audio). Each of the switchers offers manual control via front panel operation. They can also be controlled remotely by a PC, a Knox RS Remote Controller, or by a Knox Remote Keypad via their RS-232 port. Front panel LEDs indicate the current routed pattern at all times. Knox switchers are ideal for applications such as studio-feed control and switcher input control, plus they have an internal timer allowing timed sequence of patterns for surveillance applications as well.

- Accept and routes virtually any one-volt NTSC or PAL video signal input to any or all video outputs
- Accept and route two-volt mono or stereo unbalanced audio inputs to any or all audio outputs
- Video and audio inputs can be routed independently - they don't need to have the same destination
- Can store and recall preset cross-point patterns. (Not available on RS12x2.)
- Front panel key-pad operation for easy manual operation.
- Can also be controlled via RS-232 interface with optional RS Remote Controller or Remote Keypad.
- Front panel LED indicators display the present routing patterns at all times.
- An internal battery remembers and restores the current pattern in case of power failure
- Internal vertical interval switching firmware allows on-air switching
- Housed in a thin profile rackmount 1" chassis.
- Also except the RS12x2 are available in S-Video versions with/without audio
- Models RS16x8 and RS16x16 are also available in RGB/component version.
- With optional Remote Video Reacout, the RS16x8 and RS16x16 can display active routes on a monitor at remote locations, via a composite signal from a BNC connector on the rear panel.
- The RS4x4, RS8x8 and RS16x16 are also available with balanced stereo audio. They operate at 660 ohms and handle the full range of balanced audio up to +4 dB with professional quick-connect, self-locking, bare-wire connectors

LEADER

Manufacturing test and measurement equipment for over 40 years, Leader Instruments is the standard which others are measured against for reliability, performance, and most important—cost effectiveness.



5860C WAVEFORM MONITOR

A two-input waveform monitor, the 5860C features 1H, 1V, 2H, 2V, 1 s/div and 2V mag time bases as well as vertical amplifier response choices of flat, IRE (low pass), chroma and DIF-STEP. The latter facilitates easy checks of luminance linearity using the staircase signal. A PIX MON output jack feeds observed (A or B) signals to a picture monitor, and the unit accepts an external sync reference. Built-in calibrator and on-off control of the DC restorer is also provided.

5850C VECTORSCOPE

The ideal companion for the 5860C, the 5850C adds simultaneous side-by-side waveform and vector monitoring. Featured is an electronically-generated vector scale that precludes the need for fussy centering adjustments and eases phase adjustments from relatively long viewing distances. Provision is made for selecting the phase reference from either A or B inputs or a separate external timing reference

5100 4-Channel Component / Composite WAVEFORM

The 5100 handles three channels of component signals, plus a fourth channel for composite signals, in mixed component / composite facilities. Features are overlaid and parade waveform displays, component vector displays, and automatic bow-tie or "shark fin" displays for timing checks. Menu-driven options select format (525/60, 625/50, and 1125/60 HDTV), full line-select, vector calibration, preset front-panel setups and more. On-screen readout of scan rates, line-select, preset numbers, trigger source, cursor time and volts.

5100D Digital Waveform/Vectorscope

The 5100D can work in component digital as well as component analog facilities (and mixed operations). It provides comprehensive waveform, vector, timing and picture monitoring capabilities. Menu driven control functions extend familiar waveform observations into highly specialized areas and include local calibration control, the ability to show or blank SAV/EAV signals in both the waveform and picture, the ability to monitor digital signals in GBR or YCbCr form, line select (with an adjustable window), memory storage of test setups with the ability to provide on-screen labels, flexible cursor measurements, automatic 525/60 and 625/50 operation and much much more.

5870 Waveform/Vectorscope w/SCH and Line Select

A two-channel Waveform/Vector monitor, the microprocessor-run 5870 permits overlaid waveform and vector displays, as well as overlaid A and B inputs for precision amplitude and timing/phase matching. Use of decoded R-Y allows relatively high-resolution DG and DP measurements. The 5870 adds a precision SCH measurement with on-screen numerical readout of error with an analog display of SCH error over field and line times. Full-raster line select is also featured with on-screen readout of selected lines, a strobe on the PIX MON output signal to highlight the selected line, and presets for up to nine lines for routine checks.

5872A Combination Waveform/Vectorscope

All the operating advantages of the 5870 except SCH is deleted (line select retained), making it ideal for satellite work

5864A Waveform Monitor

A two-input waveform monitor that offers full monitoring facilities for cameras, VCRs and video transmission links. The 5864A offers front panel selection of A or B inputs, the choice of 2H or 2V display with sweep magnification, and flat frequency response or the insertion of an IRE filter. In addition, a switchable gain boost of X4 magnifies setup to 30 IRE units, and a dashed graticule line at 30 units on screen facilitates easy setting of master pedestal. Intensity and focus are fixed and automatic for optimum display. Supplied with an instruction manual and DC power cable

5854 Vectorscope

A dual channel compact vectorscope, the 5854 provides precision checkout of camera encoders and camera balance, as well as the means for precise genlock adjustments for two or more video sources. Front panel controls choose between A and B inputs for display and between A and B for decoder reference. Gain is fixed or variable, with front panel controls for gain and phase adjustments. A gain boost of 5X facilitates precise camera balance adjustments in the field. Supplied with a DC power cable.

Designed for EFP and ENG (electronic field production and electronic news gathering) operations, they feature compact size, light weight and 12 V DC power operation. Thus full monitoring facilities can be carried into the field and powered from NP-1 batteries, battery belts and vehicle power. Careful thought has been given to the reduction of operating controls to facilitate the maximum in monitoring options with the operating simplicity demanded in field work.

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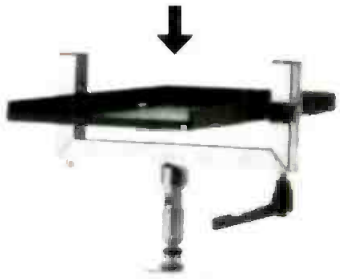

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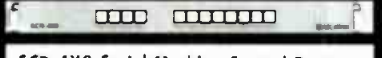

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EOM

Japanese shenanigans and a tribute

BY PAUL MCGOLDRICK

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 was accepted by the United States even if it wasn't the analog system it wanted. In a reverse situation could you imagine PBS trying to force a U.S. manufacturer to do something like that?

But at least with NAB behind us, yet again, we have heard the "Declarations of Network Standards" (and it may be an opening statement from each, with some fast footwork later), and 720p is certainly going to be used; and that decision was obviously made before any pressure was put on Panasonic. The computer people are starting to smile again as well, because they like broadcasters talking the "P" word and it was literally only a few days before we were being told about all sorts of video initiatives that were going to happen in the industry. But with NBC saying that their advanced broadcasts will be in 1,080i does that make things kind of difficult at MSNBC?

Then it was reported that whereas our broadcasters seem to be delirious about terrestrial DTV broadcasts, the Japanese equivalent of NAB, the National Association of Commercial Broadcasters, has been fighting in the 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 there." If you have been reading this column recently, you would probably guess that I tend to agree with the association. But, whereas we will have a feeding frenzy with group absorption of the losers, there is no such possibility in the more heavily regulated Japanese model.

The computer people are starting to smile again, because they like broadcasters talking the "P" word.

A real engineer

He didn't seek glory and fame; he resisted pomp. When I once suggested we should get him a Fellowship in an organization, he was horrified. He had patents in his name, but if that hadn't been company policy, he wouldn't have pursued them for his own sake.

John L. Judge

John L. Judge was raised in the potato lands of Pocatello, ID, and missed them. After living for many years in Hillsboro, OR, he despaired at the urban encroachment of people and high technology and delighted in the occasional escape back to his roots. John was well-known though, and 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 reabsorb 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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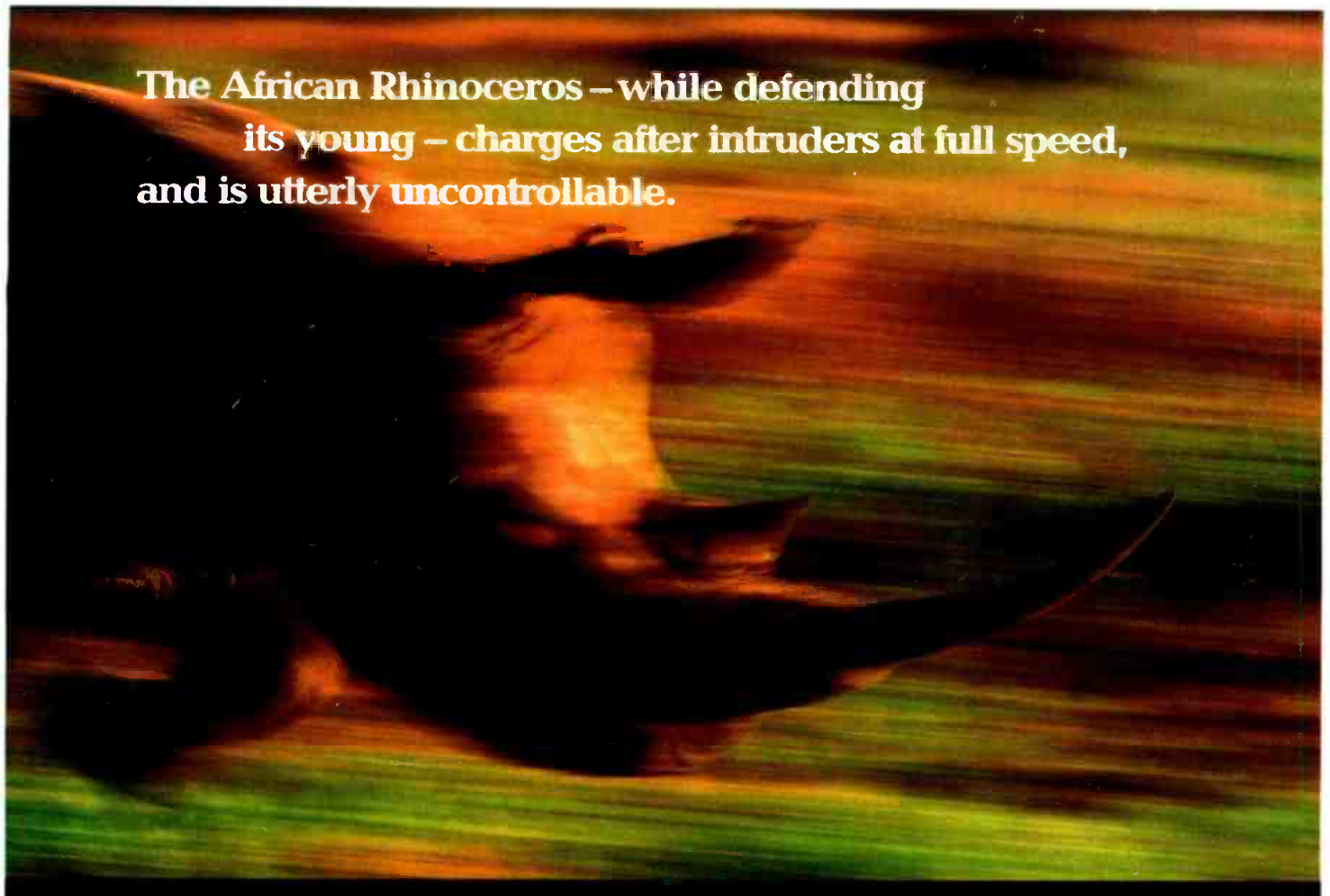

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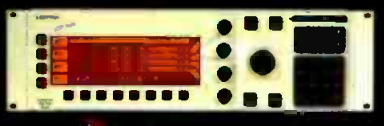

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