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## Special report: DTV Concepts

... into the future  
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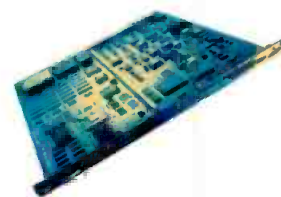
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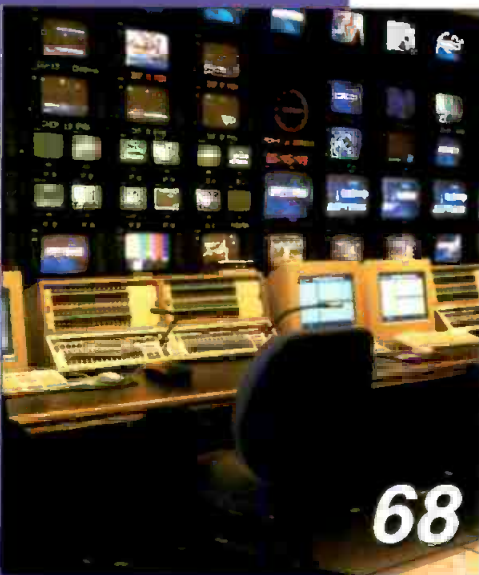
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**ON THE COVER:** *This month's cover focuses on the launch of DTV and depicts the many choices of formats and standards facing the engineers in the design of master control systems. The cover art is a tongue-in-cheek concept for the ideal master control switcher, courtesy of Tektronix Grass Valley Products.*

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Jim Saladin  
jim\_saladin@intertec.com  
913/967-1905 fax

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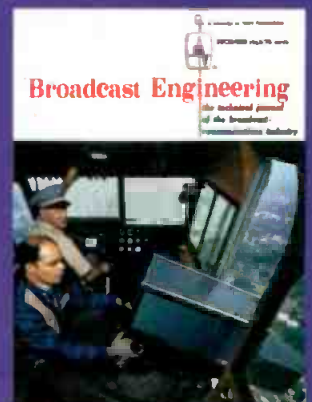
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## FREEZE FRAME

A look at the technology that shaped this industry.

### Do you remember?

December, 1967, New GE color cameras are installed in the Goodyear blimps, Columbia and Mayflower. The entire system, including microwave, weighed 500lbs and had to be transported by truck between assignments.



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# Is interlace dead?

**W**hen I told a well-known manufacturer of professional monitors that I was doing an editorial on the death of interlace scanning, he replied, “So who’s going to be your bodyguard?” He thinks going public with the position that interlace is dead is tantamount to suicide. “Only Bill Gates could save your neck,” he said. When I broached the subject with a fellow *BE* editor, he responded that discussing religion would be less dangerous.

But let’s look at some facts:

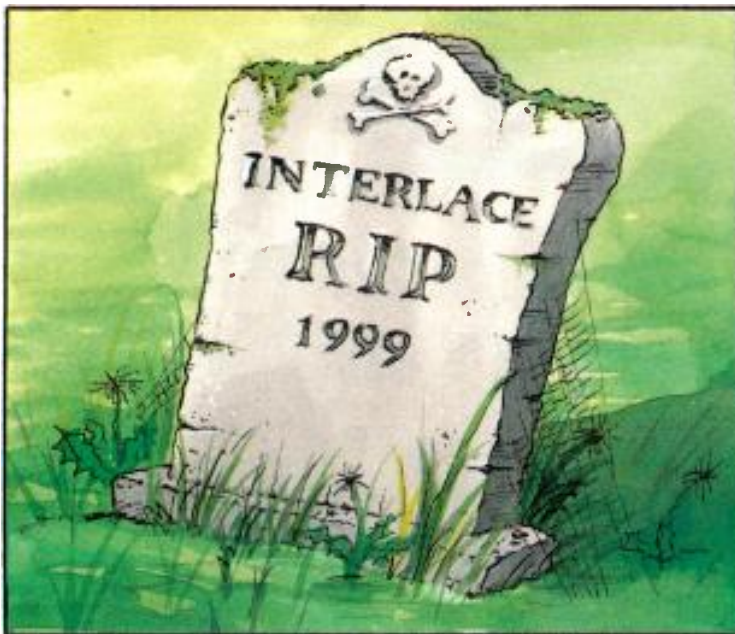
- The use of interlace is historical. Interlace was initially developed as way to squeeze enough information in the limited amount of available bandwidth to produce a picture. In other words, it was the solution to a unique *bandwidth* problem — not a *display* problem.

- Interlace results in/produces temporal and spatial artifacts. You can argue that these artifacts don’t matter or aren’t serious. But the fact remains that images shift between the time the odd and even lines are scanned. This represents image distortion. Whether or not it’s significant is a different issue altogether.

- Converting to other formats and scan rates is easier from progressive. This year’s SMPTE conference could have been called “The case for progressive.” The number of presenters at SMPTE arguing for progressive capture amazed me. Detailed and well-researched papers documenting the artifacts of interlaced capture and display were presented.

- TV sets will eventually be progressive displays. While some early HDTV displays will be based on interlace scanning, the physics of having to sweep electron beams across large CRTs is complex — and expensive. HDTV will survive only if large displays are available. This means plasma, LCD and other new technologies, which by design are progressive.

- The first HD-like images much of the public sees will come from computers — not HDTV sets. Intel is testing a new DTV computer card and 16:9 display systems. All you’ll need is a new receiver card to receive and display



(in a progressive format) HDTV images. Even the consumer industry is promoting new progressive source equipment. Toshiba just released a new DVD player that outputs a *progressive* signal.

You can transmit any of the FCC-approved scanning formats you want. You can capture content in any format you want. However, if you want your content to be shown in viewers’ homes in its native display format, the format must be progressive.

Broadcasters often forget they aren’t in the DTV driver’s seat. When it comes to implementing HD, the consumers are. And the folks at CEMA will determine what they initially see. In that marketplace, maximum image quality isn’t the goal, selling TV sets is. That means price, and price means progressive.

So in answer to my original question, “Is interlace dead?”

No, not dead, just not the future.

*Brad Dick*

Brad Dick, editor

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## Doublespeak

I must respond to Robert O. Craig's "Computer Arrogance" rebuttal to your "Letter from Camp" editorial in the August 1998 issue.

It no longer amazes me that the Microsoft folks spend billions on marketing bug-filled software. What amazes me is that people like Robert O. Craig believe this nonsense. "Service pack?" Oh, you mean bug fix. "Beta release?" Oh, you mean it's the end of the quarter and you must meet a deadline to ship.

Larry Ellison of Oracle summed it up best when he said, "It doesn't bother me that Microsoft dominates the market. What bothers me is they do it with an inferior product."

MIKE FOX

DIRECTOR, ENGINEERING & OPERATIONS  
CONUS COMMUNICATIONS

Reader question from the *Broadcast Engineering* website:

Does the percentage of nitrogen in a transmission line matter, as long as the nitrogen is dry? And, is there a performance difference between 95% N<sub>2</sub> and 99% N<sub>2</sub>?

TIMOTHY C. PHILLIS

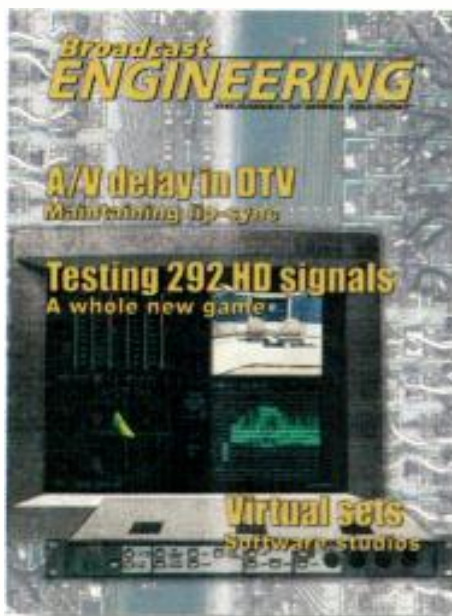
Andrew Corp. was invited to answer the question:

*In response to your question concerning the use of 95% N<sub>2</sub> versus 99% N<sub>2</sub>, the key is that the nitrogen must be dry. Nitrogen that is commonly available for industrial applications is 98.8% pure (32ppm H<sub>2</sub>O or -105° dewpoint). Both of these purity levels will work well for transmission line pressurization. The most important part of selecting a grade of nitrogen is the dewpoint. The dewpoint of the nitrogen must be lower than the lowest expected ambient temperature to prevent condensation inside the transmission line. Condensation will eventually lead to corrosion, and signal degradation. For additional information,*

*see the article in the July 1997 issue, "Nitrogen vs. air pressurization," by Lloyd Keyser, or contact Andrew Corporation at 800-255-1479 extension 396. Ask for a copy of the White Paper, "Pressurizing Transmission Lines: Air vs. Nitrogen," bulletin number 10220.*

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Despite all the wonderful technological advances in broadcasting, I notice that one thing seems to have become a low priority. I am referring to lip sync.

I have in recent months several times seen statements made by the President from the White House lawn in which the video lagged the sound. The same effect is sometimes noticeable when several different studios are linked between the two coasts.

This effect is presumably due to sound and video taking different routes, or passing through equipment with different delays; but knowing this does not make it any less irritating!

DAVID PICKETT

DIRECTOR OF RECORDING ARTS  
INDIANA UNIVERSITY SCHOOL OF MUSIC

Dear David:

As far as the White House feeds, the answer, of course, lies in what "is" is! I mean, if we're talking about what is the problem with lip sync, then it depends upon when is is. If truth is relative, as the current resident seems to believe, then maybe time is too. Maybe the audio didn't match the video so they could claim that the statement was/is condition dependent. I'd just classify it as another example of where the lies in the video are out of sync with the lies in the audio. No amount of digital processing can fix that.

However, if you're talking about other feeds, that's a different issue.

Lip-sync errors are primarily caused by the extra time it takes to encode the video versus the audio. This matter was discussed in detail in "Audio-to-video delay systems for DTV" by Tom Tucker (November, p. 82). The problem can be solved, but like you, I'm surprised by the number of times it occurs in network feeds.

The most obtrusive type of lip-sync error, as you noted, occurs when the audio precedes the video. We're conditioned to believe that we can see lips move before we hear the sound. We attribute that to distance and the speed of sound. However, when the inverse occurs, we find it objectionable because there's no basis for belief on our part.

I saw this happen with the recent space launch. The audio was several frames ahead of the video on CBS' morning feed, as shown on a Pasadena, CA, affiliate. It's going to become a bigger problem, but mostly for those originating satellite feeds. Encoding for local DTV programming won't be as big a problem because the encoders compensate for the extra video delay with audio buffering.

BRAD DICK, EDITOR

Send your comments to:  
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## News

### Some HDTV receivers to display low pixel counts

BY LARRY BLOOMFIELD



The HDTV that ends up in front of viewers may be significantly less HD than what leaves the antennas of local stations.

A recent meeting of the Chirchill Club, a group from in and around Palo Alto, CA, featured speaker Lou Lenzi, vice president of New Media for Thompson Consumer Electronics. At the meeting, Lenzi told the audience that his company's sets would only display one million pixels, less than half the number of pixels HDTV will broadcast.

Not all manufacturers are skimping on picture quality. Fellow broadcast engineer Jim Mendrala and I did an informal survey, and the results follow. Though pricing varies depending on where the set is purchased and the number of features, here's what I learned about the sets surveyed.

Hitachi has an HDTV set, model 61HDX98B, using a projection display, which will receive all 18 ATSC formats and display them on a 61" diagonal 16:9 screen. It will downconvert the



Sony KW-34HD1 HDTV set.

1080i and 720p HDTV and will display that at 480p. It can also receive DirecTV if the DirecTV card is plugged into the Smart Card slot. It is scheduled to be available in the first quarter of 1999 with a suggested retail price will of \$7,999.

Philips/Magnavox has a HDTV set, model 64PP9901, which uses a rear-screen projection in the 16:9 aspect ratio with a 64" diagonal. It will decode all 18 ATSC formats. It will also accept component video as well as VGA from your PC or laptop. It is not clear what the actual native display resolution is. It is available now for a suggested list price of \$9,999; if dealers do not yet have any in stock, they can order it. More information on various aspect-ratio formats: [www.flat-tv.com/indexprod2.html](http://www.flat-tv.com/indexprod2.html).

Samsung has an HDTV set, model SVP-555JHD, that uses a rear-screen projection in the 16:9 aspect ratio with a 55" diagonal. It will receive and decode all 18 ATSC formats. It has front-mounted component and S-video inputs. The native resolution is 800 horizontal lines. It also is available now at the suggested retail price of \$7,999. Stores should be able to order the set. More information: [www.samsung.com/products/hdtv.html](http://www.samsung.com/products/hdtv.html).

Sony has an HDTV set, model KW-34HD1, which uses a flat-face FD Trinitron Wega CRT display, not a flat Plasma display, with a 34" diagonal. It will decode all 18 ATSC formats. It features Wega circuitry that greatly enhances 601-type pictures by converting all DTV formats to 1080i by upconverting an SDTV to the native display by a proprietary technology called "digital reality creation." This technology doubles the horizontal and vertical line structure to provide four times as many pixels. The set incorporates variable size PIP and can display HD or WebTV with 480p resolution. The audio on this set is full 5.1-channel surround sound in Dolby Digital. It went on sale at the end of September and will retail for \$8,999. More information: [www.sel.sony.com/SEL/consumer/wega/index.html](http://www.sel.sony.com/SEL/consumer/wega/index.html).

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

**DTV represents a conflict of interests**  
Implementing DTV pits the divergent goals of broadcasters, TV set manufacturers and consumers against each other.

Dislikes long simulcast | Wants traditional simulcast TV formats  
**broadcaster**

**Simulcast battle:** Long vs. Short | Public vs. Private

**Format battle:** High vs. Standard definition | Widescreen 16:9 vs. 4:3

Who bears the cost?

Prefers long simulcast | Wants simple, passive viewing  
**consumer**

Wants TV to be more like a cinema | Wants TV to be a PC  
**manufacturer**

**Platform battle:** PC vs. TV | Open vs. Closed software

Source: CDG Consultants [www.cdg.net/terry.brunne@cdg.net](http://www.cdg.net/terry.brunne@cdg.net)

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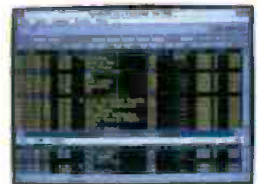
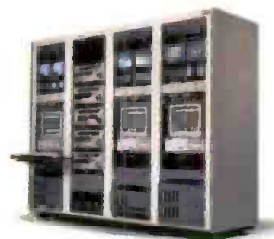
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Proscan/Thompson has an HDTV set, model PS6100, which uses a rear-screen projection in the 16:9 format with a 61" diagonal. It will decode all 18 ATSC formats and will accept component video. It will be available after the first of the year and will retail for \$6,999

RCA/Thompson has an HDTV set, model RCA P55000, that uses a rear projection screen in the 16:9 format and a 55" diagonal. In addition to decoding all 18 ATSC formats, it displays them on a 1080i screen. More information: [www.rca.com/](http://www.rca.com/) or [www.nipper.com/default.asp](http://www.nipper.com/default.asp).

ProjectaVision has a 4:3 60" diagonal rear-screen projection unit with a native resolution of 800x600 pixels. It uses a single Texas Instrument (TI) digital micromirror device (DMD) and is HDTV ready. The projector uses two DMD chips. One is for the green and one is for the red and blue. The red and blue DMD projection device uses a



Hitachi 61HDX98B HDTV set.

color wheel to get the colors with out any flicker. This idea keeps the cost down and looks good. The projector can be taken out of the set and used as a regular front-screen digital projector for boardroom and other applications. More information: [www.projectavision.com/](http://www.projectavision.com/).

Mitsubishi will have two 16:9 DTVs, one with a 65" and one with a 73" diagonal 1080i display. The sets will retail between \$4,000-\$9,000. Mitsubishi will also have 4:3 DTV sets in 50", 60", 70" and 80" diagonal and will offer an HDTV add-on for \$3,000. More information: [www.mitsubishi-tv.com/](http://www.mitsubishi-tv.com/).

Texas Instruments (TI), Digital Micromirror Device (DMD) is almost 20 years old now and is starting to catch on. Demonstrations with TI's DMD and motion picture film side-by-side

on a 47-foot screen show that the DMD can hold its own with more than 10,000 Lumens from a 5000W Xenon arc lamp. New HDTV sets using TI's DMD with digital light processing (DLP) will be able to display the picture digitally at about 50,000 times per second. Currently, the three DMDs available will resolve 600x800, 1024x750 and 1280x1024 pixels. Because the chip operates at more than 50,000 times per second the digital

bits for each pixel can be displayed digitally on the screen and the eye will convert the bits to an analog interpretation for a near-perfect gray-scale. ProjectaVision's model DHT-2 also uses this technique. As a side note, Daewoo Television is supposedly experimenting with the Aura Systems Articulated Mirror Array (AMA). At this time, the date of release and the native display format are unknown.

There are flat-panel plasma sets at

## Panasonic designs, builds and equips ABC's HDTV Release Center

On November 1, when ABC aired the first regularly scheduled network broadcast of HDTV programming (the 1996 version of Disney's *101 Dalmatians*), the broadcast originated from the ABC HDTV Release Center. The Center was designed, built and equipped by Panasonic System Solutions Company (PSSC).

Located at the network's headquarters in New York City, the HDTV Release Center serves as the hub for the release and distribution of progressive scan programming to ABC's digital-ready affiliated and owned stations. The Panasonic AJ-HD2700 D-5 HD recording system, provided by Panasonic Broadcast & Digital Systems Company (PBDSC), is a key component of the equipment in the Center.

The ABC HDTV Release Center project allowed PSSC to demonstrate its capabilities — requiring the integration of leading-edge technologies from a diverse group of manufacturers on a challenging timeline.

The HDTV Release Center consists of two fully redundant edit/control rooms. Each room will

serve as a standalone facility, providing the collective capability to originate two separate program streams or one stream with full backup.

Panasonic's AJ-HD2700, the only commercially available digital component VTR with the capability of recording 1080i and 720p images, is based on Panasonic's industry-standard, Emmy-winning D-5 HD format.

In addition to the AJ-HD2700s, ABC also purchased a variety of Panasonic HD and DTV 16:9 and 4:3 monitors from PBDSC and is evaluating additional progressive equipment for use in future HD program origination by the network.

PSSC is offering ABC-owned and affiliated stations turnkey HD station system packages consisting of prepackaged master control AJ-HD2700 VTRs. The company will install several in the first half of 1999.



The ABC HDTV Release Center.

*August 5, 1492 - Atlantic Ocean*

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broadest range of digital solutions for broadcasting today. Start with our MAV-70.



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some stores, but they are not HD. HDTV sets with flat-panel plasma displays are not yet available. The only plasma displays are NTSC-based and have about an 800x450 resolution. They will take in component video, so in theory a DTV receiver that can receive all 18 ATSC formats and convert to a 60i output could drive it.

JVC is using a new type of display — the D-ILA. It is being used in JVC's G-10 series projectors. These will accept HDTV component video and project up to SXGA (1280x1024) from your laptop computer. 1080i or 1080p will be displayed at 1280x720.

With a DTV ATSC receiver plugged into these projectors, the Hughes/JVC model G-1000 and the JVC model G-10 can display HDTV (with its tri-level sync) now on up to a 20-foot wide screen. The suggested retail price is less than \$17,000. More information: [www.hjt.com/products/north\\_america/G1000.html](http://www.hjt.com/products/north_america/G1000.html)

Various DTV Receiver/decoders are available now. The Panasonic model HD-1080 receiver will receive and decode all 18 ATSC formats and upconvert all formats less than 1080i to 1080i. It has a full 1920x1080 output. It features Mitsubishi's proprietary High-Definition Interface (HDI) (using a DB-15 connector) which is found only on the HD-1080 4:3 and 16:9 series televisions. The receiver itself requires no external controls as it is completely controlled by the HD-1080 televisions. Receiver/decoders will be available from at least nine manufacturers by the first quarter of 1999.

Frame rate will be changed to the requirements of the native display. That is, 24 frames/s could be displayed at 24, 30, 48, 60, or 72 frames/s depending on the set.

With all the press about networks and their selected transmission formats, the question really is: Will that same quality be displayed on the home receiver in its "native format?" Probably not. It appears that the weakest link in the HDTV chain will be the home receiver. ■

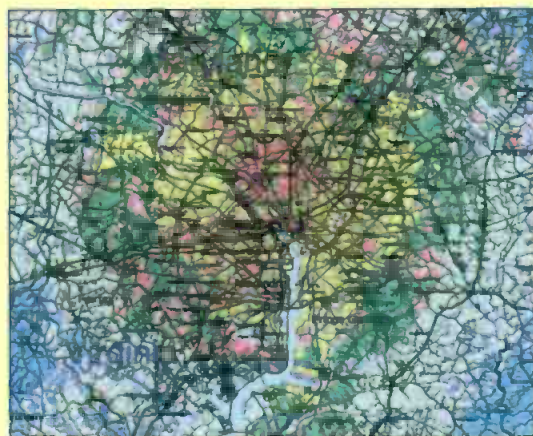
## ATSC coverage test results released

ATSC's performance in a recent test performed in the Chicago area by Tribune Broadcasting has been published

## Color-coded antennas?

Engineers at most stations get called upon from time to time to help out viewers when it comes to reception. You can bet this will continue in the wonderful world of DTV in its many flavors (such as HDTV, SDTV and multicasting).

The Consumer Electronics Manufacturers Association (CEMA) recently established an antenna subdivision. CEMA plans to teach consumer electronics retail salespeople how to use new, voluntary antenna-specification standards, and a corresponding color-coded local reception map matches antenna characteristics to particular locations. CEMA is in the process of developing maps for 211 U.S. demographic market areas (DMA) as tools to help consumers select the appropriate category of antenna for their reception area. The colors will indicate the kind of antenna, such as medium-size directional, medium-size directional with pre-amp, large-size directional and large-size directional with pre-amp. ■



CEMA's Washington, D.C., TV antenna map.

in the September 1998 *IEEE Transactions on Broadcasting*, under the title "Tribune/WGN DTV Field Test."

The tests were conducted across the Chicago area, to a radius of 55 miles, using ATSC and NTSC. Particular attention was given to areas with poor analog NTSC reception due to severe ghosting. According to the report, confirmation was obtained demonstrating that the expected coverage with the ATSC's 8-VSB transmission system is indeed achievable.

Using an outdoor antenna elevated to 30 feet, "an overall success rate of 96.4% was achieved," according to the report. The team tested 10 homes with indoor antennas, and all 10 had successful DTV reception. The report qualified the indoor antenna test, stating that the adjustment of the indoor antenna was not always trivial.

To obtain a copy of this report, e-mail the IEEE at [askieeee@ieee.org](mailto:askieeee@ieee.org). The cost of the report is \$12.95 for members, \$22.95 for non-members. For \$6 extra, CEMA will fax you the report.

If you have any questions, call IEEE at 800-949-4333.

In light of last month's story on outdoor antennas (see November's *Beyond the Headlines*, "Up with Antennas"), this report should be of particular interest. ■

## Clinton to rob broadcasters

The Clinton administration has proposed an acceleration of the auction process for 36MHz of spectrum so it can comply with the Balanced Budget Act of 1997.

According to Eddie Fritts, NAB President and CEO, "NAB is deeply concerned over the Clinton administration's proposal to accelerate spectrum auctions reserved for channels 60-69." Fritts continued, "This plan would harm both broadcasters and taxpayers and would result in inefficient management of spectrum."

In a letter to Congressman Bliley in support of his opposition to this proposal by the Clinton administration, Fritts wrote that the administration's plan is likely to have the effect of disrupting a smooth digital transition." Fritts continued, "It is crucial to proceed with the current schedule for the rollout of digital television."

The simplest solution to this issue is to keep the politicians hands out of the cookie jar, but that's not likely. ■

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## I want my local TV

Wouldn't it be nice for our elected representatives to give us a holiday gift that would allow us to receive television from any market, from wherever we want to receive it? Instead, all we'll probably get is more nonsensical infighting over who's going to get see what and where.



**Billy Tauzin, Telecommunications Subcommittee chairman**

On almost a weekly basis, the *FCC Daily Digest* covers at least one local TV station complaining about one cable company or another not carrying its signal. It seems the issue will never be resolved. Speaking at a Washington conference titled "The New FCC: Agenda for the future," Mel Karmazin, CEO of CBS, said that broadcasters who push for DTV/cable-TV must-carry while seeking deregulation elsewhere are hypocritical. Desirable shows, according to Karmazin are "our form of must-carry."

Our industry has the proclivity for speaking out of both sides of its mouth. This phenomenon manifested itself this past summer when a Miami federal

District Court issued an injunction that would stop the delivery of CBS and Fox affiliate signals to subscribers of direct-to-home (DTH) satellite subscription service. As a subscriber to DirecTV, I received a letter stating that, although I pay for this service, I would have to request a waiver from the local FOX and CBS affiliates in my area to continue receiving CBS and FOX signals via satellite. The court found that subscribers might be violating some obscure federal law.

It is strange that, in one breath, broadcasters insist that cable companies carry their programming and yet, in another, have problems if satellite providers carry that same programming. Many of us, when we've pulled up stakes and moved to other parts of the country, will subscribe to our old hometown newspapers so we can keep in touch with what's going on back home. Many of these hometown newspapers carry networks, such as the Associated Press, UPI or features from King Syndication, and it doesn't seem to make much difference where we read their material, be it Los Angeles, Allentown, PA, or Timbuktu.

This matter should come down to supply and demand. If enough subscribers wish to see a particular channel from a particular market — irrespective

of where they are — and if these subscribers are willing to pay monthly fees to the carriers, it shouldn't make any difference how the channel gets to them, be it satellite, microwave, repeaters or smoke signals.

NAB has also been flailing its political arms about this matter for a long time. Though it's hard to say whose side NAB is on, it's not on the side of the viewers — that's what I think.

Senate Commerce Committee Chairman John McCain (R-AZ) introduced a bill in September that would keep DBS/DTH from having to provide a market's entire broadcast signal until Jan. 1, 2002. The bill also requires the FCC to decide who may receive the signals of distant affiliates by 1999. The Senate let the bill die and probably won't address it until next year.

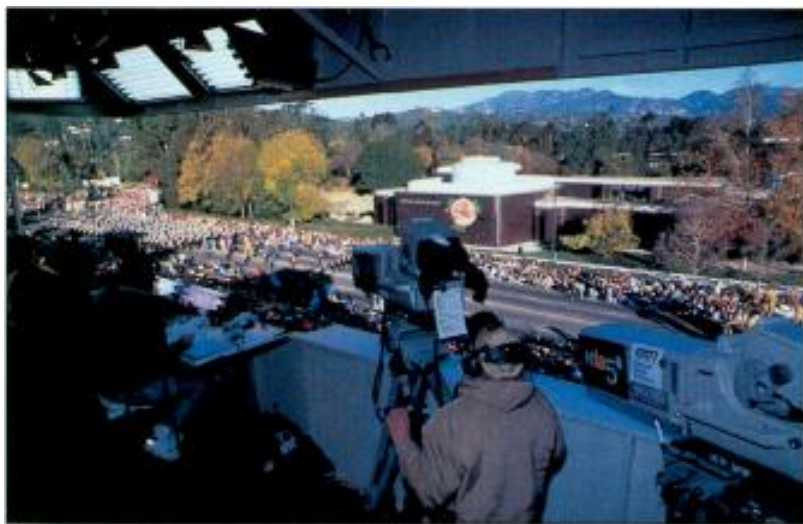
House Telecommunications Subcommittee Chairman Billy Tauzin (R-LA) is working on similar legislation that will allow satellite TV companies to offer local signals without full coverage for a set time.

EchoStar Communications Corp. has been trying to provide its subscribers with local-into-local service, but its efforts have snagged. Once EchoStar has demonstrated that there is a market for those kind of signals, no doubt other DBS providers will follow suit. ■

## National Mobile takes delivery of HD trucks

A few months ago, *Broadcast Engineering* published a story on two new 58-foot-long mobile HDTV rigs for National Mobile Television (NMT) (HD-1 & HD-2) by Sony at its San Jose plant.

Both units have been completed, with HD-1 based in and around New York, and HD-2 headquartered out of Los Angeles. HD-1 and HD-2 are now part of NMT's fleet of broadcast vans digitally equipped by Sony. Besides the five digital trucks al-



**KTLA tested Sony HD production equipment at the 1998 Rose Parade in preparation for the 1999 parade that will use HD-2.**

ready in service, NMT recently took delivery on two more SDTV units from Sony, not to be confused with HD-1 and HD-2.

HD-1 has an interesting journey ahead. Cablevision has committed HD-1 to

200 broadcast events from Madison Square Garden, Yankee Stadium and several other New York venues. After its open house in Southern California, HD-2 will get its shakedown doing the Rose Parade in Pasadena, CA, by Tribune's KTLA.

Southern California's KTLA-TV 5 has long been known for its ability to write TV history, especially in the early days. As one of the oldest

TV stations in the country, first broadcasting with the call letters W6XYZ, KTLA was the first ever to broadcast the Rose Parade. It has done so every year since 1947. The 51st Rose Parade coverage will be in HD. ■

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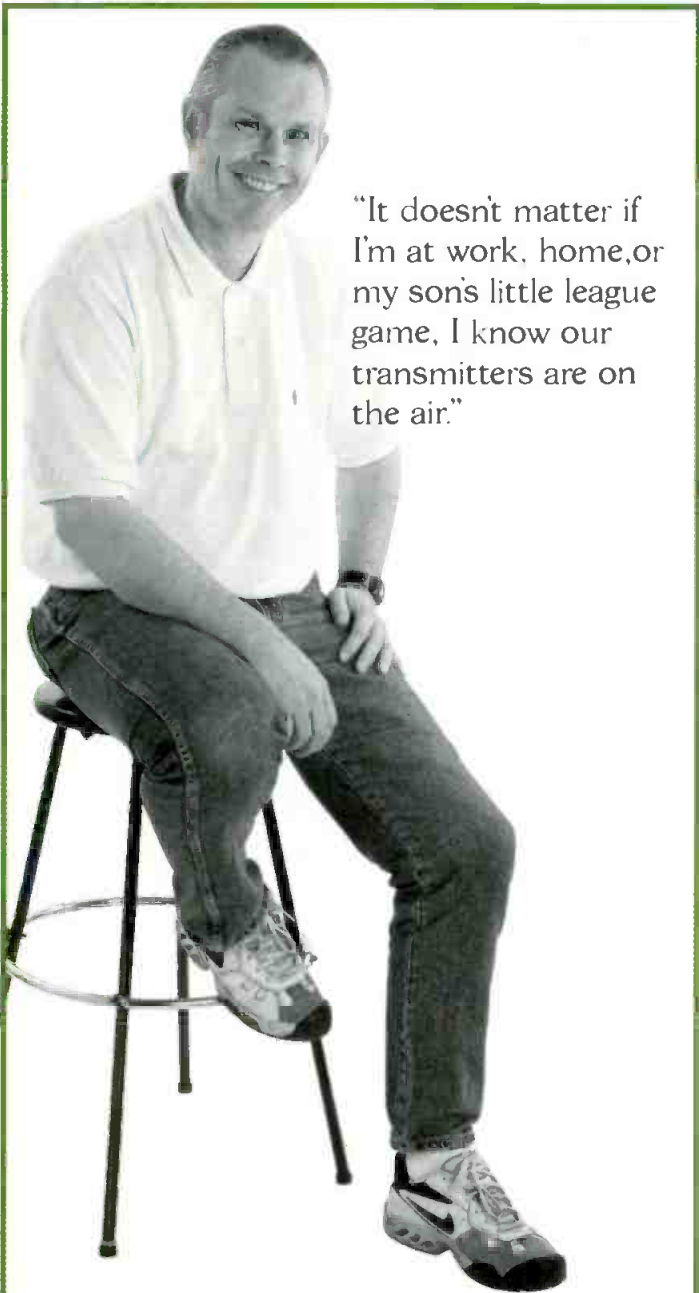
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## Stations look to multicasting

According to Mel Karmazin, CEO of CBS, desirable shows are broadcasters' form of must-carry. But what if cable operators don't pass on what the broadcasters are sending them? Based on what cable industry leaders such as John Malone of TCI are saying, cable companies may well strip off opportunistic data or convert HDTV to SDTV.

Karmazin said CBS will supply whatever the public wants, whether it's HDTV or multicasting but the latter development is years away. CBS has had a proclivity for making interesting predictions. Remember Joe Flarity and the antimatter machine being a reality before digital TV?



David Smith, Sinclair Broadcast Group

Last month's survey of local engineering managers asked the question, "What are your plans or have you considered multicasting?" The response was almost unanimous. Engineers simply want to get DTV on the air before considering any additional enhancements. This response wasn't surprising considering all the hoops

they had jumped through to get towers and equipment ready for this first window.

However, multicast is not something that should be shelved altogether. PBS has stated that they plan to multicast in the daytime and provide HD at night. The Sinclair Broadcast Group has also proposed multicasting as a solution.

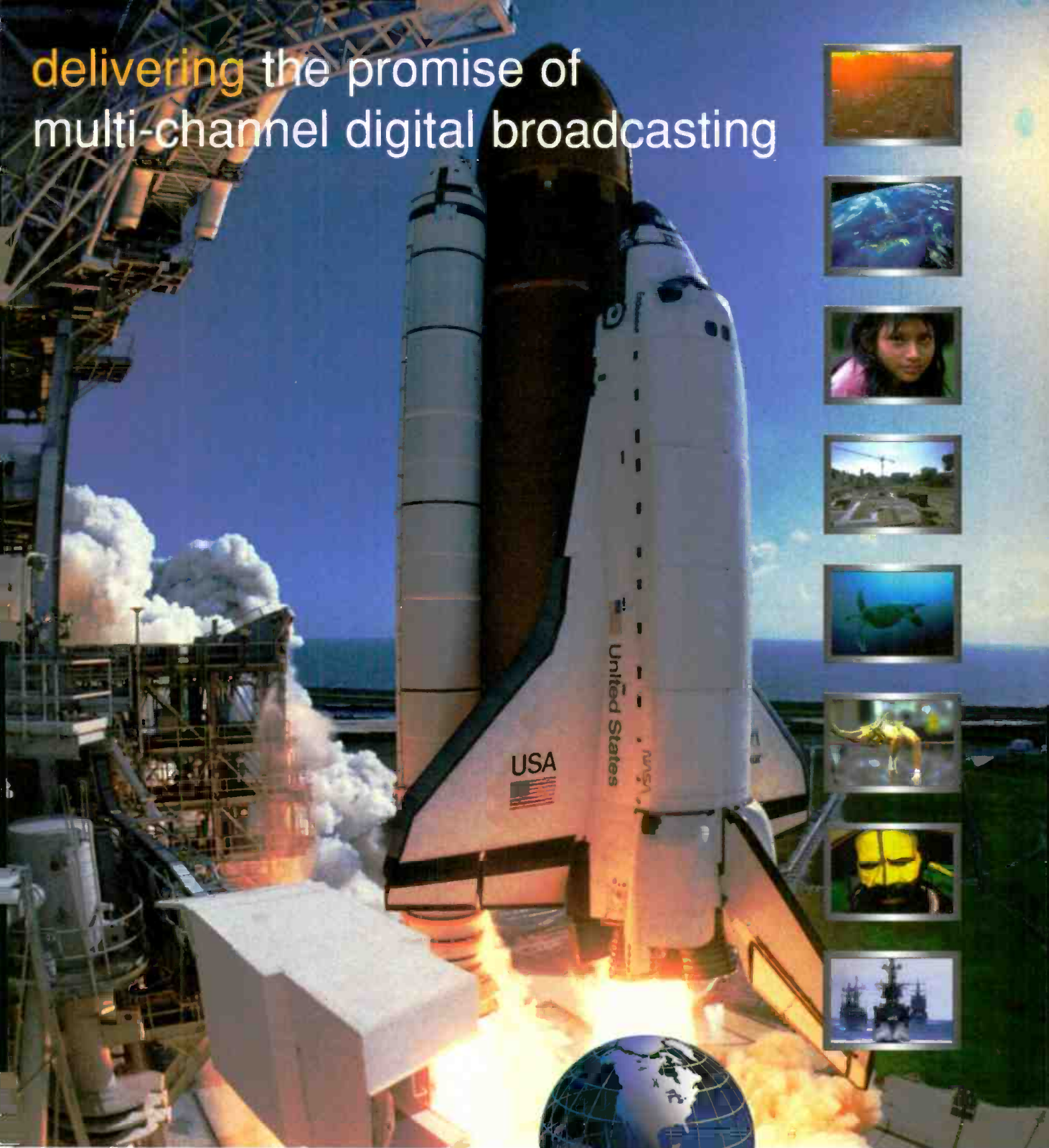
The key to successful multicasting is bandwidth management. This means you don't simply put five or six channels of digital bitstream program information in a 6MHz slot, then walk away. The key to compression is taking into account the change and rate of change in each succeeding picture or field on each of the channels, once encoded, at the point where they are to be multiplexed together.

For example, in our multicasting scenario, assume we're going to air a cartoon on one channel and a football game on another. There is little detail in a cartoon and let's say, at this point in time, the picture doesn't have much action. This means little bandwidth is required to transmit that program. On the other hand, a camera on a moving wide shot of a football stadium would require much more bandwidth. Bandwidth management means comparing all of the encoded digital bitstreams we want to put into the 6MHz slot and giving each only the minimal bandwidth it needs, rather than treating them all equally. However, it takes some rather sophisticated software to pull this off.

A recent *New York Times* article, "Is Television's Future In This Man's Hand?," discussed Dave Smith, head of the Sinclair Broadcast Group, who is a proponent of multicasting rather than HD. The story quotes Salomon Smith Barney analyst Paul Sweeney as saying, "Dave Smith is years ahead of everybody else in the business."

In an exchange in the story between Smith, calling for multicasting, and Jamie Kellner, WB network's chief executive, who favors HD, Smith said, "It makes no sense to want to be a single channel. Why should I continue to allow the cable guys to pick me apart?" Kellner responded: "It will add a dimension

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Consider this. Kellner doesn't control a signal TV station, but Smith controls 14 of the stations in the WB network. Add to Smith's list 22 Fox, eight UPN, seven ABC, six NBC, four independents, and three CBS stations for a total of 64 Sinclair-operated stations. Compare that with none for the WB network (Time Warner owns one) a 10 for Disney/ABC. So who has the practical TV experience?

If you're watching the Fox or WB

stations in Baltimore, the ABC or Fox stations in Columbus, OH, ABC or UPN in Winston-Salem, NC, WB or an independent in Las Vegas, you're watching a Sinclair station. The requirement to make the conversion to DTV rests with the stations that are required to do so and to choose HD or not, not networks. Smith is a bottom-line guy. He sees costs but no return with HD. Smith asked how many sets would be able to receive this technology when it first signed on? The answer is essentially none. "You have to go in the hole big

time before you are going to see any return." said Smith.

But Smith does see a positive side to HDTV: "The guys who are spending money to get a better-looking single channel are just creating a better chance for Sinclair Broadcast Group." ■

## Set-top boxes

There is much to be learned from the direct-to-home (DTH) satellite services, which have been sending digital-to-home set-top boxes for several years now. We know that electronic program guides are a thing of the future and that conditional access and subscription management systems will play a big roll in any pay-per-view or video-on-demand offerings.

Although not much has been said about multicasting, keep your eye on it. As soon as the "bean counters" figure out what we engineers have known for sometime — get more people to watch what you are doing so you can sell more of what you are doing — they'll be beating engineers' doors down. Cable and DTH have been doing multicasting since they began. For the first time in broadcast history, broadcasters can compete with cable and DTH on their level. (Remember, nobody has ever said that you have to do multicasting 24/7. PBS has said that they will do multicasting in the daytime and HD at night.)

Another area to keep your eye on for data exchanges is interactive television. It's surprising that cable hasn't done much in the interactive arena. There are a few isolated cable interactive systems, but nothing on a wide scale. The technology is only now becoming available to make it affordable and viable irrespective of the method of delivery: terrestrial, satellite or cable. Cable is the only method of delivery that doesn't have to assume that you have a telephone line to respond on as you could respond on the cable system itself. In any of these cases, because of the different approaches and services to be offered, you will almost certainly have to interface through or with a set-top box. (The value of the real estate on top of your TV set continues to increase.) ■

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According to the executives at NMT, it was Fujinon's quick turnaround time, the company's past service history, and the lens' superb image quality that convinced them Fujinon was the right lens for the HD-1.

Look for high-definition sports telecasts on MSG and see why Fujinon is the clear choice.



## FCC streamlines application processes

BY HARRY MARTIN

In October, the FCC adopted new procedures to simplify radio and TV applications and, starting in the fall of 1999, the agency will require them to be filed electronically. The FCC additionally revised the requirements for selling and extending unbuilt construction permits and decreased the frequency of ownership reports to every two years.

The FCC simplified 15 key broadcast application and reporting forms to make them compatible with electronic filing. In many cases certifications have been substituted for the narrative exhibits currently required. The FCC will conduct random audits of up to 5% of pre-grant and 5% of post-grant applications, with serious penalties for false certification.

Electronic filing will not be available before March 1999, but will become mandatory on a form-by-form basis six months after a form is eligible for electronic filing. The Children's Television Programming Report (Form 398), available for electronic filing since the spring of 1997, must be filed electronically starting January 10, 1999. The FCC will make available computer software that permits forms to be filled out directly on a computer screen, with the completed form transmitted instantly to the FCC via the Internet. Electronic forms will include fee submission information. Security will be ensured through the use of passwords selected by the applicant or licensee and unique account numbers assigned by the FCC. Applications will be available to the public via the Internet shortly after they are filed.

All initial broadcast construction permits will now be issued for three years, in lieu of the current two years for full-power TV stations and 18 months for other broadcast facilities. In addition, the FCC eliminated the current restrictions on for-

profit sales of unbuilt stations, allowing permits to be sold for any price the parties negotiate.

Ownership reports for commercial stations will now be filed every two years instead of annually. In addition, the revised ownership report form will require identification of the race/ethnicity and gender of each individual or entity having an attributable interest in the licensee or permittee.

### FCC looking at new EEO rules

On November 20 the FCC proposed revised EEO rules for broadcast and cable.

The proposed rules are similar to those invalidated in the Lutheran Church case, except without the numerical EEO processing guidelines targeted by the court. Rule 73.2080(a), which bans employment discrimination because of race, color, religion, national origin or sex, would be retained, and the "outreach" requirements of Rules 73.2080(b) & (c), such as the following, would be reimposed:

- Utilize media, minority and women's organizations, educational institutions and other sources of minority and female applicants to supply referrals whenever job vacancies are available.
- Communicate the station's EEO program and employment needs to sources of qualified minority and female applicants.
- Conduct a continuing review of job structure and employment practices.
- Post notices informing employees and job applicants of their EEO rights.
- Undertake to offer promotions of qualified minorities and women in a non-discriminatory fashion to positions of greater responsibility.
- Analyze efforts to recruit, hire and promote minorities and women and address any difficulties encountered in implementing the EEO program.
- Record keeping on all of these efforts would be required.

To enforce its proposed rules, the FCC would require that job "applicant pools" include minorities and women. The use of applicant pool-analysis, which focuses on "efforts" rather than hiring quotas, first was emphasized by the FCC after the Supreme Court's 1995 decision in *Adarand Constructors, Inc. v. Peña*, which struck down government-imposed racial classifications in hiring.

The FCC also is proposing to require broadcasters and cable entities to use a minimum number of minority and female-specific recruiting sources (e.g., at least six) to fill each job vacancy.

Compliance would be monitored through review of a new Form 396 to be filed at renewal time and through random audits. TV stations would be subject to mid-license term EEO reviews, and cable systems' EEO performance would be monitored as part of the annual certification process. ■

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

## Dateline

Children's TV Program Reports (Form 398) must be filed electronically on or before January 10, 1999.

On or before February 1, 1999, TV, LPTV and TV translators in New Jersey and New York must file their renewal applications. Wyoming LPTVs and TV translators also must file renewals on February 1.

Commercial stations in the following states must submit their annual ownership reports by February 1: Arkansas, Louisiana, Mississippi, Kansas, Nebraska, Oklahoma, New Jersey and New York.

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## Do your station a favor: Teach the DTV basics

BY LOUIS LIBIN

It's important that personnel, from the technician to management and everyone in between, understand some of the primary DTV issues and language. It is not enough that the chief engineer understands coverage and interference: Others within the station need to be able to talk to your audience and community about DTV and its advantages, as well as the station's plans.

### Understanding the language

The term "maximization" means that all stations, particularly ones with smaller NTSC service areas, should be able to expand DTV coverage beyond the bounds of their current NTSC service area provided that the increase in service does not cause new interference to NTSC service.

DTV service areas are defined as the Grade B service minus the interference from other NTSC and DTV stations. NTSC service areas are defined as the Grade B service minus the interference

from other NTSC stations. Service areas do not include the coverage provided by translators.

Full replication represents a 100% match between a station's NTSC and DTV coverage. Some stations may achieve more than 100% replication because their DTV service area extends beyond the NTSC service area. In other cases, a station may achieve only 98% replication. However, this doesn't necessarily translate to a smaller potential audience. The smaller area may reach a larger audience because of the directionality of the DTV pattern. Stations should focus on where they are getting coverage, not just replication figures.

### Power levels

Remember that for any station the authorized power levels were developed for planning purposes and to protect the contour of DTV coverage. DTV transmission can be started without going to full power. If certain power

levels are unattainable or unaffordable at the time construction begins, stations can operate with less power and still be able to modify facilities later. In addition, it's a good idea to consider higher towers in order to reduce power requirements. While the initial cost of a higher tower may be greater, cutting the cost of transmitter operation saves money every month. Run the numbers to see if the costs of putting up a taller tower would be offset by utility costs.

There are no easy answers. Recently, the FCC issued a Public Notice providing additional information for those stations whose DTV service facilities will not exactly meet the FCC's allotment plan. The Notice, *Additional Application Processing Guidelines for Digital Television* is available from the Commission's website: [www.fcc.gov/Bureaus/Mass\\_Media/Public\\_Notices/TV\\_Notices/pnmm8116.txt](http://www.fcc.gov/Bureaus/Mass_Media/Public_Notices/TV_Notices/pnmm8116.txt).

*Louis Libin is a broadcast/FCC consultant in New York and Washington.*

## Expert's Corner/Vendor Views

### Getting a grip on network audio

What's the easiest way to handle the multichannel audio coming down from my network? How do I handle break-ins and audio-over announcements on network feeds? What if I don't plan on generating a 5.1-channel stream for local production?

#### Expert



Jim Starzynski, project engineer, NBC headquarters.

In the beginning stages of DTV, some different versions of digital audio from the network to the affiliate are possible.

#### Channel-stereo-compatible, matrixed surround

In many cases, the network will be sending an uncompressed, PCM AES, digital-stereo pair that is matrix-surround encoded containing a left total (LT) and a right total (RT). This is the same type of stereo-compatible audio program that's been in use in analog form since the mid/late '80s. If your station receives AES LT RT from the satellite decoder, treat it as you would have in the past. Special decoding to do local cut ins or voice-overs is not necessary. Route the program on a stereo AES digital router (one AES channel is necessary; two are desirable for expansion) and mix in the added local material. If your audio console is analog, D/A and A/D conversions are necessary. Send the edited/mixed AES program to the AC-3 encoder (Dolby DP 567 two-channel or Dolby DP 569 six-channel running in two-channel mode or the AC-3 encoder built into the station's ATSC encoder). Correct for any latency issues, and monitor the audio with a decoder.

This process is also appropriate for local two-channel production in lieu of sending a 5.1. Set the metadata in the audio service menu of the AC-3 encoder to the following settings:

- Channel Mode: 2/0
- Data Rate: 384Kb



## Expert

- Bit-Stream Mode: Main complete
- Dialogue Level: -27 (default)
- LFE: Automatically disabled in 2/0 mode

- Dolby Surround mode: Dolby Surround (override the default)
- Dynamic Range: Film Standard

Important: Don't attempt to decode the LT RT to four-channel and build a new 5.1 program for the encoder. This type of program will not be downmix-compatible for those DTV audiences limited to Dolby Surround or two-channel by their receivers.

### Compressed 5.1 channel

If your network is sending a compressed multichannel feed, the fun starts here. One to six channels of compression are possible from a standard AC-3 encoder for the satellite feed if the satellite encoder can pass unprocessed AES audio. If the bit rate is set to 640Kb, a couple of cascades of the audio are possible without noticeable degradation. This will allow you to baseband process the signal later. This compressed audio is not frame-coincident with the video and can't be cleanly switched until decoded, but can be routed on one of a router's AES pair. After decoding, the audio can be treated as six discrete channels (three AES pairs) switched/edited and mixed with voiceover on a digital board. Send the edited/mixed AES program to the AC-3 six-channel encoder, correct for any latency issues and monitor the audio with a decoder.

Set the metadata to the following:

- Channel Mode: 3/2
- Data Rate: 384 Kb
- Bit-Stream Mode: Main complete
- Dialogue Level: -27 (default)
- LFE: Enabled
- Dolby Surround Mode: Not Dolby Surround (default)
- Dynamic Range: Film Standard

### Discrete 5.1 channel

It's not likely the network will send six discrete channels (three AES pairs) on the satellite. However, the process is the same as above without the AC-3 decoding of the satellite feed and a new requirement for three AES-pair routing in the station.

## Vendor



Tom Dally, marketing manager, Broadcast Products, Dolby Laboratories.

While there is a lot of excitement generated by the capability of broadcasting 5.1-channel digital audio in the form of Dolby Digital (AC-3), multichannel audio is already a common broadcast delivery format. By matrix-encoding four audio channels into a two-channel audio format, Dolby Surround has become a popular method for getting the multichannel audio experience to customers. While the creation and delivery of 5.1-channel audio is a reality for some today and for everyone soon, most facilities are not ready to handle it. To accommodate all affiliates, networks will continue to deliver surround-encoded tracks to affiliates along with 5.1-channel audio. As a first step, broadcasters should consider upgrading facilities to create and handle Dolby Surround while keeping in mind the requirements of Dolby Digital 5.1-channel audio.

With almost 100 prime-time network series, plus special events and sports now being produced with surround sound, and with more than 15-million surround consumer systems in use in the U.S., surround technology has reached a penetration level that warrants consideration by any facility involved in the creation or broadcast of TV programming. The best news is that, except for producing and monitoring, the broadcast distribution chain is the same for surround-encoded material as for stereo material.

When LT-RT signals are fed into a Dolby Digital encoder, the presence of surround can be communicated through an audio metadata parameter in the bitstream. The metadata can be preset in the Dolby Digital encoder. When the consumer's Dolby Digital system receives the metadata parameter, it automatically activates the Dolby Surround processor and presents a decoded four-channel program to the consumer.

To ensure quality and make this system work, broadcasters need to consider several issues when mixing and monitoring in Dolby Surround. In the production suites and master control, it is important to monitor the quality of the soundtracks in Dolby Surround, stereo and mono. Broadcasters need to assure themselves that they can hear what consumers at home are hearing. Additional speakers, amplifiers and metering are required to accommodate the multichannel signal. When mixing for a multichannel signal, the console must have additional bus outputs. With these and any other plan-ahead equipment purchases, be forward thinking. The same equipment will soon be used to create a 5.1-channel signal. When it comes time to implement multichannel audio into a broadcast facility, consultants are available to assist in the setup and use of Dolby equipment and the use of trademarked logos.

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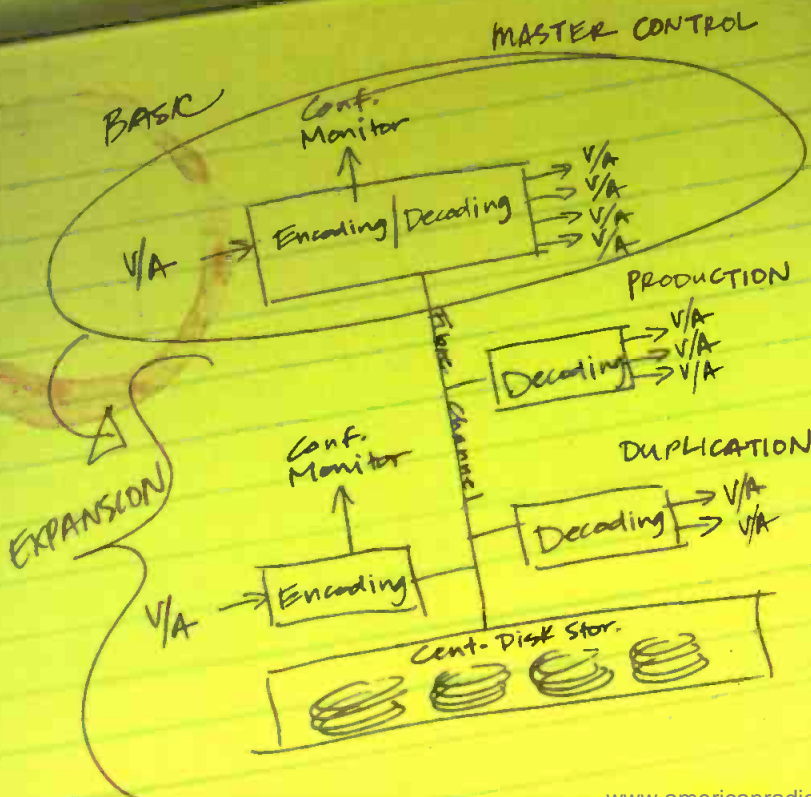
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## Vendor



Tom Crabb, technical support manager, NVISION.

The chosen ATSC format for delivery of multichannel audio to the consumer is Dolby Digital (AC3). This compression format is an efficient way to transport up to 5.1 audio channels. Once multiple channels have been mixed for surround and AC3 encoded, there is likely to be serious generation loss if they are decoded and then re-encoded after editing. The audio you are receiving from the network in a DTV broadcast is likely to be a stereo pair at present, as no reasonable way to record six baseband audio channels exists, outside of *slave-locked* multitrack audio recorders. The stereo pair could be encoded for Dolby Pro Logic Surround, which can also be delivered via the AC3 system.

Mezzanine compression formats will provide a method of receiving and distributing multiple audio channels. Dolby E and APTX will allow up to eight channels transported in a single AES stream. These formats allow recovery of all channels in baseband form. You will be able to edit for commercial insertion and mix in a voice-over before sending the audio feed to the AC3 encoder for transmission. There are two advantages in these new formats: The first is the ability to recover the baseband audio channels to do the processing required in your facility and still deliver the original multichannel mix received from the network. Second, all channels are

transported together, ensuring that the original audio phasing is accurately maintained. These compression formats allow editing on videotape, provided that the edit machine is surrounded by an appropriate audio codec. The disadvantages include additional equipment costs and edit-point latency.

Audio for DTV delivery represents one of the most serious challenges, due to the current limitation of four audio channels per VTR. As usual, the most straightforward way to handle audio is in its baseband form. Compression formats will change, and you will probably have to deal with several formats at a time. If VTR manufacturers can add more channels to new machines, life will get easier. Remember that the common denominator will always be the full-bandwidth signal. As long as you can get back to baseband, you will always be able to get the job done.

If you'd like to respond to the expert's and vendors' viewpoints, leave a message at the *Broadcast Engineering* website: [www.broadcastengineering.com](http://www.broadcastengineering.com).

# ATSC

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## Transition to Digital



### Routing switchers: The mezzanine approach

BY MICHAEL ROBIN

The preferred way to distribute standard-definition digital signals throughout facilities is the bit-serial distribution concept. The data rates, as detailed in SMPTE 259M, are:

- 143.2Mb/s (NTSC composite video, 525/60);
- 177Mb/s (PAL composite video, 625/50);
- 270Mb/s (CCIR 601 component video, 525/60 or 625/50);
- 360Mb/s (component video, 525/60 16:9 aspect ratio)

At the 270Mb/s data rate, copper cable of 200- to 300-meter lengths can be reliably used. Slightly longer cable lengths are possible with 143Mb/s and slightly shorter cables are possible with 360Mb/s rates. This, of course, assumes that a reclocker with adaptive, cable-loss equalization is in use by the receiver.

For those unfamiliar with it, the 360Mb/s data rate was born of the idea for generating a digital signal with a 16:9 aspect ratio that maintains the same analog horizontal resolution as obtained

with 270Mb/s, 4:3 aspect ratio signals. To do this requires increasing the Y sampling frequency from 13.5MHz to 18MHz. This increase is based on the following formula:

$$\text{Aspect} \quad \text{Sampling Rt.} \quad \text{New Rate} \\ \frac{(16:9)}{(4:3)} \times 13.5 \text{ MHz} = 18\text{MHz}$$

The Cb and Cr sampling frequency is also increased in the same ratio, resulting in 9MHz instead of 6.75MHz. This concept was not been favored by the broadcasting industry, which preferred the use of an SD 16:9 format using CCIR 601 sampling frequencies and a slightly reduced horizontal resolution. The 360Mb/s 16:9 format has been forgotten. However, the 360Mb/s bit rate has been targeted by all bit-serial distribution equipment manufacturers.

#### Routing switcher types

Three bit-serial routing switcher concepts coexist on the market as follows:

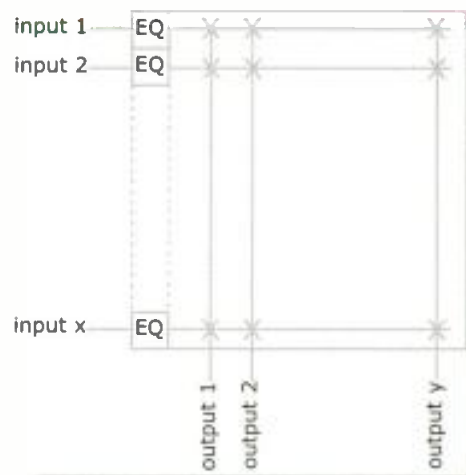
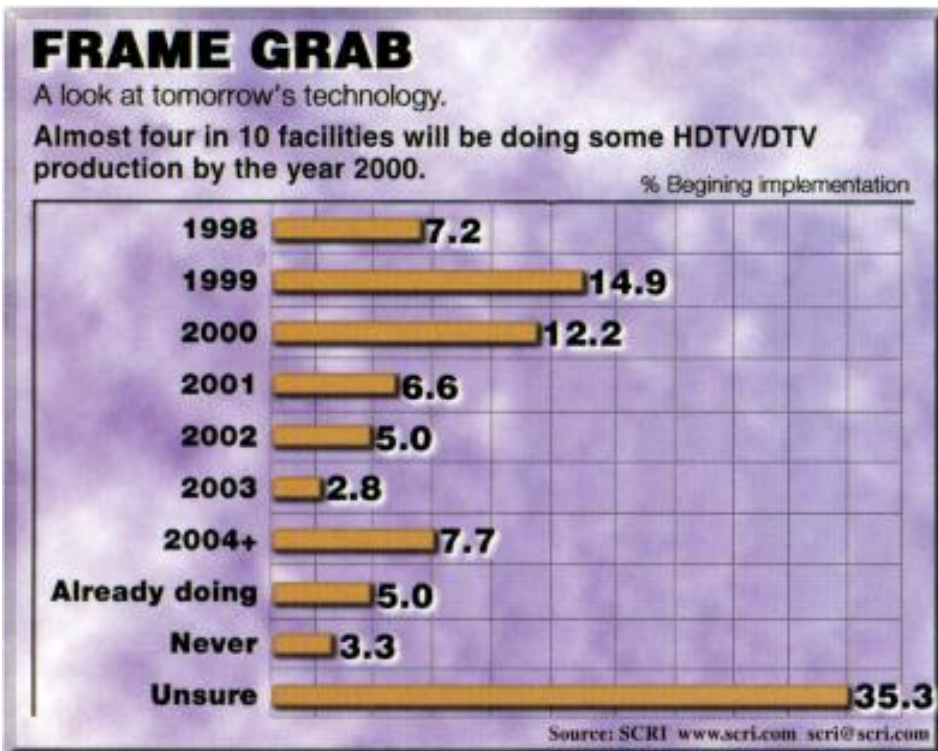


Figure 1. Simplified block diagram of a wideband analog routing switcher.

•*Wideband analog switchers:* As the name implies, this routing switcher concept circulates the bit-serial signal as if it were a wideband analog signal. These switchers usually incorporate analog high-frequency equalizers for every input. In most cases, signals available at the output suffer from degradations due to the added noise and the limited switcher bandpass. Most have difficulty meeting the specifications of SMPTE 259M. On the positive side, these switchers pass any type of bit-serial signal of compatible bandwidth because they are indifferent to the data rate. Figure 1 shows a simplified block diagram.

•*Digital switchers with reclockers at every output:* These switchers are an improvement over the analog approach. Reclocking the digital signal at the switcher's output removes all traces of noise and regenerates the original SMPTE 259M waveform. Depending on the design, the output reclocker locks automatically to the datastream or has to be programmed to operate with the selected data rate.

•*Digital switchers with reclockers at every input and every output:* These switchers regenerate the input signal to the original waveform. The output re-



clocker eliminates any waveform distortions and noise generated by the internal high-frequency losses of the switcher. Again, depending on the design, the input and the output reclockers can lock automatically to the input signal or will need to be programmed to operate at the selected data rate. Figure 2 shows a simplified block diagram of this type of digital routing switcher.

#### DTV scenarios

It is expected that network-originating studios will operate in HDTV for a given number of hours per day, gradually increasing as we advance toward the NTSC shut-off date of 2006. The rest of the day, they are likely to operate using a 16:9 SD format. This will likely require the generation and distribution of digital signals with a variety of bit rates.

Initially, network affiliates are expected to pass the network-originated signals in their original format. Locally generated programs will be inserted in either SDTV or in an upconverted HD format. In the future, increasing numbers of HDTV local inserts will be generated. This type of operation will also require the generation and distribution of digital

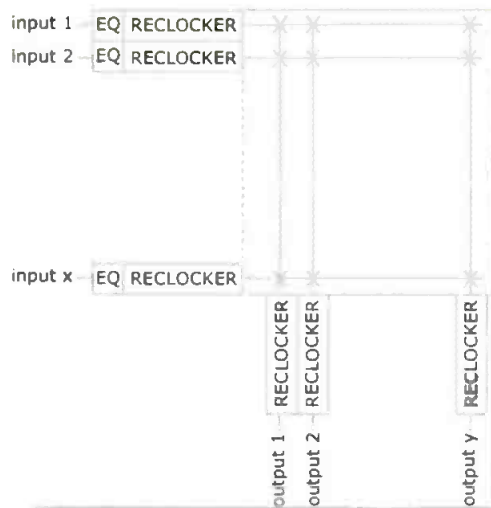


Figure 2. Simplified block diagram of a digital routing switcher with reclocked I/Os.

signals with a variety of bit rates.

Analog HD signals (not exceeding the 1920/1080/30i format) generate digital bit rates of the order of 1.5Gb/s. As a consequence, the HD signal distribution choices inside the studio are as follows:

- *Distribute HD signals in the native component-analog format as wideband GBR or YPBPR:* This approach is obsolete and undesirable.

- *Distribute HD signals in a 1.5Gb/s bit-serial format:* Given the contemporary

and continuously developing technologies conforming to the SMPTE 292M standard, this choice is becoming cost-competitive and will undoubtedly be favored by newcomers to the DTV field.

- *Distribute HD signals in a mildly compressed (<360Mb/s) bit-serial format and use a bit-serial digital switcher with I/O reclocking capabilities capable of operating at a bit rate of 360Mb/s:* This approach will be favored by studios with a significant investment in a CCIR 601 bit-serial signal distribution facility. It is assumed that network-originating headends have an installed CCIR 601 bit-serial distribution system with a 360Mb/s capability.

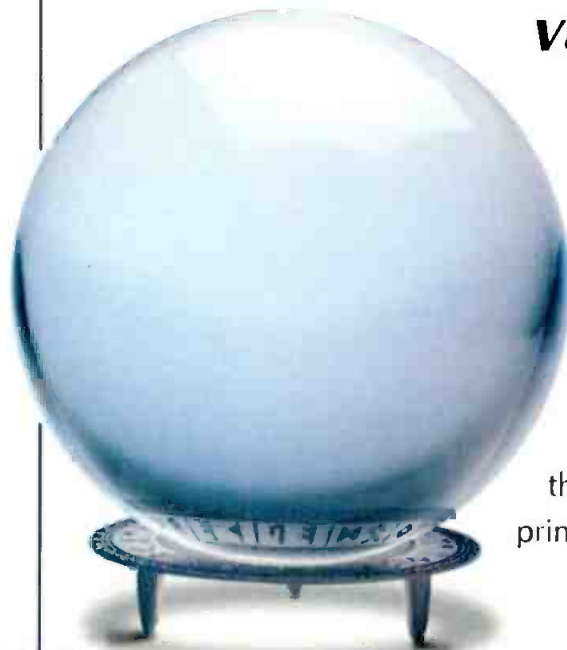
This choice would be further justified, since there are currently no HD 1.5Gb/s noncompressed VTRs available on the market. The state-of-the-art choice would be using a D5-type digital VTR operating at 360Mb/s for recording mildly compressed HD signals.

#### SMPTE standardization activity

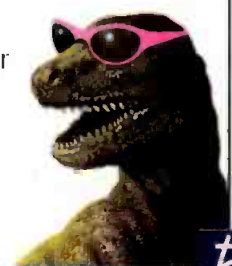
Recognizing the need for standardization, SMPTE is in the process of putting the finishing touches on a standard (305M) specifying the manner in which



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



**A.** Originate in a format that will give you the most data - either 35mm film or one of the HD video formats if your budget allows. 1080i offers the best spatio-temporal capture parameters of all video formats. You can derive all of the ATSC transmission formats from it. And in the future it will give you the best quality conversions to HD progressive. The faster field rate of video makes it more suitable for sports than 24 frame film which is often preferred for prime-time dramas.



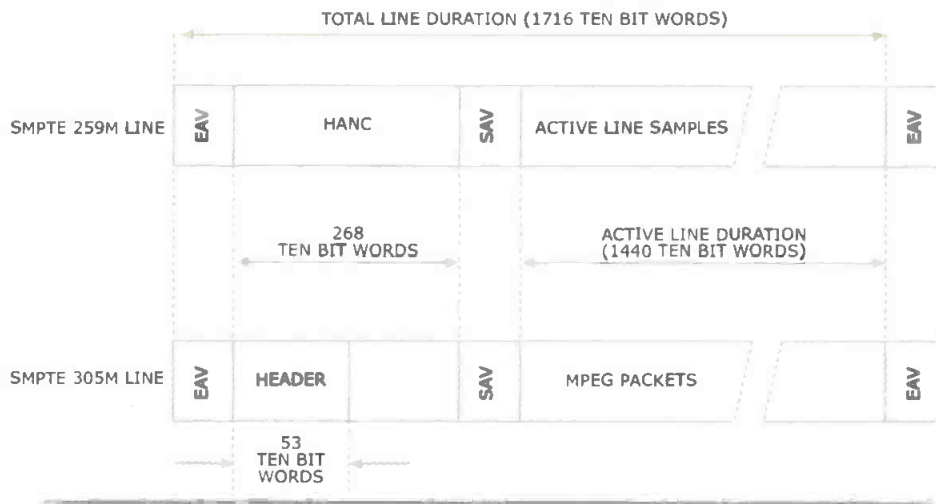


Figure 3. Comparison of the SMPTE 259M and SMPTE 305M data structure

non-CCIR 601 bit-serial digital signals can be formatted for distribution using a 270/360Mb/s routingswitcher. This standard introduces the concept of serial data transport interface (SDTI). SDTI can be used to transport MPEG-2 packetized data within a studio/production center environment. The data packets and the synchronizing signals are compatible with the SMPTE 259M standard.

The proposed datastream is intended to transport over the active lines any

packetized data with a maximum data rate up to 200Mb/s (approximately) for the 270Mb/s system or 270Mb/s (approximately) for a 360Mb/s system. The signal levels and specifications are as per SMPTE 259M. The preliminary specifications are as follows:

- The word clock-rate is 27MHz or 36MHz;
- The data word length is 10 bits, which results in a nominal bit-serial data rate of 270Mb/s or 360Mb/s;

- A header-forming SDTI ancillary data packet is placed between the EAV (end-of-active-video) and the SAV (start-of-active-video) timing-reference signals;
- The data payload is placed between SAV and EAV; and
- The space after the header data but before the SAV is available for ancillary data.

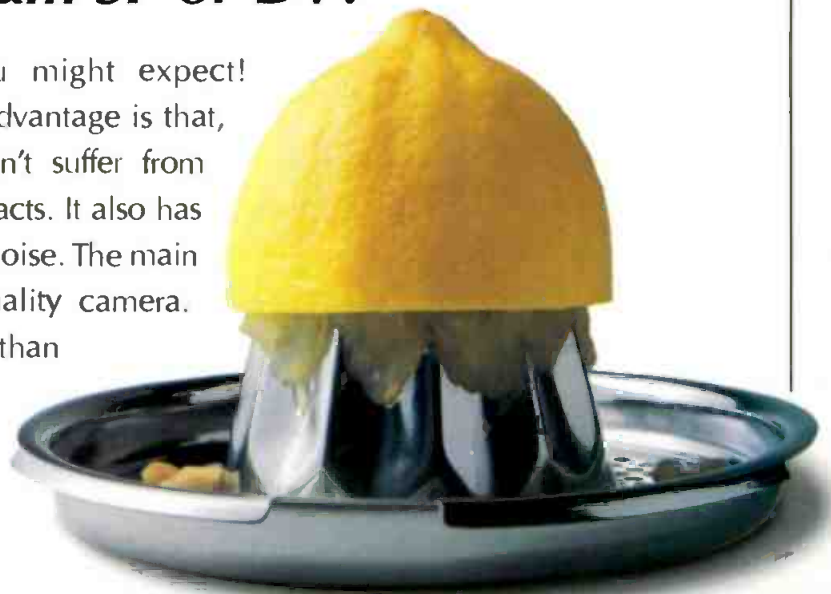
Figure 3 shows the relationship between the horizontal line interval of signals conforming to SMPTE 259M (270Mb/s) and SMPTE 305M. At 270Mb/s mezzanine or intermediate level (IL), switchers offer a solution for distributing compressed HD signals as well as a variety of compressed and non-compressed digital signals within facilities. Given the multiplicity of DTV formats that will be encountered within facilities, the IL routing switcher is likely to become the internal signal-distribution medium of the future. ■

*Michael Robin, former engineer with the Canadian Broadcasting Corporation engineering headquarters, is an independent broadcast consultant located in Montreal, Canada. He is the co-author of Digital Television Fundamentals, published by McGraw-Hill.*

ち SNELL & WILCOX ち

**Q. My budget doesn't allow an HD video format. 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.

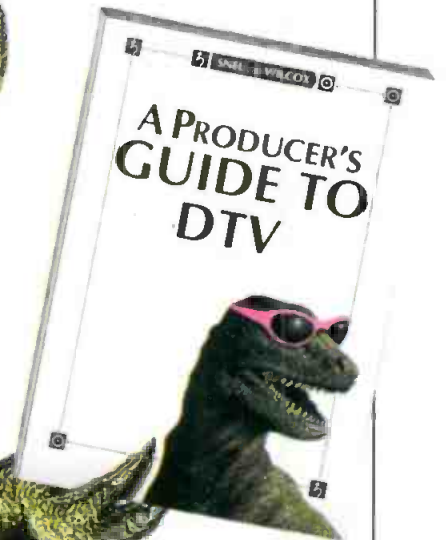
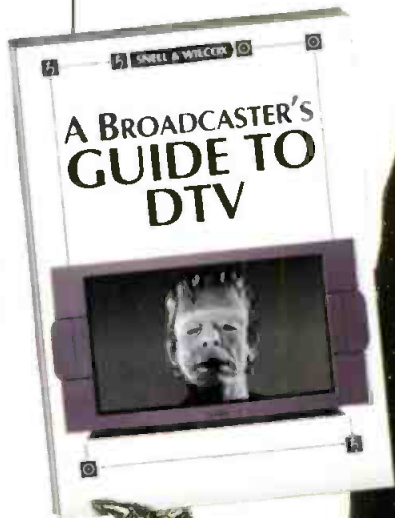




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# Building with fiber

BY BRAD GILMER

**B**uilding your first fiber network, whether for broadcast or computer applications, can be somewhat daunting. However, by observing a few simple guidelines, the task can be an enjoyable learning experience.

## Choosing fiber optic cable

For broadcast use, cable options are divided into two camps — cable designed for indoor distribution and multi-fiber cable optimized for outdoor use.

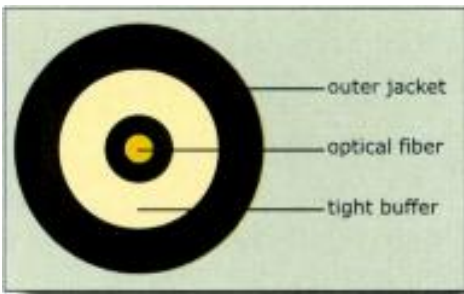


Figure 1. Typical cross section of a single-fiber indoor-use cable.

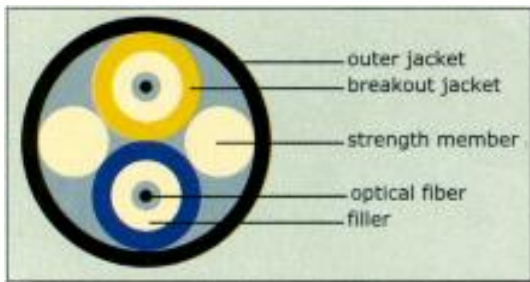


Figure 2. Cross section of a multifiber indoor-use cable. Cables such as this can be terminated without a breakout kit.

Additional cable types are available for intercity and longer applications, but broadcasters typically do not install and maintain this type of fiber optic network.

Looking at the cross sections of indoor and outdoor fiber optic cables reveals a great deal about their construction and intended use.

Figure 1 shows a single-fiber cable suitable for indoor use. Note that it contains a single-fiber strand with a tight buffer surrounding it. The result is a robust cable that can be terminated directly without any special considerations. Broadcasters may choose to employ a cable like this as a jumper between a

desktop graphics device and a wall plate or behind equipment racks in a point-to-point application. These cables can also be obtained in siamese zip-cord pairs.

A multiple-fiber indoor-use cable is shown in Figure 2. Cables such as this contain two or more tight-buffer cables surrounded by a common outer jacket. An important difference between this cable and cables intended for outdoor use is that once the outer jacket is stripped away, termination-ready fiber cables are found inside. Cables such as this may be larger in a multifiber configuration than their outdoor counterparts, but they do not require breakout kits for termination. (More on breakout kits later.)

Figure 3 shows the cross section of a cable designed for outdoor use. There are several significant differences between this cable and the one in Figure 2. First, the outdoor cable contains several fibers separated by a loose-buffer tube. The tube, lubricated by a gel, slides over the fibers. Several fibers are contained in each buffer tube. Note also that the individual fiber strands are not surrounded by a protective jacket. This saves space in the cable, but means that a breakout kit must be used to terminate it. Last, the jacket on the cable is much thicker than the jacket used on indoor cable. The added bulk is due to its fortifications against water and ultraviolet radiation.

Going from outdoors to indoors usually requires a transition. This involves breaking out the loose-tube individual-fiber strands and connecting them to a panel. The other side of the panel is then connected using indoor cable.

A typical breakout kit is shown in Figure 4. Breakout kits are used to convert the loose-tube multifiber cable to a number of tight-buffer individual-fiber cables. These tight-buffer fibers can be terminated with the appropriate connector. The tight-

buffer cables are more rugged and will withstand the environment of a broadcast facility much better than the individual strands of a loose-tube cable.

## Connector selection

If you are concerned about terminating fiber cables yourself, there is good news. Terminating cables is much easier than it used to be.

If you have ever tried terminating fiber cables in the past, you probably still have nightmares about epoxy ovens and sanding little figure eights while repeating some magic incantation. Well, all that has changed. 3M, Sicom and others now make crimp connectors and splices that allow you to terminate fiber easily and at low cost.

Your losses will be in the range of 0.5-1dB per connector. Connector kits cost about \$350, and connectors are about \$6 each.

Gone are the days of the old, biconic fiber connectors in which alignment was a problem. The new FC connectors always mate correctly. With a little practice, you should be able to terminate a fiber in under a minute.

## Ducting

If you have the opportunity, take a tour of a large fiber installation. When you look at the equipment racks, one of the first things you will notice is a large number of yellow ducts running all over the building. Fiber optic ducts are designed to carry fiber optic cables and protect them from damage. They have carefully designed curves and openings

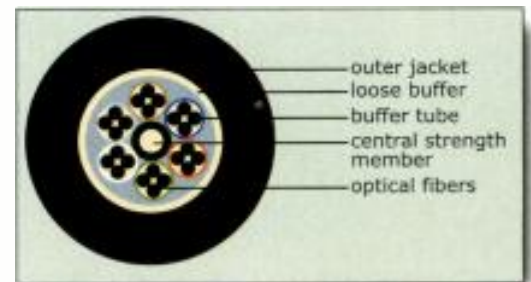


Figure 3. Multifiber outdoor-use cable typically consists of numerous optical fibers contained within a weather-resistant jacket. Terminating these types of cables requires a breakout kit.



*Venice, 1609 - Midnight Sky*



To Galileo, an elaborate puzzle  
waiting to be pieced together.



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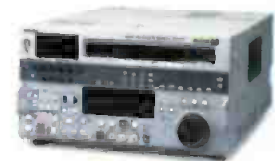
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that protect the cable from stress and excessive bending that can degrade performance or possibly break the fiber. The decision to use ducting is usually based on the amount of fiber being installed and whether the fiber is concentrated in a central area. Be aware that in the not-too-distant future, broadcasters will most likely use significantly more fiber throughout their facilities. For example, fiber may be used to interconnect router frames, thereby eliminating the huge wire bundles currently used.

#### Guidelines for fiber

Finally, here are some guidelines to consider as you build your fiber network:

- Use the right cable. Broadcast installations are not typical telco or cable-system installations. Our needs are specific. For example, using a loose-tube cable when a tight-buffer cable is required can cause maintenance headaches down the road.

- Use breakout kits and termination panels to avoid cable damage and downtime.
- Keep clean. Dirt is a serious problem

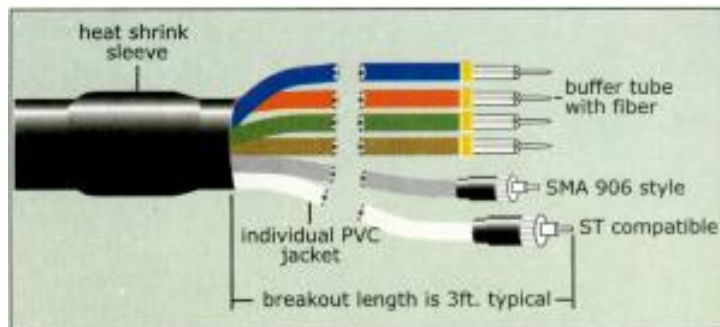


Figure 4. Breakout kits provide a means to transition from numerous loose fibers to single-fiber indoor-use cable.

in fiber installations. If you are building a network and the termination equipment is not yet installed, use dust caps to cover the ends of the cables.

- Avoid unnecessary transitions. Each transition introduces 0.5- to 1dB of loss. If the application requires numerous indoor/outdoor transitions, investigate hybrid indoor/outdoor products that will alleviate transitions at each building entry point.

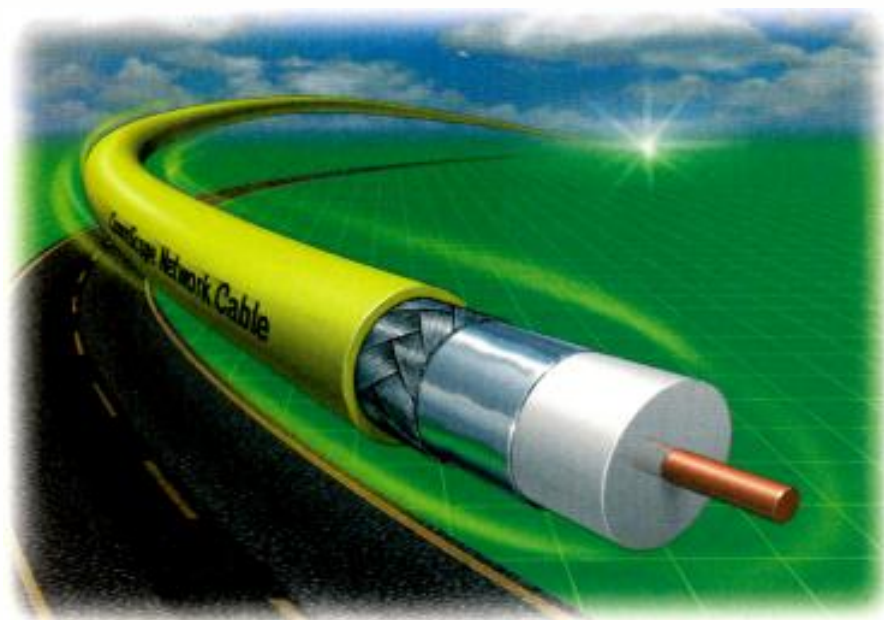
- Run more fiber than you need. The labor costs associated with installing fiber are much more than the fiber itself. Figure out how many fibers you need, then multiply by three. (I used to recommend multiplying by two, but experience has proved this figure inadequate.)

- Run multiple fiber types. If your equipment uses multimode fiber, pull in some single-mode fiber along with it — use of multimode fiber is on the decline. You may avoid a costly cable pull later if you install cable now. If there is extra money in the budget, consider running some 50-micron cable along with the 62.5-micron just in case.

- Talk to your equipment manufacturer. You can learn a lot about fiber optic technology from these experts. ■

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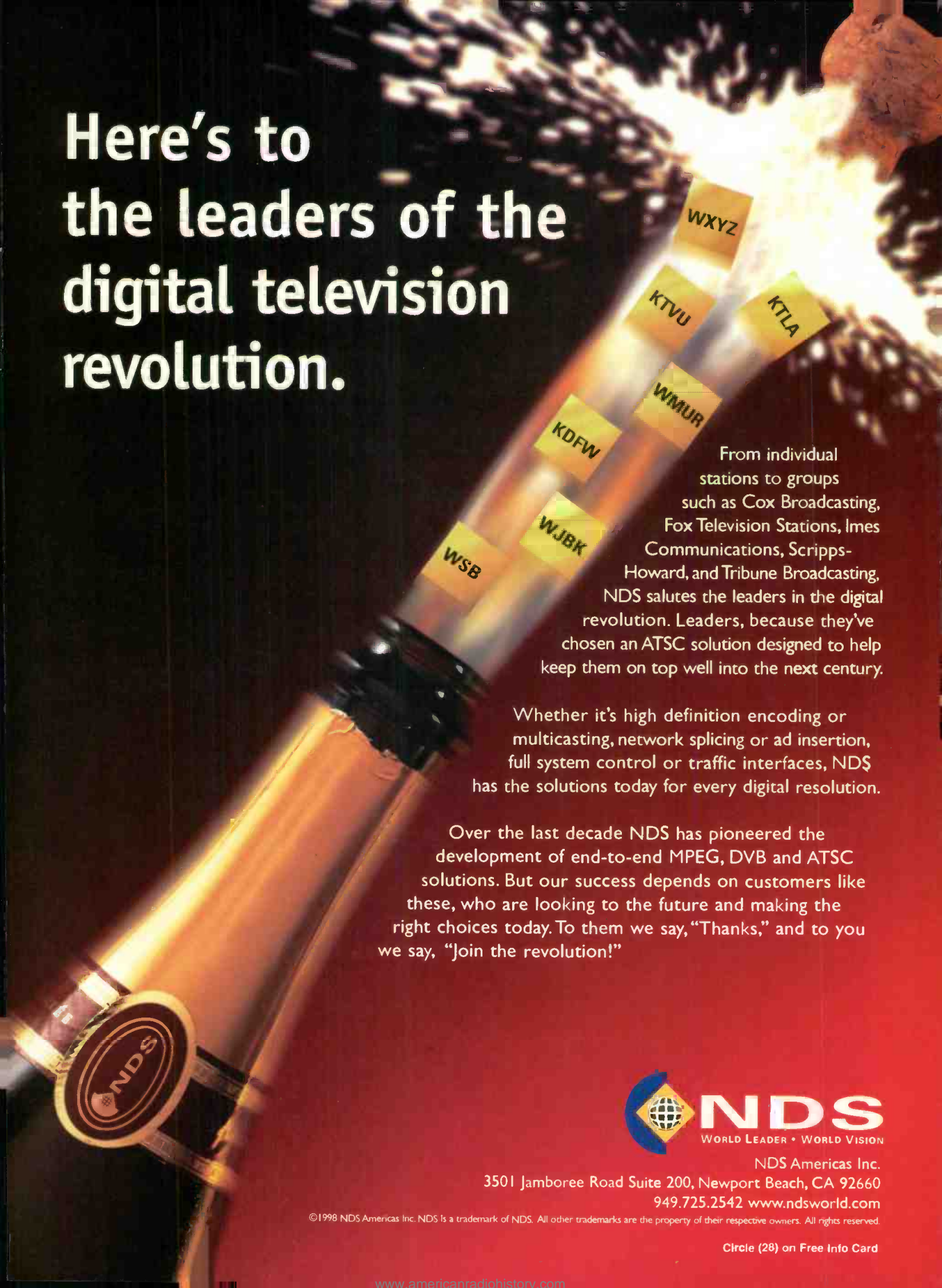
Brad Gilmer is president of Gilmer & Associates, a management and technology consulting firm — (770) 414-9952.

Look for Brad Gilmer's upcoming six part series:

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# Here's to the leaders of the digital television revolution.



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## Tape incompatibilities?

BY STEVE EPSTEIN, TECHNICAL EDITOR

**W**e're in a dilemma. Our business plan for the year includes new camera purchases, and we were leaning toward the Sony DSR130 or perhaps even the new DSR300, both of which record in DVCAM format. We bought into DVCPRO to handle both of the other DV formats, so we figured, "no problem." We also thought to equip some staff with miniDV format palmcoders.



However now we hear this may pose a "problem" which may very well encompass miniDV also (i.e., that ME tapes — both miniDV and DVCAM — will clog the heads of the DVCPRO equipment).

Care to dig into this?

*John J. Beech  
GM (and janitor)*



Dr. Digital responds:

John included two responses he had received from Panasonic. He felt neither were satisfactory.

For those not familiar with the DV consumer format and its professional derivatives DVCAM and DVCPRO (50), DV and DVCAM use metal-evaporated tape while DVCPRO(50) uses metal-particle tape. DVCAM decks can play back consumer DV tapes but not DVCPRO(50) tapes. DVCPRO decks can play back both DV and DVCAM tapes.

I sent the entire exchange back to Panasonic hoping for a more substantive answer. Here is the response:

Panasonic Responds:

Panasonic's DVCPRO technology was developed as a system of hardware, software and selected media to respond to broadcasters' needs after an international agreement was reached regarding DV standards. Broadcaster needs were paramount when design

parameters for quality, integrity, robustness and longevity were determined.

Based upon its overall strength relative to other media, metal-particle tape was selected for the DVCPRO system. A consideration in DVCPRO's design was the possible use of other compatible media such as metal-evaporated tape. The characteristics of Panasonic's metal-evaporated DV tapes were included in this consideration. Numerous tests were conducted using Panasonic metal-evaporated DV tapes, which proved reliable with DVCPRO hardware. However, there were limitations inherent in metal-evaporated tape construction, including increased oxide shedding relative to metal-particle tape. The shedding associated with metal-evaporated tape is one of the reasons metal-particle tape was selected for DVCPRO systems.

For the benefit of end users, our designers included the widest track width in the DVCPRO system to accommodate Panasonic metal-evaporated DV media. Extensive tests of DVCPRO hardware with DVCPRO metal-particle tape and Panasonic metal-evaporated DV tape have been conducted with successful results. Panasonic DVCPRO hardware has proven to be compatible with DVCPRO metal-particle and Panasonic metal-evaporated DV media under varied and diverse physical conditions and environments. However, when Panasonic metal-evaporated DV tape is used in DVCPRO systems, the requirements for cleaning are increased due to the increased shedding of oxide within the transport.

Cleaning requirements for any tape transport are dependent upon a variety of factors, including physical environments, media involved, media quality, care and handling, and manner of use (e.g., straight playback vs. multi-pass editing). In an average editing environment, when DVCPRO metal-particle tape is used, we recommend cleaning once or twice per week. In the

same environment, when using Panasonic metal-evaporated DV tape, cleaning may be required every third day. Within this same environment, when non-Panasonic metal-evaporated tape is used, cleaning may be required every day. These recommendations and requirements are heavily dependent upon the environment, how the tape is handled and the manner of editing.

Panasonic's DVCPRO systems of hardware, software and media remain a field-proven, award-winning system of choice for broadcasters worldwide. If DVCPRO end users accept any media other than Panasonic media into their system, the media's source, characteristics and condition should be verified (this should be true of *any* out-of-house tapes). DVCPRO systems and media are not a closed system, but rather an intentionally designed open system based upon tests using Panasonic media — metal-particle DVCPRO and metal-evaporated DV. The use of other media is up to the end user. Panasonic Broadcast and Digital Systems representatives are just a phone call or website visit away from customers needing additional information.

*Tom Weems  
Manager, Product Marketing,  
DVCPRO*

Well, there you have it. The main point is if you use Panasonic's metal-evaporated DV tape, expect to clean the decks more often, but you shouldn't see any other problems. Using other metal-evaporated products may mean you will be cleaning the decks more frequently.

Need help? Drop me a note at [drdigital@compuserve.com](mailto:drdigital@compuserve.com). ■

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## Transmission & Distribution

### The surprises just keep coming

BY DON MARKLEY



The advent of DTV is upon us. Several stations are on the air broadcasting everything from simple test signals to real HDTV offerings. A handful of sets capable of receiving the signals have been purchased. As for the extent to which these signals are being used on a full-time basis, maybe the late Carl Sagan's novel is applicable, and the residents of some distant planet are now preparing to watch our signals in DTV.

For we earthbound mortals, some TV stations are already starting to taste the fruits, however bitter they may be, of the start of the DTV era. Without being truly specific, one Midwestern station, lets call it "A," recently signed its DTV facility on from a new antenna on a community tower. Everything was done correctly with the best of equipment. Station A is rightfully proud of its system and of the fact that, by implementing DTV, it is among the leaders in our industry. At least one other station does not share A's glee.

The second station is on the same channel as the newly instigated DTV operation. For years, that second station, lets call it station "B," has been happily serving a large area in its part of the state. Like many stations, its service has not been confined to the calculated Grade-B contour, whether computed by the FCC curves or by Longley-Rice. Numerous cable systems have been using Station B's signal with rather generic antennas mounted on tall towers. Station B is not a little facility with shoddy equipment but, like Station A, is a first-class operation operated in accordance with the best of standards. Likewise, the cable systems

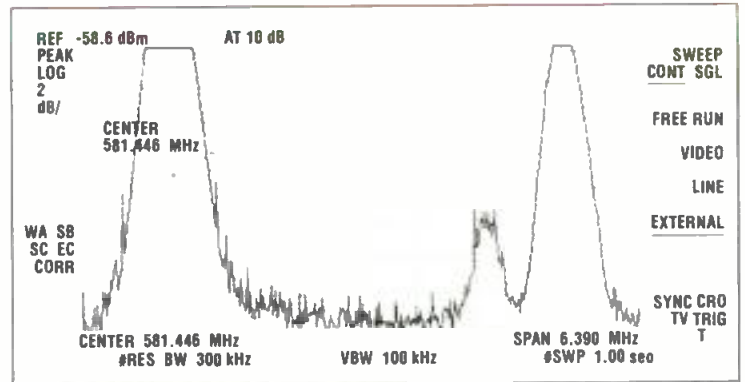


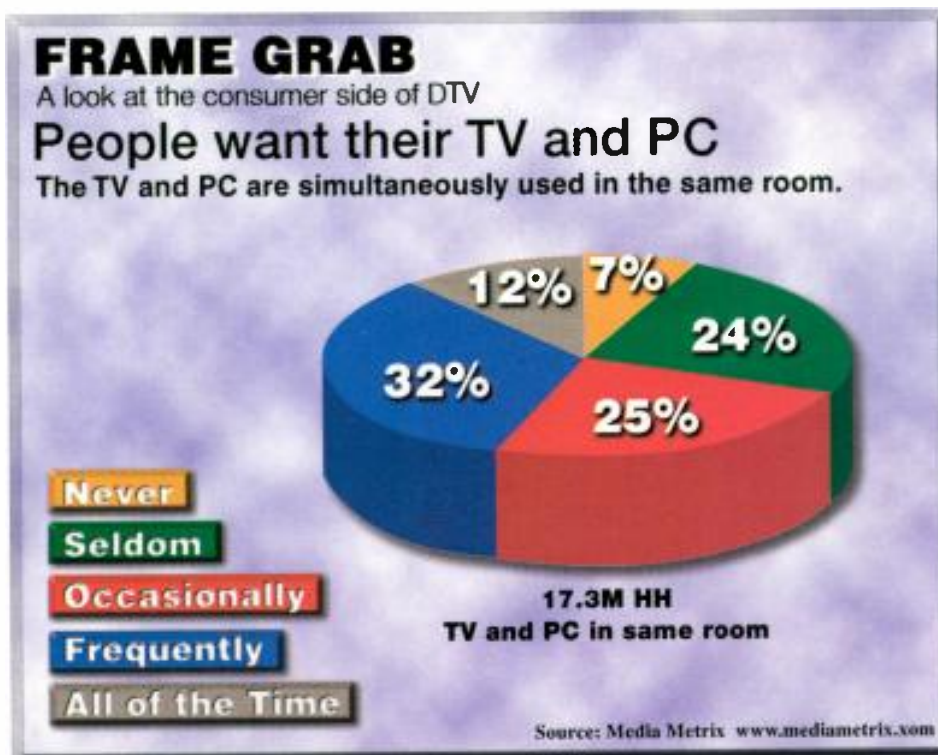
Figure 1: A relatively clean off-air signal from the receiving antenna.

involved are well-built and belong to major operators with modern, well-maintained equipment. This arrangement would appear to sound good for all parties involved, including the viewing public. Now the dragon enters.

#### NTSC/DTV interference

When Station A signed on with its DTV signal, the cable systems, including one located within Station B's grade-B contour, suddenly started receiving interference. The interference was such that the received NTSC signal was unusable. Viewer complaints skyrocketed. Calls flooded the station as though a major contest were underway.

In this situation, Station B did what every red-blooded station would do. It immediately, and correctly, decided the cause of the interference was Station A's DTV operation. The question then became: "Was Station A was doing something wrong?" That started the computers whirring at several engineers' desks. Several hours of analysis by at least two engineering firms proved that Station B's assumption was correct. Those involved appeared to be operating correctly and within the rules. In the FCC DTV allocation data, it was predicted that Station B would receive interference from Station A's DTV signal. It should be noted here that the calcula-







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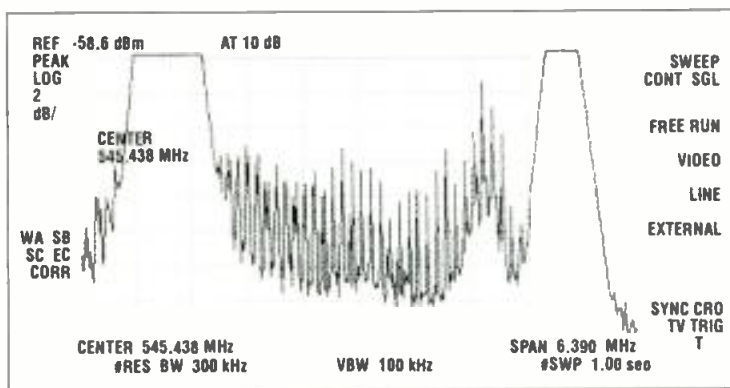


Figure 2: Station B's off-air signal with interference from Station A. Note the regular spacing of the interference spikes.

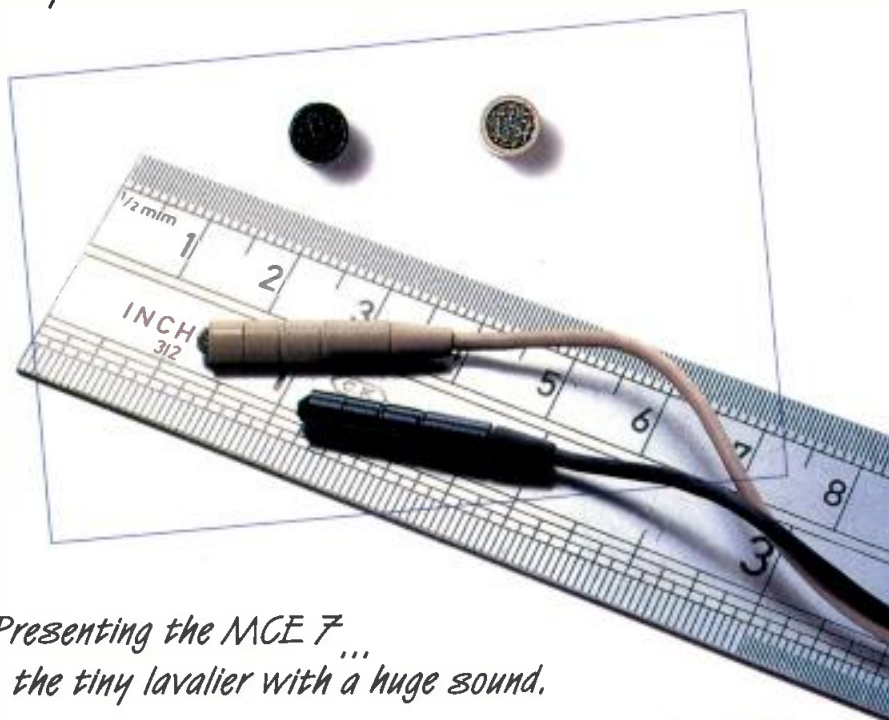
tions done by the Commission are based on noise-limited service of home-type antenna systems located 30 feet above the ground. If the receiving antenna is raised another hundred feet or so, the noise-limited contour drastically changes. The higher receiving antenna also means that the interfering signal sees a much better path with regard to both terrain obstructions and curvature of the Earth.

As most engineers haven't really seen what such interference looks like, we have supplied measurement plots demonstrating the results of the DTV signal over the NTSC station. The first spectrum analyzer plot (See Figure 1) is for a different station from the same receiving antenna to show a relatively clean off-the-air pickup. The receiving antenna is a standard commercial yagi. Figure 2 shows the received signal from "B" with the overriding DTV interference. It is interesting to note that the DTV signal shows spikes at very regular intervals of frequency, making them readily identifiable as opposed to random noise. The color carrier is highly distorted.

Figure 3 shows a demodulated test signal. The digital interference is obvious. In particular, the sync pulses appear to have an overriding noise as well as the white level in the window. The interesting thing was the general quality of the signal when viewed on a standard NTSC receiver. The presence of the noise was obvious. It looked much like "snow" as seen in a weak signal. Colors were not terribly affected but the overall picture was certainly degraded. This made what would have been a TASO Grade-5 signal go to about a Grade 2. The response from the station's viewers has been widely mixed, probably depending, to a large degree, on the directivity of the receiving antenna system in use in each home. The effects of the interference have ranged from mildly troublesome to totally unacceptable. Even though Station B is the only source of a major network to many of the viewers, they are tuning it out because it longer provides the clean picture that they expect.

The calculations done by the engineering firms proved that the Commission's calculations were correct. All of the calculations agreed within a percentage point or so, which is certainly reasonable, because there will always be some variation between such studies based on minor differences between programs. All calculations indicated that interference would occur around the cable systems' head ends. The conclusion was

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# Transporting Digital Video via Fiber Optic Links

Fiber Optic technology has been successfully employed by Telcos for many years. However, its use as a transport layer for digital video has been limited and viewed as an expensive technology for all but long haul applications. Most of the electrical-to-optical (E/O) and optical-to-electrical (O/E) converters offered for digital video applications are modified versions of telco designs. Although these products provide adequate performance, they often carry a high cost and do not always handle all possible signal patterns found in the video format.

With the advent of digital television and the requirement to convert many analog broadcast facilities, fiber optic transports will probably become a standard requirement to ensure that SDI (270/360 Mbit) signals can be easily distributed at distances in excess of 250 meters. An additional motivation to employ fiber will come from any installation that will generate, distribute or redistribute programming in HD-SDI (1.5Gbit); in this case, receivable signal distance via coax will be limited to 150 meters at best and nominally 100 meters.

**NVISION... has a reputation for delivering high quality products at reasonable prices, and carrying this image over to the fiber designs was paramount.**

NVISION, a manufacturer of routing and distribution equipment for digital video and audio signals, based in Grass Valley, CA, has taken a new approach to the design of products for fiber optic conversion. Inspired by their design of new routing products for HD-SDI and SDI signals, NVISION now offers a comprehensive range of



**NVISION's 4000 Series HD4270 module**

O/Es, E/Os and transceivers for SDI and HD-SDI signals. These modules have been designed from the ground up.

Before the NVISION design engineers set pen to paper (or mouse to pad), the company conducted extensive research to understand user requirements and their difficulties with available equipment. This research uncovered several problems that required attention:

1. The purchase costs for the E/Os and O/Es were too high.
2. Available fiber E/Os were often very sensitive and required that SDI signals performed well within the SMPTE specifications for signal level and jitter.
3. Most fiber products would not handle pathological signal content (long strings of 0s or 1s)
4. Adoption of fiber often presented technical problems for system engineers unfamiliar with the nuances of fiber termination and management.

NVISION started by designing fiber converters for HD-SDI, as this was technically the most

difficult task. They utilized their 4000 Series equipment frames as the host for the new modules. This allows purchasers to include fiber optics with standard DAs, A to Ds, embedders etc. The company has a reputation for delivering high quality products at reasonable prices and carrying this image over to the fiber designs was paramount.

As a result of their efforts, they now offer six fiber optic products: An SDI transceiver (SD4170), an SDI O/E (SD4171), an SDI E/O (SD4172), an HD-SDI transceiver (HD4270), an HD-SDI O/E (HD4271) and an HD-SDI E/O (HD4272). All of these products meet the following criteria:

1. The new products are inexpensive.
2. They will perform well with any input signal that meets SMPTE specifications.
3. They will receive all signals without bit error, including pathological content.
4. NVISION offers a technical support line to help system engineers with fiber installation (530) 265 1059.

Other additions to the 4000 product line include 4 to 16 channel audio embedder/disembedders. When used in combination with fiber optics, these products allow a video channel and up to 16 phase aligned AES channels to be transmitted over tremendous distances for an affordable price.

Also, these products provide the only current method to transport accurately phased groups of six audio channels at base band. This provides a reasonable way to manage surround sound mixes (5.1 channels) prior to compression for delivery to the home.

NVISION can be contacted at 1 800 719 1900 or by fax at 530 265 1021. You can visit their website at [www.NVISION1.com](http://www.NVISION1.com).

## Calculating transmission distances

When determining the transmission distance for a given signal and fiber optic transmitter/receiver combination, the following rule of thumb is applied. Please note that the numbers given are pessimistic and are offered as a guide only.

1. Calculate the maximum loss budget (allowable loss between transmitter and receiver), i.e. Tx power = -7.5dBm - minimum receiver level = -20dBm  
Maximum loss = 12.5dBm
2. Calculate the losses of the path, including length and connectors.  
Use 0.3dBm loss per km for SDI or HD-SDI.  
Add .5dBm loss for each connector in the path (including bulkheads).  
Total loss = length in km x 0.3 + # connectors x 0.5dBm  
i.e. 10 km x 0.3 = 3dBm + 4 connectors x 0.5dBm = 2dBm  
Total loss = 5dBm
3. Subtract path losses from the loss budget. (It's that easy!)

# Digital Television... The Ultimate Frontier

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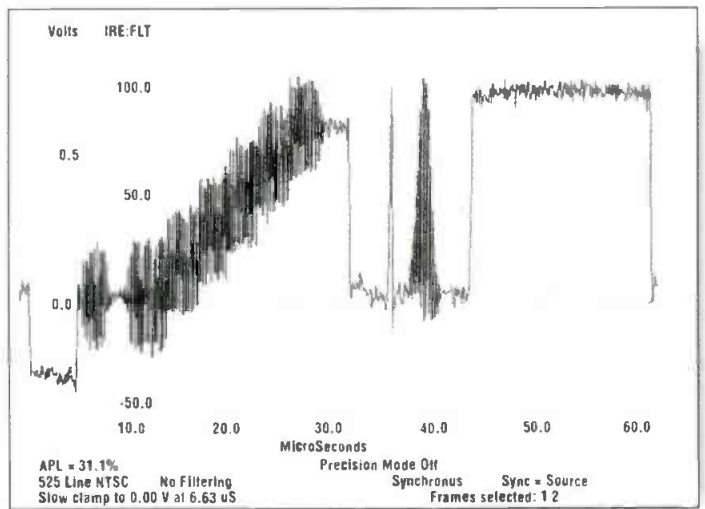


Figure 3: A demodulated test signal from Station B with obvious digital interference.

simply that Station A was operating properly and Station B had to deal with the problem.

So, now what? The obvious first fix is to replace the receive antennas at the cable head ends with ones with better directivity. Additionally, it is possible to pair receive antennas such that deep nulls can be created in their pattern at a specific bearing. This can effectively reduce the undesired signal's strength by several additional decibels. Such approaches are presently underway. The results will be reported in a later column.

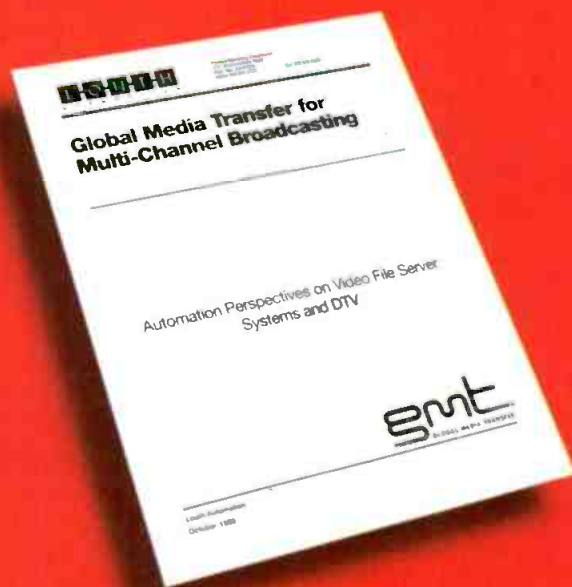
### Moving forward

Now for the real purpose of this warning. Stations should take a look at the cable systems that use their signals, especially near or beyond their grade-B contours. Those systems should be evaluated in terms of DTV allocations to determine whether interfering signals might be anticipated when future stations come on the air. DTV studies can provide stations with not only the percentage of their service area that will receive interference, but also with the locations. That data then can be combined with cable system receive site locations to predict possible problems. If such interference can be anticipated, it is in both the station's and the viewing public's interests to start work on replacing receive antennas before the interference exists. This will greatly reduce the number of calls that will occur, especially from those folks who have the little books to mail after they record their viewing habits.

The problem of new interference has already been considered in detail. However, it seems to be like flu warnings: Everybody ignores them, believing that they will be immune. The fact is that another 1500 or so stations are coming on the air. Existing stations *will* experience some interference problems. Some of that interference can be anticipated. Taking the proper precautions now can minimize its effects. It's a little bit like trying to squeeze 20 pounds of manure into a 10-pound bag: Some of it is going to escape. It would help to have tissue on hand prior to being struck.

*Don Markley is president of D.L. Markley and Associates, Peoria, IL.*

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## Intrafacility interconnection

BY KENNETH HUNOLD

In this business, it can be assumed that if you do something once, you will probably want to do it again — only bigger or better. If you connect two studios with five video trunks, you will probably want 10 trunks tomorrow. You are constantly asked to do more with your facility, and to do it over a greater distance.

Historically, whenever you needed to connect with someone outside your station, you had to deal with the telephone company. Now, thanks to deregulation and competing technologies, you have different — but related — options.

### Audio signals

For audio signals, telephone jargon such as switched-56, ISDN and T1 have become part of the interconnection strategy for many broadcasters. For video signals, DS-3 service has been adopted and expanded. DS-3 and other data-modulation techniques have been applied to station-owned STLs, TSLs and studio-to-studio links over private terrestrial microwave and satellite links. Advances in data reduction (more commonly referred to as video compression) have enabled video signals to be sent as data over alternate in-house and out-of-house communications networks. Many of the new interconnection strategies use lasers to create links between “remote” station facilities.

### Dark fiber

*Dark fiber* is a term used to describe excess fiber capacity. Because the excavation of roadbeds and repaving costs are so high (greatly exceeding the cost of the fiber alone), utilities often install more fiber capacity than necessary. This excess fiber is not connected to a laser light source, so it is termed “dark” fiber (notwithstanding that the laser light itself is often invisible, but that is a topic for another day). Occasionally it is possible to lease this dark fiber from your

utility for private uses.

The cost of a fiber optic link may not be justified for a single signal on a single fiber. Considering the overall bandwidth of a fiber optic cable, a single signal on such a cable does not fully exploit the capacity of the medium. Many vendors have developed multiplexing schemes that combine several signals and place them all on a single optical fiber. A technique for combining signals that have their own optical transmitters, called *wavelength division multiplexing* (WDM), has been developed. Using laser light of different wavelengths (fre-



**Production studios no longer operate in a vacuum. It's often necessary to interconnect more than one studio for live shots. Shown here Studio B at the Fox News Channel in New York built by A.F. Associates. (Copyright Corporate Print Communications. Courtesy A.F. Associates.)**

quencies), several channels of information can be sent (audio, video and/or data) down a single fiber, even bidirectionally.

Alternatively, the video and audio signals can be digitized, and the resulting data can be multiplexed with other data for more efficient use of the fiber resources. Of course, this data could be compressed, if desired, to fit more information into the fiber link. Even the ubiquitous Ethernet connection, with its constantly increasing speed and data throughput, can be used to combine several signals for distant, surveillance-type monitoring.

If a studio is located in another building, a few fibers could provide all of the audio and video connectivity needed for

all normal operations, including redundancy. Technologically, there is no reason why such a scheme could not work over much longer links, but this is an area where the tariffs set by the communications carrier will affect the situation more than the underlying technology.

### Data hierarchy

Parts of the telecommunications data hierarchy can be used over other delivery methods (such as DS-3 data over a microwave channel). A recent development that has popularized this method of delivery is the transmission of an ATSC datastream plus a compressed NTSC signal over a common link to the transmitter(s). There are no technological barriers to using this scheme for other data uses. The primary implementation obstacle to such a system is spectrum availability, but even this problem has a potential solution.

An infrared optical system has been developed for wireless video and audio over a laser beam of light. This is a bidirectional, point-to-point system that does not require an FCC license to operate. This system can transmit over distances approaching two miles and has a bandwidth of about 500MHz. Line of sight between the two points is required, but if you need to get some signals between two buildings in a crowded downtown location (and are out of microwave channels) this system could be useful.

From radios to fiber optic cables, and from laser beams to Ethernet, techniques exist for delivering multiple channels of video, audio and data over distances greater than what can be reached with baseband signals and/or conventional interconnections. Decisions can now be based on production requirements and not by technical limitations. ■

*Kenneth Hunold is a New York-based technology consultant for Broadcast Engineering.*



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Photo: WXYZ anchor desk and studio.  
(All photos courtesy of Tektronix Inc.)



W

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Z

## begins a new era with HD

By Michael Doback

The staff at WXYZ is no stranger to the challenge of breaking new ground. Located in Detroit, MI, the station is an ABC affiliate and is owned by the Scripps Howard Corporation. It was one of the few that volunteered to be on the air with digital broadcasting by November 1, 1998. Despite unknowns in HDTV technology and the uncertainties of consumer acceptance, station management decided building for broadcasting's HD future was worth the investment. At the time the commitment was made, the staff didn't realize the obstacles that would have to be overcome in a short time frame.

# WXYZ

## Engineering for HD

Early on, the staff realized that a totally new infrastructure would be needed to support HD and multi-channel operation. Making the step to a totally 601 serial digital infrastructure would provide the basis for initial operations and growth to future multichannel possibilities. Also, a digitally networked system would



The networked control room will allow WXYZ staff to direct the on-air playback of both HD and multichannel using Omnibus networking and Profile servers.

Beyond a desire to bring Detroit's viewers the latest technological advances, we identified other factors that justified the move to digital.

permit the station to easily adapt to a mix of recording and transmission formats while taking advantage of automation technology to control on-air operations.

Beyond a desire to bring Detroit's viewers the latest technological advances, we identified other factors that justified the move to digital. One was the desire to increase the station's overall productivity and reduce high maintenance costs. For instance, analog tape machines require constant maintenance. Another was that digital networking and control can reduce ongoing operational costs.

Finally, because much of the station's analog gear was already due for replacement, it was the perfect time to switch to digital. For example, its Grass Valley master control switcher was 12 years old. Adapting it and a lot of other, older equipment to digital at the end of their useful lives simply wasn't an option.

## The conversion begins

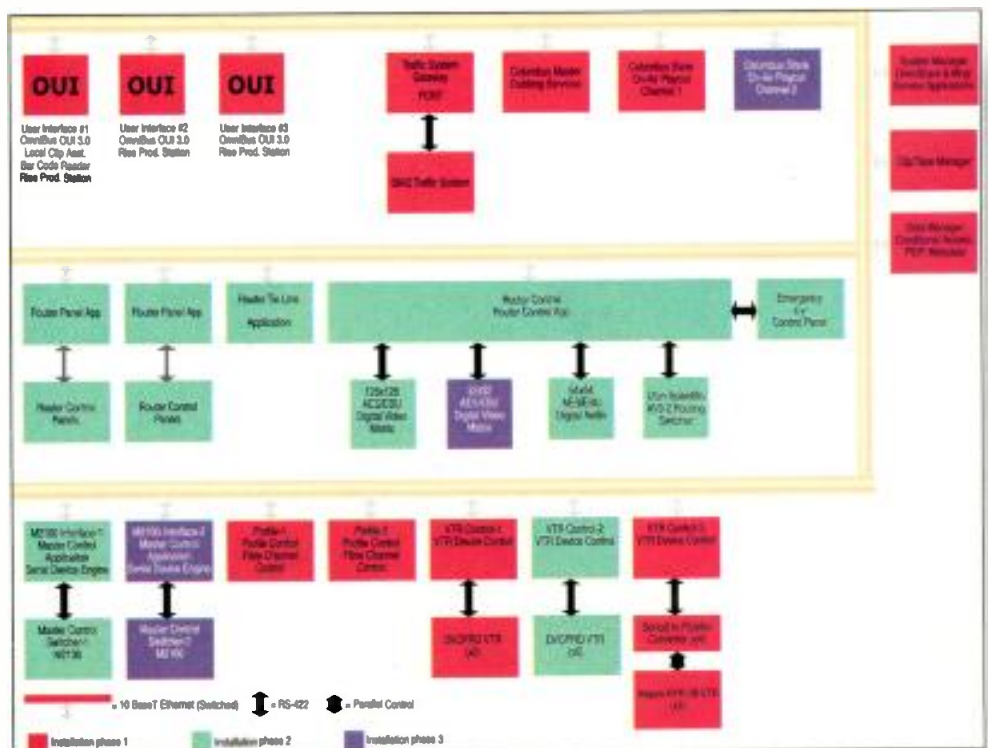
The first part of the conversion process began at the transmitter. A transmitter building supplied with a new power line was built, then a new Harris transmitter and Dielectric feed line and antenna were installed. This part of the project also required the removal of old antennas and coax from the tower so it could support the new channel 41 antenna.

The next, and even more complex, step was to begin the studio rebuild.

Because the project was so large and the technology needed so complex, the engineering staff sought outside help.

Prior to considering system integrators, the WXYZ engineering team developed a functional block diagram of the desired system. This not only helped define station equipment needs, but also allowed the staff to evaluate potential integrators' suggested solutions and plans.

After considering a number of system integrators, we decided to use the



The WXYZ broadcast automation system encompasses all areas of the station's operation. It relies on OmniBus networking and media management, Grass Valley M2100 master control systems and Profile storage.



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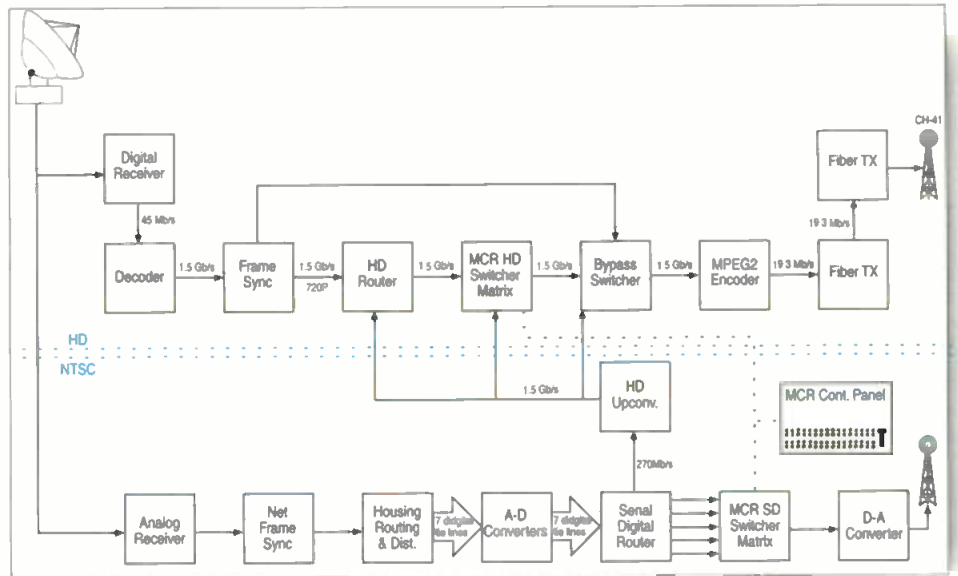
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# WXYZ

consulting services of Tektronix' Video and Networking Division (VND) to assist with the project. In addition, Tektronix hardware and an OmniBus facility management system were picked as key components in the project.

The first meetings between Tektronix and station staff were held in May 1998. One early task was to examine the proposed equipment list to determine which functional areas could be scheduled and built for delivery in time for a July goal.

Tektronix proposed using its Digital Media Foundation (DMF) as the base design for the project. This solution provides on an open-architecture software system, with an open environment for applications ranging from editing and live production to on-air playout. The system is easily inter-



Separate and yet complementary, paths are provided for both the SD and HD signals. An unconverted NTSC signal is used when an HD-quality signal is not available.

faced through a distributed network of storage devices linked via audio/video routers and data networks.

A part of the consulting service included on-site training for station staff. The training was targeted to coincide with the delivery and completion of each phase of the project. Specific product information and manuals were provided in advance so we could get a running start in understanding the systems before using the equipment.

## Equipment selection

The short time frame meant that much of the Tektronix Grass Valley HD production equipment selected by WXYZ was first shown at NAB98. This meant that, with installations scheduled for early July, delivery times were tight. The first installations included two MPEG-2 PDR204D Profile video servers, Grass Valley HD and SD routers, and the OmniBus facility management system. This complement of

hardware would ultimately provide the station with a fully automated commercial playback system with mirrored storage of all on-air content.

One early design goal was to move away from videotape as the primary storage for commercials. The two Tektronix PDR204D Profiles provide 576GB, or more than 50 hours, of

The new equipment was installed in parallel to the current on-air operation.

mirrored storage. The servers are networked with Fibre Channel, which allows us to put any commercial in inventory directly on the air.

To ensure a smooth transition and sufficient time for training, the new equipment was installed in parallel to the current on-air operation. The OmniBus control system is interconnected by an Ethernet network running under TCP/IP protocols, thereby giving the network sufficient bandwidth for future growth.

In addition to the quality benefits digital storage provides, the server-based playback system gives WXYZ more flexibility in handling on-air operations. We will eventually be able to play and record material from satellite feeds or VTRs, or to move programs



A pair of Grass Valley M-2100 master control systems and OmniBus automation provide the control needed to direct both HD and multichannel operations.

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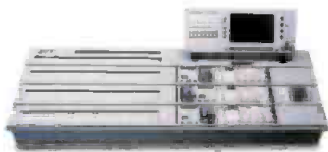
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# WXYZ

and commercials to and from the servers with ease. Then, as the schedule calls for it, we will be able to move that same material directly-to-air or distribute the material in-house via the networked routing systems.

## Facility control

The OmniBus system is used to control on-air playout of both the HD and SD channels. The programs are switched through the Grass Valley M-2100 master control system. If needed, the two program streams can also be manually directed from the 2100's control panel. The OmniBus system provides full media tracking and resource management functions, which are vital to efficient operations. On-air operation can be controlled from any terminal or workstation connected to the network.

## Almost furnished

While not yet finished, most of the hardware is now in place. The last bit



Dual PDR204D Profiles with mirrored storage provide more than 50 hours of storage.

of software is being configured to provide the necessary control functions for multichannel operation. Fortunately, WXYZ won't need that capability immediately because a start date for multichannel broadcasting has yet to be decided upon.

We're now looking forward to the time when the system is fully functional. Then we'll be able to take pride in

knowing that, with the help of Tektronix VND, we've been able to build a fully 601 facility with sufficient bandwidth for 1.5GB HD and multichannel operation. Then, WXYZ will truly be ready for the HD future. ■

*Michael Doback is director of engineering for WXYZ-TV, Detroit*

## Design Team

### WXYZ team members

Michael Doback, Director of Engineering  
Demetri "Trip" Kraniak, Technical Support Supervisor/HD Project Supervisor  
Larry Pacific, Studio Operations/Master Control Supervisor

### Tektronix team members

Wayne Schrand, Tektronix Senior Account Manager  
Douglas Wynn, Systems Management Group Manager  
Larry Mast, Implementation Manager  
Pablo Esteve, Project Engineer

## Equipment list

Two Tektronix MPEG-2 Profile 204Ds with 576GB storage and Fibre Channel option  
Tektronix Fibre Channel Hub  
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Grass Valley M-2100-HD master control system, 1080i/720p  
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Grass Valley SMS7000 AES audio switcher — framed 128x128, loaded 64x64  
Grass Valley SMS 7000 AES audio switcher — framed 64x64, loaded 32x32  
Grass Valley SMS 7000HD (1.5 Gb/s) video switcher — framed 32x32, loaded 16x16  
Grass Valley Performer 10x1 HD switcher  
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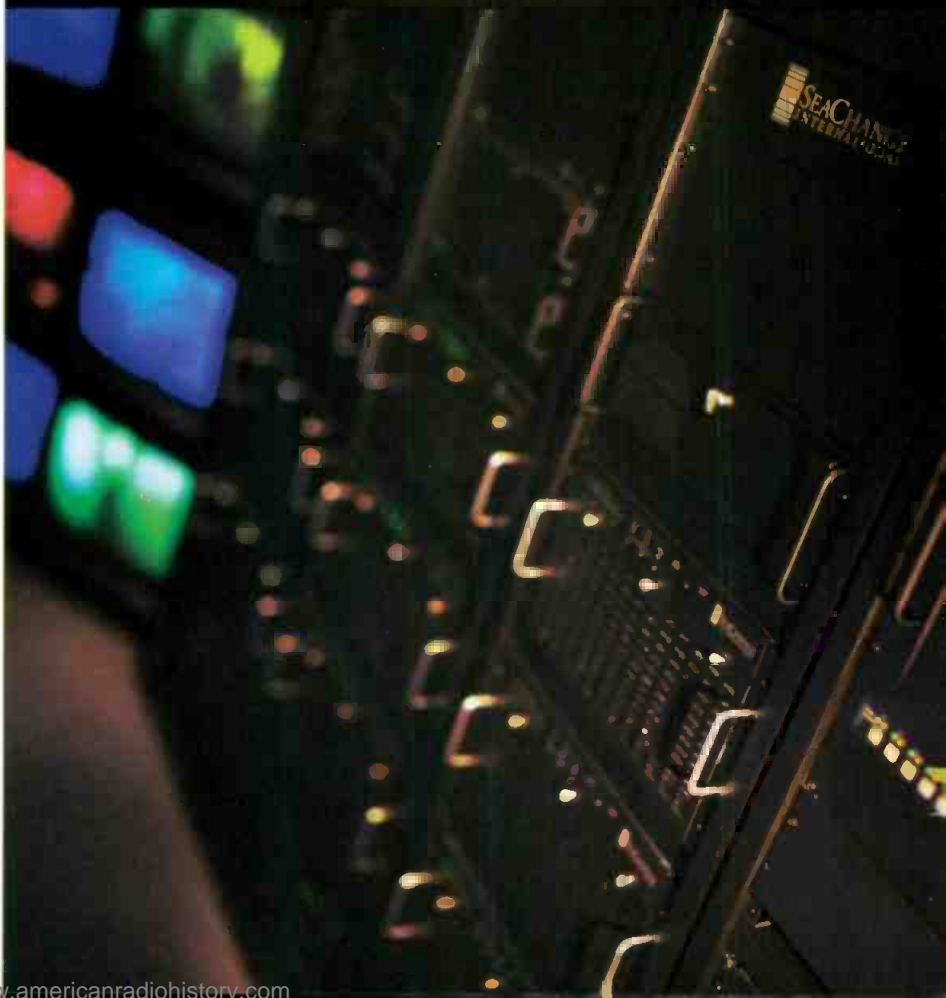
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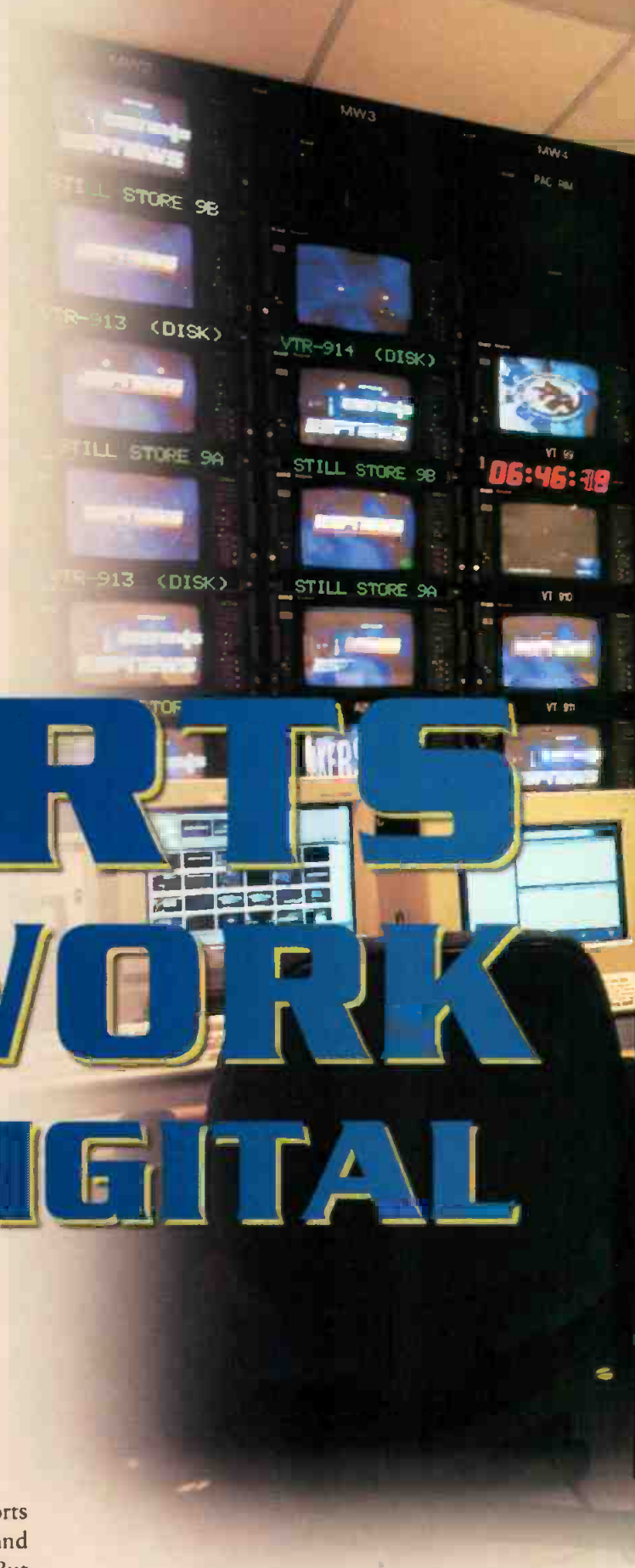
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# SPORTS NETWORK GOES DIGITAL

By Brad Dick, editor

**L** launched September 7, 1979, ESPN Inc. delivers sports programming to virtually all countries in 20 languages and reaches more than 75% of American TV households. But when the decision was made to create a new digital production facility at its headquarters in Bristol, CT, in preparation for multi-faceted SDTV and HDTV telecasting, ESPN faced a great engineering challenge. The new installation had to be accomplished on time, on budget and while ESPN's existing productions were still on the air.



ESPNEWS Production Control Room 9 featuring Grass Valley Model 4000 production switcher and monitor wall. (All photos courtesy of National TeleConsultants, Inc.)

# SPORTS NETWORK

## Race to the digital goal

Kickoff was January 1998, and the goal line was September 1 — just nine months away — and there could be no overtime in this game. National Tele-Consultants (NTC) was chosen to help plan the strategy and provide the backup for ESPN's fine team of in-house engineers.

The existing ESPN headquarters had analog Production Control Rooms, Master Control Rooms, high-end edit suites with sophisticated effects capabilities and ENG edit stations. But the top priority was the urgent need for a new digital home for production and transmission of ESPNEWS. That meant

both Bristol and Los Angeles. "With the design team separated by a continent, we used the Internet extensively during the project," Don Phillips, NTC vice president, recalls, "and we found that we could send updated drawings between Los Angeles and Bristol within about eight seconds. You could almost track it as it crossed the Rockies, passed by Chicago and reached the other coast, accelerating our paperwork with the speed of e-mail."

ESPN provided accelerated design approvals, which allowed cable fabrication to begin three weeks after the project start. This kept the aggressive schedule on-track while existing offices were cleared out of the space that was to become the new central digital distribution equipment room.

Equipment procurement involved close coordination between members of the design team and equipment vendors in the knowledge that equipment

accommodate ongoing operations. The on-air date dictated that installation begin well ahead of design completion. This required close communication and coordination between the design engineers and the installation team.

## Infrastructure issues

The infrastructure would eventually have to handle 400 digital video sources and 200 dual-stream AES audio sources. ESPN's operational philosophy of sharing resources throughout the facility required extensive translation of signals between the analog and digital infrastructures. Reclocking video DAs and regenerative AES DAs with 16 outputs were chosen in order to supply sufficient outputs for current and future facilities. The passive looping of inputs between adjacent eight-output DAs was not an option with the component digital video due to problems

with high return loss common with the high bandwidth of these signals.

The first challenge they faced was the delay inherent in many conversion products. "We were surprised to find that there were not common answers to these kinds of problems already in existence," NTC's Associate project director, Mazen Ghurani admits, "but that is one of the challenges of integrating analog and digital facilities. We were confident, though, that our engineering team could



**Audio Control Room 9 allows a single operator easy access to critical on-air devices and line-of-sight access to the director.**

the new facility had to conform to the demands of the existing analog plant's equipment as well as fit the requirements of new digital production, so the operational parameters of this expansion had to be designed to satisfy everyone's needs.

## The process

The design process began in late May with a project-team kick-off meeting. Design team members were working in

deliveries would be critical to the project's success. As equipment arrived, equipment racks would be ready and pre-wired for immediate installation.

The installation team arrived on site the last week of June with an initial crew to begin interfacility cable pulls. One week later, the balance of the installation team of 15 arrived. Since many interconnections needed to be made into the existing plant, great flexibility in scheduling was needed to

work with the equipment providers to find solutions." Although component digital video switchers have a fairly wide window for accepting differently timed signals, the 3D adaptive comb filter delays needed for the best A/D conversion put signals originating from analog sources outside of even this tolerance by a line or two. This was unacceptable because all ESPN's new productions had to be able to mix analog and digital sources instantly.



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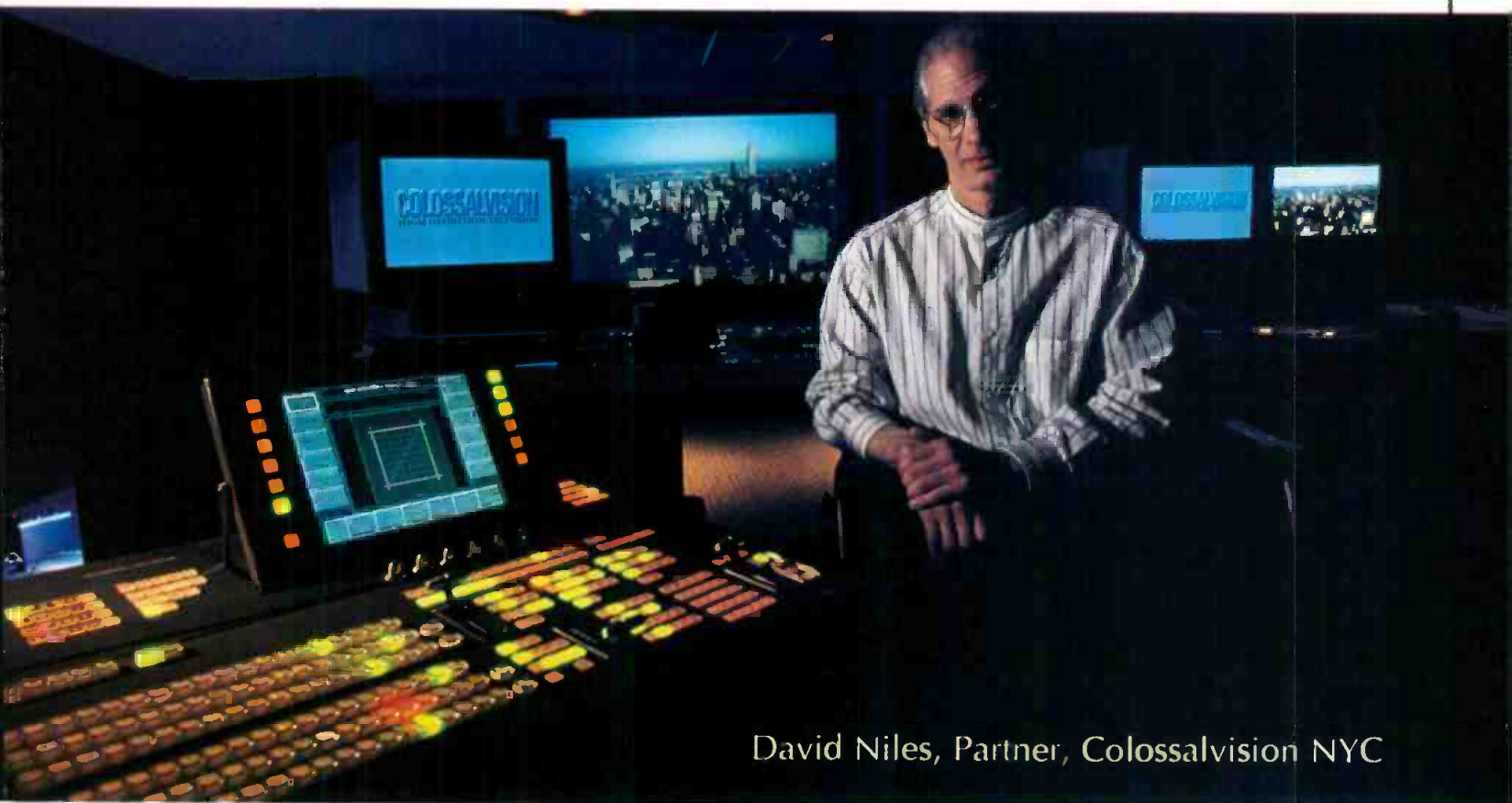


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LONG, LONG  
TIME FOR AN  
HD SWITCHER  
THIS GOOD.”**







David Niles, Partner, Colossalvision NYC

"In the past thirty years I've worked with just about every switcher on the market," says David Niles. "The new HD1012 is an extraordinarily smart design, from its ergonomics and human interface to its internal architecture."

With clients like the Walt Disney Company, Cablevision, Sony Entertainment, Macy's and Madison Square Garden, David has to have 100% confidence in his equipment.

"To produce really great HD images, you need to have control over color," he adds. "The color information is five times that of NTSC. Until now, we've had to rig up all kinds of gizmos, but the HD1012 allows a level of creative color enhancement never available before.

"Its color correction circuitry is really slick, with seven integral RGB color correctors, plus memory capability. To us that's the biggest and most important plus."

The Snell & Wilcox HD1012 (12 input) and HD1024 (24 input) HDTV Production Switchers include three fully-featured keyers, program/preset bus, border generators, two wipe generators, (each with 100 wipes) timeline control and much more. They are upgradeable to future HDTV DVE options.

# SPORTS NETWORK

that produced a high-quality NTSC to SDI separation and conversion with only a seven-microsecond delay. Extensive distribution of AES reference signals was also required to ensure that all digital audio was locked to video.

Many of the existing studio cameras provide analog RGB outputs that are used instead of their NTSC outputs in

**In the new Audio Control Room, ESPN chose to use an analog audio mixing console.**

order to convert to the highest-quality component serial digital signal. Many other sources such as graphics devices, character generators and paint boxes are natively digital so they can be

brought to digital distribution directly.

The engineering team next discovered that nobody was making the 16-output audio and video distribution amplifiers ESPN needed. Working closely with a major manufacturer, the team developed a strategy that would lead to the delivery of the required audio and video DAs. Ultimately, 325 digital video DAs were delivered, of which more than 200 were newly created, 16-output models, specially designed to meet ESPN's requirements. Additionally, nearly 200 newly designed, 16-output AES digital audio DAs were employed.

## Design issues

Because the new Master Control Room is on-air 24 hours a day/seven days a week, a highly reliable system with redundancy was required. A 16x1 backup switcher was installed with a highly reliable transfer switch, which retains its position even in the event of a power failure, for additional redundancy. That way if the master control switcher fails, the TD can keep the show going by selecting sources on the back-up. The transfer switch allows the operator to quickly change paths

## NTC team:

Don Phillips, vice president  
Mazen Ghurani, associate project director

Terry Priesont, manager —  
implementation services  
Paul Dietrich, installation supervisor

Greg Jones, project engineer  
Tom Levno, senior engineer  
Yves Schanck, project engineer  
Bob Sights, site installation supervisor  
Ed Zammit, project engineers

so ESPN is protected from the failure of the main or the backup switcher. Of course, if the master control switcher is not functioning, you lose automated machine control as well. So a backup manual machine control console was also designed and custom built to be used in emergencies. The operator can just turn 30° and control the tape decks and other equipment needed to keep the show on the air from the backup console.

In the new Audio Control Room, ESPN chose to use an analog audio mixing console. "There are very spe-



Production Control Room 9 uses digital monitors with programmable under-monitor displays to support 10 operating positions.

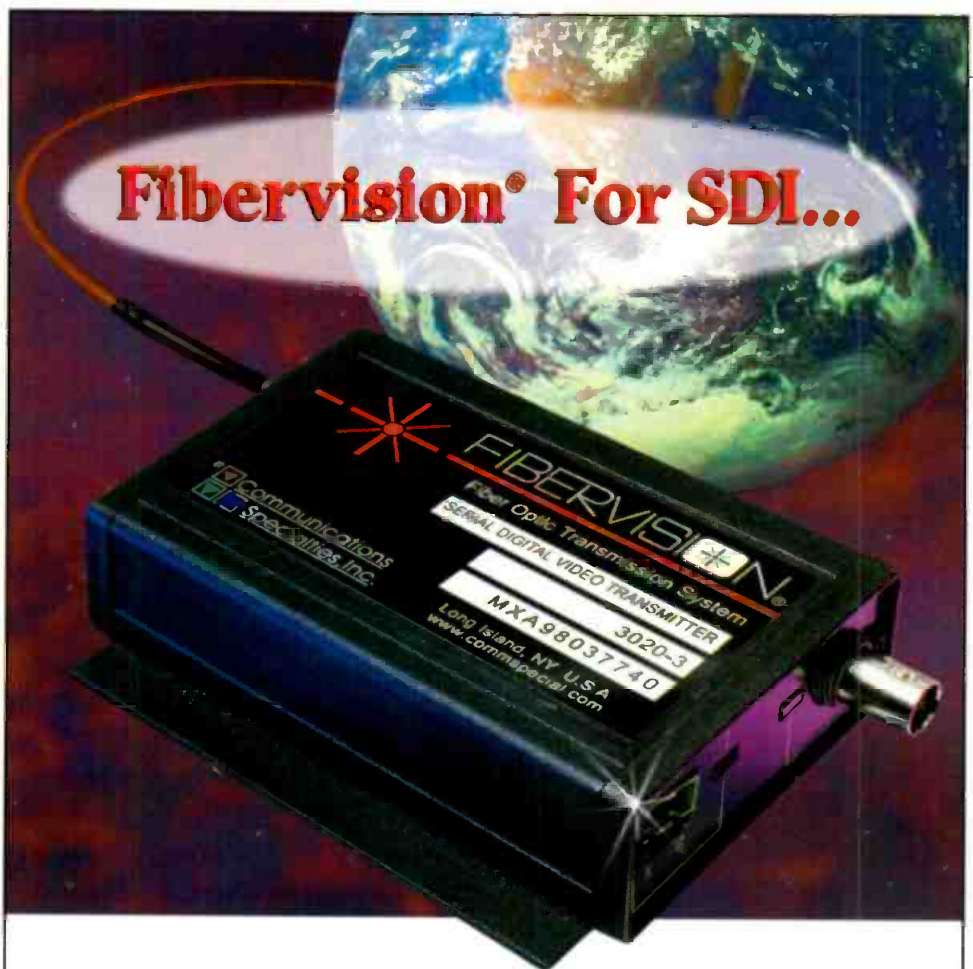


Master Control 9 provides program and commercial integration for ESPNEWS network feeds.

Specific requirements an audio mixer must fulfill when doing live news 24 hours a day that made it disadvantageous to convert audio handling to digital," Phillips explains. "And, there are always extensive needs to record live remote inputs and send mix-minus feeds back to the field on multiple shots at the same time. So in the midst of all this new digital technology, it was decided to leave one island of analog audio capability to give us maximum flexibility at a lower cost."

Of course, the new installation needed a machine room for its tape and disk sources. For the first time, ESPN decided to share a single tape room between Production Control and Master Control because they will both be in use at least 15 hours a day and need to be ready for quick turnaround of sporting events. This room contains eight program VTRs and extensive digital file servers for program material, interstitial break material and commercials.

Few people watching any of the ESPN networks last summer realized that the engineering excitement behind the scenes was almost as frenetic as the organized chaos of the sporting events they were watching. Most amazingly, it was all accomplished on budget and on time while ESPN was still on the air. NTC succeeded in its goal of helping ESPN move fully into digital production for ESPNEWS. ■



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Broadcast Engineering

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# Digital TV: Where's the consumer?

Studio E at WBIS, Channel 31 in New York was built specifically to accommodate the demands of DTV's 16:9 aspect ratio. Notice the enhanced use of the peripheral areas of the set. (Photo courtesy of IMMAD. Andrea Brizzi)



## By James Penhune

Last month marked the official launch of digital television (DTV) broadcasts in the U.S. As mandated last year by the Federal Communications Commission (FCC), TV stations in New York, Los Angeles, Boston and other major metropolitan markets are finally beginning to transmit digitally encoded versions of sports, entertainment and other programming along with the analog transmissions in use for decades. At the same time, consumer electronics manufacturers are unveiling the first generation of TV sets capable of receiving these digital signals at prices more typically associated with compact automobiles.

DTV promises huge potential rewards to a wide range of media and entertainment companies. For broadcasters and programmers it offers the prospect of increased viewership generated by high-definition (HD) programming, as well as new revenues produced by additional channels or data services. For hardware makers, DTV represents the sales opportunity of a lifetime, because it will ultimately require replacing an installed base of some 250 million TV sets in 100 million U.S. homes.

DTV still faces a range of obstacles that are likely to slow its acceptance for years to come. In addition to high hardware prices, the unresolved issue of cable carriage, and a still-undefined path to profitability for broadcasters, little attention has been paid thus far to the expectations of consumers. This article uses data gathered in the Yankee Group's recently-

# Digital TV

completed Technologically Advanced Family (TAF) Survey to consider how consumers receive and regard analog TV today and their interest in the various enhancements promised by DTV in the future.

## The high cost of hardware

Most broadcasters are using some form of high-definition TV (HDTV) for their first digital program offerings, although their choices on viewing formats and content noticeably vary. No matter what type of digital programs reach the airwaves first, it is safe to say that their audience will be minimal for some time to come. Although many of the best-known names in consumer electronics

es in the \$7000- to 10,000 range. Many of the same companies are also marketing separate set-top DTV converters designed for use with conventional analog sets. Despite the hope that these set-tops would offer consumers a low-cost alternative to replacing their current TVs, prices for most run between \$1000 and \$2000.

How soon can we expect to see hardware prices that are more in line with consumer expectations? Consumer electronics vendors are counting on two factors to drive down prices. The first is the competition and economies of scale that have historically driven down the price of all new CE products over time. The first VCRs designed for consumer use in the mid-1970s were prohibitively priced at about \$2,000; but once more vendors entered the business and began manufacturing the machines in large quantities, prices

age digital transmissions, chips that are more efficient and less expensive should go a long way toward reducing costs overall. Nevertheless, with initial manufacturing costs high and DTV programming options still in the earliest stages of development, few manufacturers expect prices for most DTV sets to fall below the \$3,000-\$4,000 range for the next two to three years.

But high hardware prices and the current dearth of programming aren't the only factors likely to limit the growth of the DTV audience over the next few years. At least two other major issues involving the role that cable TV will play in enabling broadcast DTV must be resolved before the new service will be easily accessible to prospective viewers. The first of these is the question of how users receiving broadcast channels carried by their local cable TV operator will be able to tune into the new digital versions of these channels. At present, the only way to receive a local station's DTV transmissions is by using an antenna, because standards for passing the digital signal through cable infrastructure have only recently been finalized. Cable-ready DTV receivers are not expected to reach the market until late next year.

**We expect that major cable MSOs will strike agreements to add digital broadcast channels on a case-by-case basis.**

have made good on promises to have DTV hardware available in time to catch the networks' maiden broadcasts, the first generation of digital receivers barely qualify as products aimed at real consumers. Most of the digital TVs to reach the market thus far are large-screen rear-projection models available in limited numbers from Panasonic, Sharp, Thomson and others at list prices

quickly tumbled to the under-\$200 levels we take for granted today. Second, DTV vendors expect that price erosion will be further accelerated by Moore's Law, the PC industry golden rule which states that the computing power of microprocessors must increase geometrically even as their prices decline. Since DTVs rely heavily on microprocessors to receive and man-

## The role of cable

A thornier question is whether cable companies — which deliver TV to about two-thirds of all U.S. homes — will be required to carry broadcasters' new digital channels. Having already won a windfall from the government through its loan of valuable spectrum, the broadcast industry is unlikely to score another regulatory victory with digital must-carry. Instead, we expect that major cable MSOs will strike agreements to add digital broadcast channels on a case-by-case basis as DTV broadcasts gradually become more regular and the installed base of DTV viewers grows. Cable's ability to carry additional channels will also increase in the next few years as more operators add capacity through their own planned upgrades to digital technology.

## What about consumers?

Finally, there are the needs and interests of consumers to consider. Most reporting and analysis of DTV has

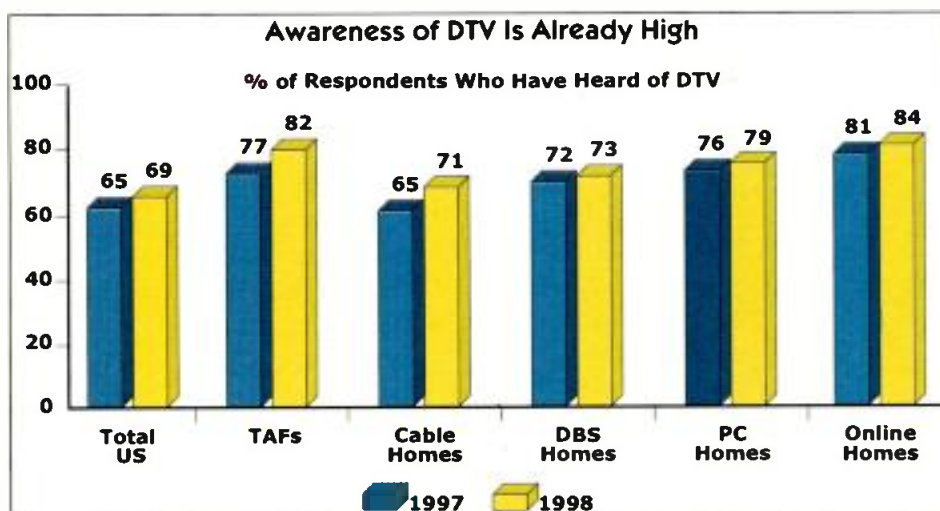


Figure 1.



Station WLWT-DT, Cincinnati, OH, selected an Itelco T603WN, solid state, liquid-cooled transmitter for its channel 35 DTV needs.

focused exclusively on the technological, regulatory and competitive issues outlined above. But what about the audience of more than 100 million homes that are watching TV today? How many of these consumers are really looking for the benefits that DTV promises, such as a larger, clearer pic-

segmentation scheme, which classifies about 15% of those sampled as TAFs, or early adopters, based on the types of products they already own, is particularly useful in identifying target customers for new technologies such as DTV.

#### Consumer awareness

Years of marketing hype, technology and standards controversies and high-profile political wrangling have all helped to produce consistently high levels of unaided awareness of DTV. (See Figure 1) Overall, 69% of the 2000-plus households polled in this year's

**How many of these consumers are really looking for the benefits that DTV promises?**

ture and the ability to carry multiple channels of video or other forms of data?

The Yankee Group's analysis of DTV's market potential draws on data gathered directly from consumers through our 1998 TAF Survey of more than 2000 representative U.S. households. The Yankee Group has used the TAF Survey for over a decade to measure consumer adoption, usage and interest in a broad assortment of technology products and services. The survey's

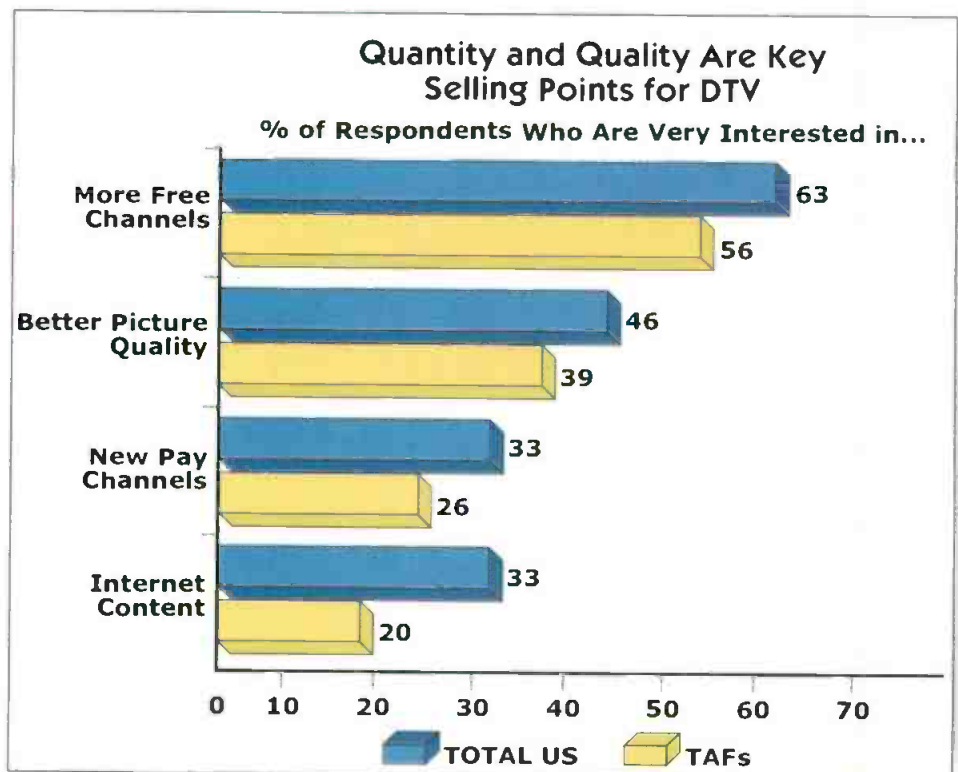


Figure 2.

# Digital TV

TAF Survey said they had heard of digital TV, up four points from the 65% who registered awareness a year ago.

Awareness levels were even higher within those segments of the market that are likely to be predisposed toward DTV. These include households using advanced TV services such as premium cable, PPV or DBS, subscribers to online or Internet service providers and TAFs, who tend to learn about and embrace new technologies well in advance of the general population.

The downside to DTV's high profile is that the term "digital TV" is broad enough to mean different things to different people. While many consumers have begun to associate DTV with the high-definition programming and equipment now being launched by broadcasters and manufacturers, oth-

ers may be thinking of more established DBS services, which providers like DIRECTV and EchoStar have successfully marketed under digital TV rubric. And cable operators such as TCI, Cox Communications and Comcast are touting the new programming and services made possible by long-awaited network upgrades as "Digital TV" as well.

## Which features matter?

Which of the many features and benefits associated with DTV hold the most appeal for consumers? Although the networks and TV makers are betting that the improvements in screen size and picture quality afforded by high-definition broadcasts will be the most persuasive selling point for DTV, our data suggests that for most consumers quantity may be more important than quality. Asked which aspects of DTV they found most interesting, more than half (56%) of the consumers surveyed cited the possibility of receiving more free broadcast channels, which some broadcasters have considered provid-

ing through multiplexed digital transmissions (see Figure 2). This same interest in having more choices, channels and control over programming has been a key factor in the adoption of existing enhanced TV services such as premium cable channels, pay-per-view and DBS.

Better picture quality was ranked second in importance, mentioned by 39% of respondents, followed by the ability to receive new pay TV channels (26%). Significantly, DTV's ability to deliver Internet-based content or information services, a feature expected to become increasingly important over time, received the lowest ratings from our panel, with only 20% of respondents finding it very interesting. As one might expect, enthusiasm for all of the DTV features listed ran considerably higher among more technologically sophisticated TAF households.

## How important is high-definition?

Despite the fact that DTV's most obvious advantage over analog lies in its ability to produce pictures that are larg-

## A new revenue model for DTV stations

By Clint Chao

The era of DTV is here, promising consumers everywhere crystal-clear digital video and home-theater surround sound. But, not many people have \$5000 to \$10,000 to spend on the HDTV receivers required to watch these programs, and the market acceptance for this expensive proposition is a slow ramp at best. So, if there is hardly anyone to watch the programs, what's in it for the more than 30 TV stations that began investing huge amounts of money in allocating 19Mb/s of spectrum for DTV? Even more, why should the TV stations rush to convert their analog spectrum?

Although the answers aren't obvious right now, an enormous opportunity exists for broadcasters to become suppliers of multimedia broadcast content as opposed to just video broadcast programs. Broadcast networking suppliers believe they have a solution as clear as the new HDTVs. This solution introduces a new business model that allows the delivery of rich digital data content, as well as video, to consumers and businesses. By creating DTV media channels, broadcasters can turn the Worldwide Wait into the "great wide hope" by using the spectrum they already own.

One broadcast networking supplier has developed an end-to-end solution that allows TV broadcasters to blend IP data content with MPEG-2 transport streams. This process maximizes the usage of the 19Mb/s spectrum currently allocated for the transmission of HDTV signals. One alternative is to transmit a 6Mb/s SDTV video signal along with 13Mb/s of high-speed IP data. The data can be set up as separate broadcast channels — anything from a financial channel to a prime-time-equivalent lineup of favorite websites to a premium service that delivers encrypted content to local enterprise. Imagine a travel agent beaming itineraries to clients. Of course, the 13Mb/s stream can also be set up as a Web-caching service to aggregate preselected Web content in local storage or as a turbo Internet service, much like DirecPC in the satellite world. Whatever the service, the broadcasters can set up numerous business models, ranging from pay-per-view services to monthly subscriptions to good old-fashioned advertising.

The system components needed to set up your data business are becoming commercially available. Zenith and Philips, have introduced DTV-receiver PC cards that allow users receive any content they subscribe to (though there may be free services built on advertising business models).

With a DTV media center in place, imagine the new types of services that could be made available with DTV receivers, which can either cache or broadcast information on the fly. A combination DTV receiver and Palm Pilot would make for the perfect travelling companion, providing the user with traffic updates and driving directions. Train and bus commuters could read the *Wall Street Journal* on their laptop computers without being connected to the Internet. The latest sports scores and stock prices appear on billboards or in sports bars or banks.

*Clint Chao is vice president of marketing for SkyStream Corporation, Mountain View, CA.*



er, more detailed and less subject to interference, most consumers say they are happy with the picture quality they receive from TV today (see Figure 3). Among households subscribing to cable TV (which currently reaches two-thirds of all U.S. homes), 86% said they were very or somewhat satisfied with their TV's picture quality and reception. These favorable ratings ran even higher among DBS users, where 96% expressed satisfaction with their current picture. The only segment of the viewing audience badly in need of a clearer picture is households that use broadcast TV exclusively, where only about a third (36%) said they were satisfied with their present service. While this data suggests that DTV may fulfill a need to improve the quality of over-the-air programming, it is important to note that broadcast-only viewers are unlikely to be early adopters of the new service, since they tend to watch less TV and spend less money than their counterparts using cable or DBS. (See Figure 3)

These findings also suggest that demonstrating DTV will be crucial in attracting new consumers. For even if the vast majority of today's viewers are happy with analog TV, it also goes without saying that virtually none of these viewers have ever seen a digital picture. Letting consumers look at the improved resolution, wider aspect ratios and distortion-free reception that DTV offers is the most powerful way to let consumers know that a new generation of broadcast TV has arrived. But demonstrating DTV on a wide scale will be a challenge for most retailers, who may be reluctant to invest the floor space, inventory dollars and sales personnel needed to display high-cost DTV equipment in their stores. Others may gamble that the cost of a DTV demonstration will be offset by the increased store traffic and incremental sales — including those of conventional analog TVs — that it is likely to generate.

**But will they pay for it?**

A further obstacle for retailers and manufacturers will be the high prices that most types of DTV hardware are likely to command for some years to come. Thanks to the high production volumes and fierce competition that have characterized the consumer electronics market for decades, consumers

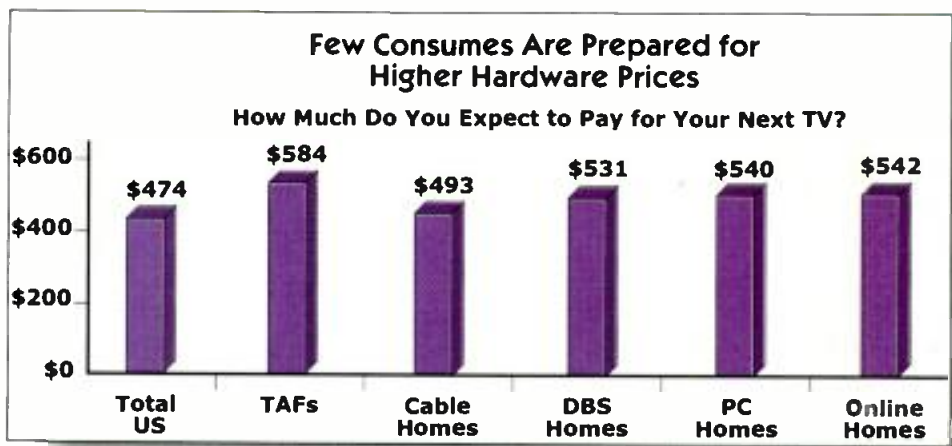


Figure 4.

have grown accustomed to paying near-commodity prices for most of today's analog TVs. Asked how much they expected to pay for their next TV, our respondents reported an average price of \$475: Higher than many of the smaller-screen sets on the market today, but still a far cry from the \$7000 to \$10,000 commanded by the first DTV receivers (see Figure 4).

As we have noted above, a combination of technical, competitive and economic factors are likely to drive the cost of DTV hardware down sharply over time. However, for the next few years, prices for most receivers are likely to remain in the thousands of dollars, with

less-expensive set-top converters an option for more cost-conscious consumers.

**Outlook**

Despite its huge implications for the media and entertainment industries, the launch of DTV will have little impact on consumers in the near term. Our initial forecast for DTV receiver sales anticipates that less than 200,000 units will be sold in the U.S. over the next 12 months, with total penetration rising to only 2.5 percent of households by the end of 2002 (see Figure 5).

While high hardware prices are the most obvious impediment to widespread

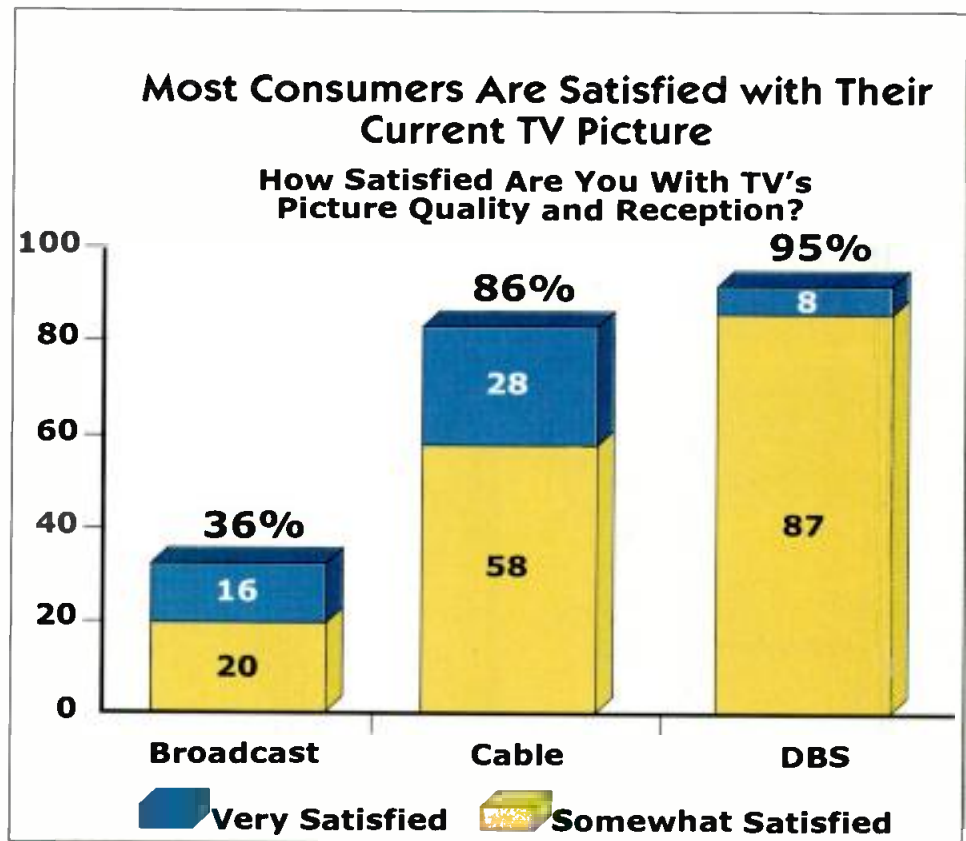


Figure 3.

# Digital TV

consumer adoption, the lack of DTV programming represents an equally significant obstacle. Even under the optimistic deployment schedule created by the FCC, upgrading all 1600 of the country's local TV stations for digital is expected to take at least three more years. We believe that this costly and complex conversion process is likely to take at least a decade.

In the mean time, the quantity and quality of DTV programming to be shown by stations making the change remains uncertain. To build word-of-mouth among influential early-adopters and make the best possible case for DTV, the networks will need to act aggressively in producing and marketing high-definition or other types of

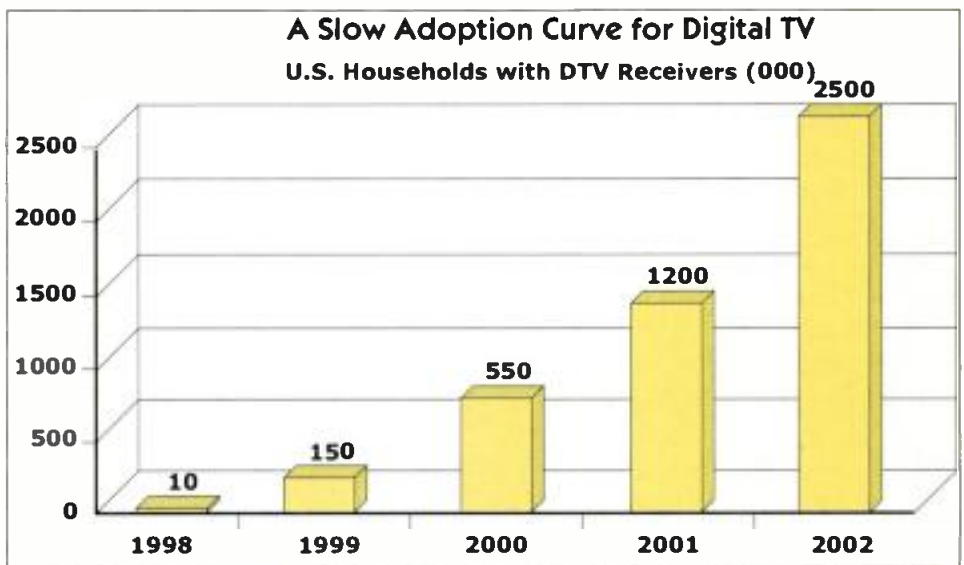


Figure 5.

well as the cable MSOs, which act as gatekeepers to two-thirds of the viewing audience. With the prospect of a digital must-carry ruling growing more dim, the broadcasters will have to rely

plants in the U.S. will have the capacity needed to add extra broadcast channels by the year 2002. For MSOs with less room, the broadcasters' new digital signals will take a back seat to their own array of cable channels until plant upgrades are completed. As a result, many of those consumers who want to receive DTV will need to add separate set-top or rooftop antennas, another stumbling block toward large-scale adoption.

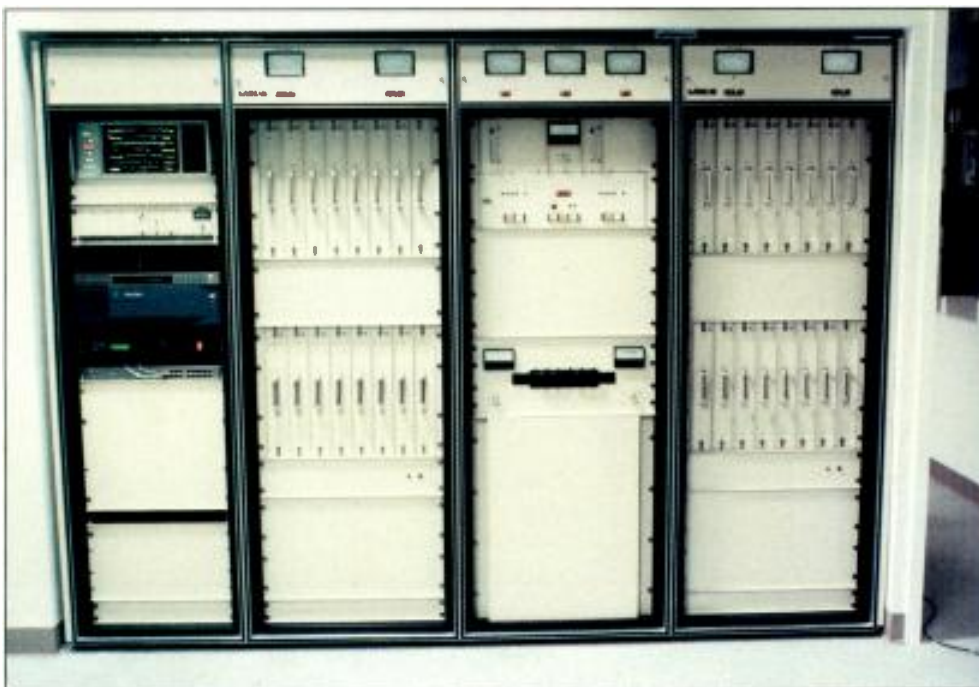
**The quantity and quality of DTV programming to be shown by stations making the change remains uncertain.**

enhanced programming. However, to do this will require support from the film industry (which has recently raised concerns about copyright issues related to the digital broadcasting of movies) as

on voluntary carriage from cable operators, many of whom are just beginning their own plans for digital network upgrades. The Yankee Group believes that only about half of all the cable

## Stay tuned...

In light of these obstacles, the fundamental question of how broadcasters will make money from DTV is still unanswered. Will better-looking HDTV programming win back audiences now being lost to cable? Can it command higher rates for advertising? Will DTV's potential for delivering multiple streams of SDTV allow the networks to mimic cable's strategy of creating new channels for targeted audiences? Finally, how real are the prospects for combining information and other content from the Internet with more conventional forms of TV programming? All of these issues will soon be revisited by companies in and around the media and entertainment industries as the deployment of DTV slowly moves beyond today's launch. ■



A Larcan DTV/VHF solid state transmitter installed at WTNH, Channel 10, New Haven, CT.

James Penhune is program manager, Media & Entertainment Strategies for The Yankee Group, Boston.

# Interactivity in TV's digital age

By Joel Zdepski

Throughout its brief history, the TV medium has continuously evolved to enhance the "reality" of the viewing experience. Television has moved from black and white to color, mono to stereo. Soon broadcasters will embark on the next big step, transitioning from analog to digital and from passive receptor to interactive tool. This profound transition will require system-wide changes affecting program creation, storage, broadcasting and reception. Competition to retain customers will force digital broadcasters to offer value-added services in addition to current programming.

## Consumer behavior

Consumers will demand that interactivity not dramatically change their viewing experience. Rather, TV viewing must be enhanced by simple-to-use new services. Also, interactive television is not simply a way to provide Internet service via a TV screen.

Surprisingly, consumers seem to be somewhat indifferent about interactive television. A new report from Jupiter Communications found that most people don't care about online, supplemental information for entertainment-based interactive television. TV viewers are already content to surf the Internet using a PC. Jupiter's report also suggests that TV viewers will only exert minimal effort to get added value from DTV services. Therefore, the goal should not be to imitate the PC in the new TV sets. This follows the notion that television is passive and computing is active. When we watch TV we want to relax, maybe even with a group. When we use the computer we usually are alone and sit in an upright, attentive posture. Moving to interactive must not be a drastic revolution from viewers' decades-old habits.

## Generating new broadcast revenue

Interactive television, while still on the horizon in the U.S., is already available in parts of Europe. Jupiter Communications research shows interactive services gaining ground in Europe, and broadcasters and service providers are developing a platform that competes with the Internet for users and advertisers. The research shows that digital TV-based interactive services will reach 19 percent of households in the United Kingdom, 28 percent in Sweden and 12 percent in France by 2002. Jupiter also reported 33 percent of British households and 29 percent of French households expressed a willingness to pay for interactivity on their television sets. Clearly, the interest is high and is gaining momentum.

Broadcasters are now looking at interactive television as a new way of increasing advertising revenue. Jupiter forecasts that by the end of the year 2005 there will be over 12 million DTV subscribers worldwide. They also expect broadcasters to be able to generate up to 20% of their total advertising revenues from interactive services by the same year. With Internet ad spending projected to reach \$5.1 billion in 2000 alone, it is clear why broadcasters are eager to get DTV into homes as soon as possible.

## Technical requirements and infrastructure

For interactive television to gain acceptance, software manufacturers must develop a comprehensive and cost-effective end-to-end solution for TV stations, hardware manufacturers and application developers. The product family must include an operating system for the DTV receiver, a set of authoring tools for developing applications, software to inject the data to the broadcast stream. For TV stations, it then comes down to being able to deliver the data. Because the DTV station will already be configured for MPEG-2 video and audio distribution, only minor modifications to the station's infrastructure will be needed. In fact, the procedures are similar to handling a pay-per-view or local ad insertions.

Prior to broadcast, the content to be aired must be stored on the server. For application data, information such as bit rate, synchronization and expiration date is also required. Some applications, such as augmented advertisements, will require usage tracking to fulfill contractual obligations to the content provider. The as-run log can handle this. Because the interactive material will be added to an on-going video stream, it may be necessary to reduce the video's bitrate (or steal some space from other data streams) in order to fit all of the material within the channel. Dynamic bit-rate allocation can easily handle this task. The interactive data is then inserted into the outgoing bit stream, much like EPG data.

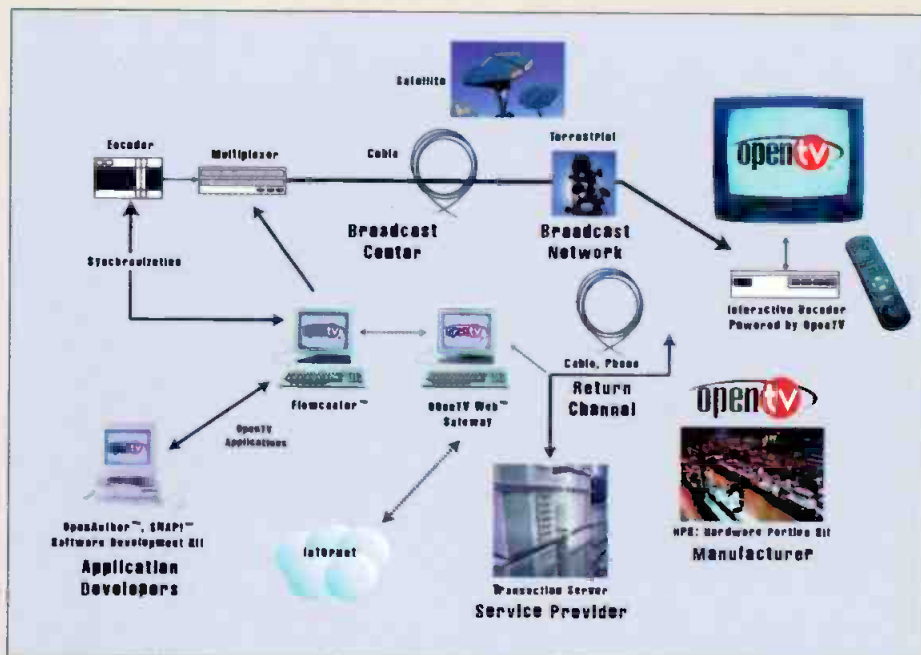


Figure 1. Interactive TV can be delivered by a variety of methods. For TV stations, the encoding and transmission process is relatively straightforward and much like other forms of data.

Joel Zdepski is vice president, Applications Group for OpenTV, Mountain View, CA.



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Thanks to all the readers who made these awards possible.

**By Dana Guthrie, Associate Editor**



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## Systems Wireless intercom

The Series 800 wireless intercom system has been upgraded to include optional ISO and stage-announce capabilities from Beltpac remotes. Beltpac users can now communicate in ISO mode, eliminating the talk path to the hardwired intercom with which the Series 800 interfaced. In the stage-announce mode, Beltpac users can make announcements through the Series 800 system to an external paging/speaker system. These options are available on all new systems and can be retrofitted into all previous versions of the system. The intercom system can operate as a stand-alone system or can be interfaced with most hardwired intercom systems. Up to four users per base station can operate hands free at ranges of more than 2000 feet.

**800-542-3332; fax 703-437-1107; www.swl.com**

Circle (303) on Free Info Card



## Sony portable HD camera

The HDC-750, the portable companion to the HDC-700, has a variety of output video interfaces that simultaneously meet the requirements for HDTV and SDTV systems. The camera is designed to meet the needs of broadcasters and production companies for providing high-quality programs in different formats. The HDC-750 features high-HDTV performance, flexible creative video controls and sophisticated dual-format (HDTV and SDTV) video interfaces. Features inherited from the SDTV BVP-700/500 Series include the new contemporary digital-command network system, a user-friendly menu-control system and an automated setup system.

**800-686-SONY; fax 201-358-4058; www.sony.com**

Circle (304) on Free Info Card



## Sennheiser condenser microphone

The MKH 20-80 is a series of RF condenser microphones designed for recording to the most exacting standards. The microphones feature low inherent self-noise for exceptionally accurate sound reproduction, exceptionally flat frequency response and high linearity. The series features a wide range of pick-up patterns, including omnidirectional, cardioid, wide-cardioid, super-cardioid and figure-eight. The microphones' low weight and durable, light metal design make them suitable for outdoor applications. Reliable accessories support an extensive range of applications.

**860-434-9190; fax 860-434-9022; www.sennheiserusa.com**

Circle (305) on Free Info Card



## Radamec robotic rail track

The Track Cam system is designed to support the Radamec 421 and 435s pan/tilt heads and is capable of carrying a large range of cameras and lenses. The system can be configured with any of Radamec's control panels, such as the ARC 2000 Touch Control Panel, and can be easily integrated with existing Radamec systems, which enables broadcasters to enhance their current productions with additional movement.

**918-518-0685; fax 908-518-0687; www.radamec.com**

Circle (306) on Free Info Card



## Panasonic HD switcher

The compact AV-HS3100 Millennium\* is a 1080i switcher with 100 wipe patterns. This switcher offers three program outputs (six additional SDI outputs are optional) and an advanced control display panel. A variety of options are available, including a one-channel digital effects generator, frame store, keyer, FDD drive and analog output. The switcher is designed to meet the needs of HDTV production, post-production, editing and telecine operation. The compact control panel is ideal for those environments, such as a telecine, in which space is limited.

**323-436-3500; fax 323-436-3660; www.panasonic.com**

\*This switcher is a replacement for the AV-HS1200 HD switcher.

Circle (307) on Free Info Card





## Panasonic post-production solution

POSTBOX Elite is a complete post-production solution that features real-time editing, 2D and 3D keying and transitions, online and offline capabilities, multiple compression modes, real-time audio mixing, a character generator, a built-in paint program, and expandable and removable storage options.

Version 4.0 software, now available for POSTBOX, features greater customization of timelines, bins and preferences, one-step editing, direct digitize to timeline, Rock'n'Trim scrubbing of video and audio with JKL keys; networkable media bins, and waveform and vectorscope monitoring. Other features include unlimited layered audio channels, slip-and-slide on the sequence editor, fast audio wave display, and variable speed for audio.

**323-436-3500; fax 323-436-3660; [www.panasonic.com/PBDS](http://www.panasonic.com/PBDS)**

Circle (308) on Free Info Card



## Sony iLink-based editing system

The Windows NT-based ES-3 EditStation nonlinear editing system, is a professional-level editing system with direct iLink (IEEE-1394) interface support for DV and DVCAM acquired digital footage. The ES-3 features ClipLink support and Direct Digital Link for iLink, SDTI and SDI digital interfaces in addition to standard analog I/Os. The editing system relies on 4:1:1, eight-bit component DV-based recording to the ES-3's hard drive for its excellent picture quality, so editing DV and DVCAM-acquired video footage with a Direct Digital Link results in minimal image degradation.

**800-686-SONY; fax 201-358-4058; [www.sony.com/news](http://www.sony.com/news)**

Circle (309) on Free Info Card

## Kramer mini tools for video applications

The Kramer Tools line of handy, miniature devices used in many video applications has been expanded. The line includes equipment for almost every need, including distribution amplifiers for video and audio, Y/C line amplifiers, mechanical switchers for composite and Y/C, a VGA distribution amplifier and a switcher, a transmitter and a receiver for twisted-pair A/V and a range and port extender (which is also a four-way bidirectional distribution amplifier for the RS-232). Some of the tools have bandwidths of 260MHz and can handle SDI signals with no distortion. Products added to the line this year include a composite Y/C converter, a 1:4 mic DA and more twisted-pair products.

**800-557-2637; fax 908-735-0515; [www.kramerelectronics.com](http://www.kramerelectronics.com)**

Circle (310) on Free Info Card



## Communications Specialties line of fiber optic communication products

The line, a result of CSI's recent acquisition of Math Associates, comprises six fiber optic products, each suited to the unique needs of the teleconferencing and communications industries. The Math Fiber Optics FM/Video Transmission System is designed to transmit high-quality NTSC, PAL and SECAM video signals over standard multimode or single-mode optical fiber.

The Math Fiber Optics Video/Stereo Audio Transmission System (on one fiber) uses wideband, low-noise circuitry to ensure excellent transmission of a composite video (NTSC, PAL or SECAM). The Math Fiber Optics Serial Digital Video Transmission System uses high-speed pulse modulation to transmit wideband, digitally encoded video signals in accordance with SMPTE digital video standards at 143, 177, 270 and 360 Mb/s. The Math Fiber Optics Balanced Audio Transmission System transmits high-fidelity audio line level signals with low distortion, high linearity and wide frequency response, via wideband, low-noise circuitry. The Math Fiber Optics Bidirectional Data Transmission System is a full duplex bidirectional digital transmission system that requires only one optical fiber for the link. The Math Fiber Optics Bidirectional T-1 Data Transmission System is compatible with conventional 1.544 Mb/s T-1 telephone-related signals.

**516-273-0404; fax 516-273-1638; [www.commspecial.com](http://www.commspecial.com)**

Circle (311) on Free Info Card



## ParkerVision PTV automated production system

At the heart of the PTVNEWS line is CameraManSTUDIONEWS, a computer-based production system that integrates, coordinates and automates all the production equipment necessary to produce a 30-minute newscast. The dynamic dual-monitor interface allows one person to control



multiple robotic cameras, VTRs and servers, switch video, mix audio, key graphics, cue digital video effects, and scroll scripts in the manual, semi-automated, or fully automated mode. The system's Transition Macro automation technology uses an icon-based drag-and-drop timeline, so directors can pre-program all the effects and transitions, preview, and then go to air having seen the finished product. Up to 16 hotkeys can be pre-programmed to insert an entire series of production events at any point in the Transition Macro. The system has been installed at WVLA, NBC33 in Baton Rouge and at News 12-The Bronx, a 24-hour cable news station in New York.

**800-532-8034, fax 904-733-3587; www.parkervision.com**  
Circle (312) on Free Info Card



## Pinnacle Systems image management system

Lightning 1000 is a powerful, easy-to-use, image management system with an integrated stillstore, DVE and a paint program. Lightning 1000 offers one-, two- or three-channel operation and is aimed at the high-end broadcast market, in installations where many systems are likely to be networked together. It is available with digital or analog plus digital I/O. Standard storage capacity is more than 5000 stills, with internal expansion capability beyond 10,000 stills. With the addition of external disk drives, storage is unlimited. The Lightning 1000 is used by broadcasters such as Time-Warner, the BBC, ESPN and Swiss Television.

**650-526-1600; fax 650-526-1601; www.pinnaclesys.com**

Circle (313) on Free Info Card



## PanoramaDTV (a Wohler Technologies company) A/V Monitor

The VAMP-1 SDI offers the ability to monitor four channels of analog or digital audio and video signals, including SDI, from one space-saving 2RU unit. The built-in LCD screen allows simple confidence monitoring, and composite output for viewing video on larger, external video monitors is available. A self-powered speaker system, headphone out, source switch, four level meters and



phase indication are also included.

**888-5-WOHLER; fax 650-589-1355; www.wohler.com**

Circle (314) on Free Info Card

## Accom video disk array

The WSD/2Xtreme video disk array offers three minutes uncompressed, plus higher-capacity models of 10, 20 and 34 minutes.

2Xtreme is the latest version of Accom's Work Station Disk (WSD) product line and is used worldwide in computer graphics, editing and post-production applications. WSD is the original desktop digital disk recorder and is used worldwide in 2D/3D computer graphics and editing applications. WSD provides disk storage and video I/O integrated in a single system. With video storage being network-accessible by virtually any computer, plus fast Ultra SCSI-3 performance, WSD/2Xtreme provides fast image transfers and high-quality uncompressed storage for multiple computer platforms.

**650-328-3818; fax 650-327-2511; www.accom.com**

Circle (315) on Free Info Card



## Ross digital production switchers

The Synergy Series is designed for live news, live sports and live production. Over-the-shoulder boxes, picture freezes, repositioning of keys, pushes and more are available with the innovative Squeeze & Tease feature. Complex switcher and remote-control operations are made simple through the unique custom-control hot buttons. Additional features include preview overlay, 12 aux busses, up to 64 inputs, VTR control, external DVE integration and redundant power. Synergy is packaged in a compact 11RU, 600W frame. Three models are available: Synergy 4 (four MLEs), Synergy 3 (three MLEs) and Synergy 2 (two MLEs).

**613-652-4886; fax 613-652-4425; www.rossvideo.com**

Circle (316) on Free Info Card





## Dolby multichannel encoder

The DP569\* supports encoded bit rates from 56- to 640Kb/s and channel configurations from mono to 5.1-channel surround sound. It lets broadcasters use time code to trigger configuration changes automatically for smooth program transitions. Disk-authoring facilities can use timecode to encode separate program segments accurately and create single encoded soundtrack files. Other features include fault-monitoring circuits that warn of system failure, bypass connections for hot-standby operation in broadcast installations, and remote control from Windows95/NT-equipped devices.

650-589-1355; fax 415-863-1373; [www.dolby.com](http://www.dolby.com)



\*The DP569 Multichannel encoder is a replacement for the DP561B, which is no longer in production.

Circle (317) on Free Info Card

## Pixel Power nonlinear editing and graphics system



Collage Edit has more than 50 new features and interface refinements. EEdit version "Triple One" is a significant development of the system's capabilities, with recent installations in CityTV (Toronto), Oasis Television (London), Key Editing (Stockholm) and Unilever (UK). Combines the functionality of a high-end, noncompressed, nonlinear editing system, sophisticated real-time character generation and graphics capabilities, eight-channel audio and DVE. The system has uncompressed 4:2:2 quality and standard 36- or 72-minute uncompressed video storage with up to 12 hours audio.

+44 1223 721000; fax +44 1223 721111;

[www.pixelpower.co.uk](http://www.pixelpower.co.uk)

Circle (318) on Free Info Card

## Gepco audio cable

The GEP-FLEX has been reintroduced, now with color-coded pair jackets to the base-10 resistor color code. The cable consists of a flexible outer-jacket compound surrounding the 618 (22 gauge), 724 (24 gauge) and 803 (26 gauge) series multipair audio cable. Because of its extremely high/low temperature characteristics and UL-type CM rating, GEP-FLEX is ideal for remote use and permanent installation in recording studios, radio stations and other facilities. Alphanumeric surface print, inverted every inch, identifies the pair jackets. Each pair is jacketed and shielded with a 100%-bonded foil, allowing for both to be stripped in one operation. Gepco will stock the cable in bulk lengths and cut it to the customer's length requirements.

800-966-0069; fax 312-733-6416; [www.gepco.com](http://www.gepco.com)

Circle (319) on Free Info Card



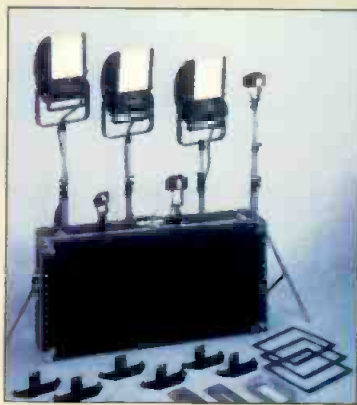
## JVC widescreen digital camera

The KY-D29W digital camera is switchable from its native 16:9 aspect ratio to traditional 4:3, offering flexibility in image capture to broadcasters and high-end producers. The camera achieves widescreen capacity via three 460,000-pixel 16:9 CCDs and boasts a microlens over each pixel for maximum sensitivity and negligible vertical smear. The camera can dock to any format and uses 14-bit digital signal processing and three-dimensional digital noise reduction (3D DNR). It features an S/N ratio of 65dB, 850 lines of horizontal resolution.

800-JVC-5825; fax 973-315-5030; [www.jvcpro.com](http://www.jvcpro.com)

Circle (320) on Free Info Card





## Pana-tek light kit

The Cool-Lux COMBO/SOFT Kit is designed around the Cool-Lux Combo-Light, which accepts 300W, 500W, 750W or 1000W double-ended lamps with a Softlight Hood to prevent projecting heat on the subject. The kit contains three Combo-Lights, barn doors, Softlight Hoods, diffusion accessories and 500W bulbs. It also contains two lightweight AC/DC Mini-Cools with 250W lamps, four-way barn doors and dimmers. For DC applica-

tions, the kit contains a 12V, 22W bulb and daylight filter assembly. A 35W, 12V Micro-Lux is included for ENG requirements.

**805-482-4820**

Circle (321) on Free Info Card



## Otari minidisk recorder

The MR-30\* is a professional, convenient and cost-effective digital recorder that uses commercially available minidisks. It provides various recording, editing and playback functions for broadcast, post-production and sound reinforcement. Features include 148 track-minutes per minidisk, AES/EBU and SPDIF inputs, basic editing with multiple layers of undo and instant playback of selected tracks.

**800-877-0577; fax 818-594-7208; www.otari.com**

\*This product is no longer supported in the U.S. but is available internationally.

Circle (322) on Free Info Card



## Spencer serial digital stillstore

The SS-2000 stillstore was designed specifically for TV-news production. It gives a "super-station" look with an affordable budget.

Its clear, intuitive graphical user interface and touchscreen provide a system that is operationally fast and easy to use. A traditional style-control panel is available. The minipix stills on the GUI are so clear that preview and program video monitors are not required at the operator position. The unit has a dual-channel DVE and dual linear and chroma keyers built-in. The DVE and synchronizer take ENG or satellite feeds and resize them for "live, over-the-shoulder" presentations typical in a news program. Bumpers can also be created by "squeezing back" the outgoing show credits. Essential for today's competitive news show, the built-in linear keyer displays graphics that have gradient transparency. It also features a powerful database and a still storage capacity of up to 10,000.

**818-840-0907; fax 818-840-8375; www.Spencer-Tech.com**

Circle (323) on Free Info Card



## CommScope HDTV transmission over coax

The 7538 Miniature Serial Digital Coax Cable provides outstanding performance in digital applications and improves wiring management in high-density areas. With a diameter of less than 0.159 inches and a weight of less than 14.3 pounds per 1000 feet, the cable reduces hardware, clutter and weight. This streamlined cable design delivers extremely low signal loss by incorporating CommScope's exclusive gas-injected foam process. The cable provides 84% velocity of propagation, with exceptional high- and low-frequency shield effectiveness. This cable effectively transmits 601 serial digital video up to 720 feet and HDTV transmission up to 190 feet, and provides improved electrical performance. Sony Systems Integration Center installed the 7538 Cable in the All-Mobile Video Production Truck, which won the NAB '98 Best of Show Award. Because of its low weight and durability, Southwest TV of Phoenix selected the cable for installation in three of the company's 50-foot production trucks.



**800-982-1708; fax 828-328-3400; www.commscope.com**

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## Technology In Transition

### Cameras: To upgrade or not to upgrade

BY JENNIFER M. LOWE

Probably no product area is more riddled with vastly different claims on performance than cameras.

There is no doubt that many stations will want to replace studio cameras when building new sets. Often, the change results from something as simple as a new lighting system. Yet many stations will delay purchases until they see consumers' reactions to 16:9 format programs. The real interest in new cameras seems to center on ENG and remote-production applications. New technology has resulted in lighter, more efficient, higher-quality cameras. Combined with DVCPRO, SX and DVCAM recording formats, station engineers are faced with a bewildering number of camera/camcorder choices. (For a discussion of some of these format issues, see Dr. Digital, p. 46.)

Instead of merely providing readers with a list of models and specifications, the BE staff contacted each camera manufacturer to see how companies are positioning their products in light of a push by some stations to hold off purchases until prices come down and the HD- and image-format questions shake out.

Each camera manufacturer was sent a survey form, which posed the following question, which our readers have repeatedly asked: "My camera works fine. Why should I buy a new camera today when, in the next few years, camera prices will come down and much of the dust from HD will have settled?" As of December 1, after several follow-up calls and faxes to each manufacturer, the following responses were received.

#### Sony

The era of DTV is here. Regardless of how HDTV and SDTV ultimately shake out, it is certain that both will have a long-term significant role. Depending upon your client base, you need to decide on a near-term investment in an HDTV camera or, at the very least, a contemporary widescreen SDTV camera. All DTV receivers, without excep-

tion, are widescreen. From here on out, major productions will only have a shelf life if they are widescreen. There is a learning curve in shooting widescreen, and you need to be proactively engaged in this right now. The new enhancement of DTV picture quality delivered to the home will demand the highest quality in picture origination.

The dust will NOT settle quickly on DTV signal formats, therefore flexibility in conversion between them is the new imperative. In anticipation of the launch of DTV, prices of both HDTV and SDTV cameras have substantially lowered over the past two years, and are not likely to drop much more.



Sony's HDW-700

Sony Electronics offers HDCAM, a high-definition format incorporating HD Digital Compression technology for high-end production. The HDW-700 digital widescreen high-definition camcorder employs the HDCAM format. The camcorder is a full RGB two million-pixel CCD camera with 10-bit 74.25MHz DSP processing of the RGB video.

Laurence J. Thorpe, vice president, Acquisition Systems, Sony Electronics' Broadcast & Professional Company; [www.sony.com/professional](http://www.sony.com/professional)

Circle (340) on Free Info Card

#### JVC Professional Products Company

The primary reason to upgrade is to add additional capabilities or to upgrade image quality. An upgrade today will mean that you can change more for your work and build a higher-quality library for the future. Of course, that also means that you should upgrade

your camera and recording format.

JVC offers the DY-700Y 4:2:2 component Digital-S camcorder featuring an integrated three CCD camera head and a heavy-duty tape transport mechanism. The camcorder has an SMPTE timecode generator and an externally locking timecode generator, and includes a 48V Phantom Power supplied to the mic inputs.

JVC Professional Products Company; [www.jvcpro.com](http://www.jvcpro.com)

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#### Hitachi Denshi America Ltd

There are two primary reasons for buying a new camera. First, to produce in a 4:3 aspect ratio for immediate use and to archive productions in a 16:9 format to use in the future with DTV. Second, DTV today offers very limited programming, but this programming will slowly, but steadily, increase, and in the next year or two there will be a need to begin limited local origination.

At NAB98, Hitachi introduced the SK-3000, a multistandard studio camera that provides simultaneous HDTV and NTSC outputs. The SK-3000 studio/field camera conforms to today's



Hitachi's SK-3000

NTSC standards and at the same time offers total compatibility of future ATSC digital broadcasting. The SK-3000 is also available in a portable version, the SK-3000P. Hitachi also offers a number of digital 4:3/16:9 switchable cameras, including the newly introduced SK-2060PW, SK-2700W and Z-3000W.

Tony Delp, product manager, Hitachi Denshi America Ltd; [www.hdal.com](http://www.hdal.com)

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# Your guide through the digital maze.

Pull ahead in the DTV rat race.



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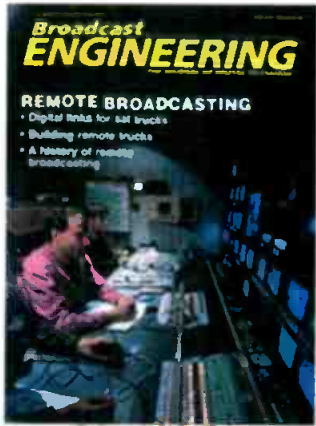
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## Fooling ourselves into making decisions

BY KARE ANDERSON

**T**hink back on a decision you have made that has had negative consequences, then consider choices that would have resulted in a better outcome.

Some of our biggest regrets come from faulty decision-making. Often, thinking through decisions leads to wiser choices. Perhaps you rely on your gut instincts but are fooled by the unconscious decision-making traps we all fall into. According to negotiations guru Howard Raiffa, we are destined to repeat the same faulty decision-making process and experience more grief from poor results if we don't gain insight into decision-making traps.

According to Raiffa, the fault often lies not in the decision-making process but in the mind of the decision maker. The following are insights into the three most common traps we set for ourselves when making decisions.

### Anchoring

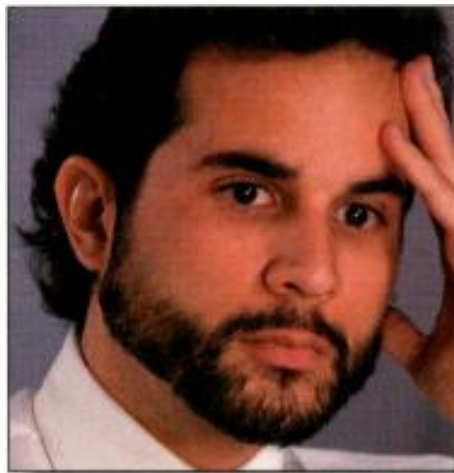
When considering a decision, the mind disproportionately weighs the first information it receives. Initial impressions, estimates or other data overshadow subsequent thoughts and judgments. In business, one of the most frequent anchors is a past event or trend. In attempting to project sales of a product for the coming year, a marketer often begins by looking at the sales volumes for past years. This approach tends to put too much weight on past history and does not give enough weight to other factors.

Reduce the impact of the effects of anchoring by following these important guidelines:

- Be open-minded. Seek information and opinions from a variety of people to widen your frame of reference.
- Offer objective information. In seeking advice from others, relate only the facts so you don't inadvertently anchor the person with your opinion.

•Don't let someone anchor you. Remember that the person who characterizes a situation can anchor your perception of it.

•Be especially wary of anchors in negotiations. Think through your position before any negotiation begins,



so you can avoid being anchored by someone else's proposal or position.

### Maintaining the status quo

We are instinctively drawn to what is familiar. Thus, we look for decisions requiring the least change. For instance, when a new product is introduced, it is made to look like a familiar one. As examples, the first cars looked like horseless carriages, and the first online newspapers and magazines were formatted much like their print counterparts.

Experiments have shown that the more choices someone is given, the more influence the status quo has. Why? Because more choices involve more effort, and selecting the status quo helps us avoid that effort. In broadcast, sins of commission (doing something, i.e. taking a digital leap) tend to be punished more severely than sins of omission (doing nothing, i.e. staying with an analog alternative for a while longer). In all parts of life, people want

to avoid rocking the boat.

Although avoiding the status-quo trap seems difficult, it is not impossible. Start by thinking of your goals when preparing to make a decision. Review how these goals are served by the status quo as compared to a change. Look at each possible change, one at a time, so as not to overwhelm yourself and instinctively want to stay comfortable and unvarying. Never think of the status quo as the only alternative. Remember that the desirability of the status quo may change over time. When considering a change, look at situations that may arise over time. If several alternatives are superior to the status quo, avoid the natural tendency to fall back on the easy decision. Easy decisions are not always the correct decision.

### Justifying past actions

The more actions you have already taken on behalf of a choice or direction, the more difficult you will find it to change direction. Whenever you have invested time, money, or even your personal reputation in a choice, you will find it more difficult to change your course of action.

Important decisions call for a conscious effort to set aside past actions and investments and instead concentrate on present factors. Seek out and listen to people who were not involved with the earlier decisions.

Don't cultivate a failure-fearing culture in employees around you. In such an atmosphere, others will perpetuate mistakes rather than admitting them to you and changing course. When you set an example of admitting and correcting your mistakes, others will believe they can do the same. ■

*Kare Anderson is a speaker and author. Visit her website at [www.sayitbetter.com](http://www.sayitbetter.com).*

# Windows to the Web



[www.pinnaclesys.com](http://www.pinnaclesys.com)

**Pinnacle Systems:** Pinnacle Systems' broadcast products give professionals the cutting edge tools needed to create dazzling productions faster and more affordably than ever before. These innovative digital video manipulation tools perform a variety of on-air, production, and post-production functions such as the addition of special effects, image management, capture, storage, and play-out, as well as graphics and title creation.



[www.sterlingcm.com](http://www.sterlingcm.com)

**Sterling Communications International:** Sterling Communications International, a full-service advertising and marketing communications agency, specializes in design and implementation of integrated communications for video, broadcast, satellite and cable products manufacturers. Our services include branding, corporate identity, marketing plans, advertisements, corporate / product brochures, collateral, direct mail promotions, annual reports, packaging, catalogs, copywriting, digital media, and more.



[www.wg.com](http://www.wg.com)

**Digital Transport Systems:** Digital Transport Systems (DTS), a subsidiary of Wavetek Wandel & Goltermann, provides innovative product solutions for the digital broadcast test and measurement industry.



[www.broadcastengineering.com](http://www.broadcastengineering.com)

**Broadcast Engineering:** *Broadcast Engineering* is the only technology-driven online magazine in the industry. Its editorial environment delivers practical, informative articles on digital technology, systems integration, management, how-to installation, and systems and equipment maintenance. It is a package geared toward TV stations, cable/ telcom, production, post-production, business TV, satellite and interactive television.



[www.nova-sys.com](http://www.nova-sys.com)

**Nova Systems:** A leading manufacturer of signal processing equipment for television broadcast, teleproduction, and industrial video applications. Nova's product line corrects, converts, and distributes video as well as audio signals.



[dennis\\_triola@intertec.com](mailto:dennis_triola@intertec.com)

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## New Products

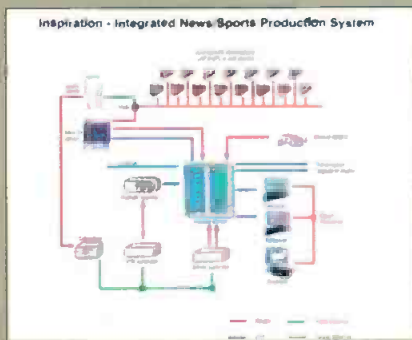
### HDTV product line

**VAS Group 20 Series:** models include two Y Pb Pr/RGB transcoders, a safe-area generator and a blanking generator; models accept analog HDTV 1080i and 720p standards (SMPTE 274M and 296M); the field rate is selectable for 59.94- or 60Hz; available in a standard one-RU chassis; 818-843-4831; fax 818-843-6544; [www.vasgroup.com](http://www.vasgroup.com)  
 Circle (251) on Free Info Card



### Integrated news/sports production system

**Quantel Inspiration:** handles all aspects of news or sports operation in a fully integrated system; centered around the Clipbox video server, Inspiration integrates the AP Electronic News Production System with journalist PC video browsing and editing capabilities (supplied by OmniBus Systems); provides complete automated control of loading — the OmniBus Columbus automation system provides playout and asset management; 800-218-0051; fax 203-656-3459; [www.quantel.com](http://www.quantel.com)  
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### Digital audio editor software update

**360 Systems Short/cut '99 software update:** Short/cut is a completely self-contained two-channel digital editor optimized for editing of audio, including speech, music, call-in clips, news, promos and spots; scheduled for introduction early next year, the update will support compatible file interchanges with most common formats, including .WAV, .BWF and .AIFF; other features include



the ability to generate fade-in, fade-out and crossfade options and to provide for larger capacity hard-disk storage; 818-991-0360; fax 818-991-1360; [www.360systems.com](http://www.360systems.com)  
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### ADAT mastering tape

**Quantegy ADAT:** uses Quantegy's latest coating technology, by which the front coat of the tape is an optimized high-coercivity, cobalt-doped, gamma-ferric oxide particle and the base film is tensilized for superior handling; the shells and special carbon backcoat are designed to reduce BER and increase performance; 42-plus- and 60-minute program lengths are available in reusable sleeves or in an album configuration; 770-486-2800; fax 770-486-2808; [www.quantegy.com](http://www.quantegy.com)

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### Media processing platform

**Chyron Duet:** available as an SD or HD system, this WindowsNT, GL-compliant video machine supports 56 simultaneous, full-bandwidth video streams along with an object-oriented 2D/3D graphics engine scalable to various DTV resolutions and scan rates; Duet is an open platform that includes CAL, the Chyron Abstraction Layer; the CAL library provides full access to all Duet functions and works with third-party applications through Microsoft's COM and DCOM technologies; 516-845-3871; fax 516-845-3888; [www.chyron.com](http://www.chyron.com)

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### Digital video switcher

**Sony DVS-7150:** combines up to 24 inputs with the flexibility of a 1.5 mix/effect bank architecture and tight DME effects integration in a compact format; inputs can be specified in SDI or NTSC formats; up to seven aux busses, including an edit preview bus, can be used to feed video and key signals to external DMEs, monitors and recording devices; switchable 525/625-line operation with component signals and switchable 4:3/16:9 operation; 800-635-SONY; 201-358-4058; [www.sony.com](http://www.sony.com)

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### Two microconverters

**Miranda picoLink SDM-771p and IDA-771p:** a monitoring D/A converter and an impedance converter, respectively; the 4"x1"x0.7" units, with lightweight, compact aluminum bodies and a simple design, allow for easy installation and operation; 800-224-7882; fax 514-333-9828; [www.miranda.com](http://www.miranda.com)

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**ATSC-compliant, MPEG-2 transport stream analyzer**

**Digital Transport Systems MPEG-2 Transport Stream Analyzer:**

ATSC standards have been added to this DVB-compliant unit; available in desktop and portable configurations, it can be delivered with DVB-compliant transport stream analyzer and generation capabilities or upgraded with these features as user needs expand; allows for real-time analysis of an MPEG-2 ATSC transport stream at the output of a multiplexer, demodulator or encoder during development or manufacturing stages for quick isolation and correction; 619-675-1410; fax 619-675-1412;

www.dtsys.com

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**HD station automation and post-production systems**

**Sony and Pluto Technologies International**

**HyperSPACE HDCAM:** a playout server to be used in broadcast applications for HDTV random-access station automation and as an HD disk recorder for post-production applications; uses advanced HDCAM compression technology; allows broadcasters, cable operators and post-production facilities to operate in a purely HDCAM environment, minimizing generational video quality loss and improving the on-air product; 800-686-SONY; fax 201-358-4058; www.sony.com/news.



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**Single-channel encoder with built-in modulator**

**BARCO RE 4221:** DVB-compliant DSNG encoder/modulator; features 4:2:2/4:2:0 encoding, QPSK/8PSK/16QAM modulation, digital and analog video as well as audio interfaces; housed in a compact, 19-inch, two-RU chassis with front-panel control; designed for digital satellite newsgathering and point-to-point contribution applications; 770-590-3600; fax 770-590-3610; www.barco.com

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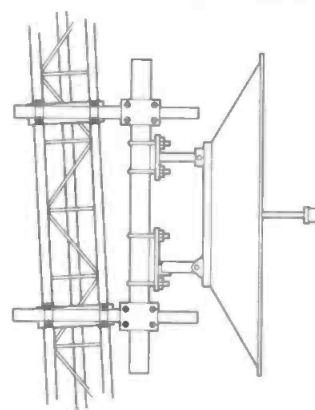
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### SDI video transmission system

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**Serial Digital Video Transmission System:** designed for integration into a range of applications, including broadcasting and video production; equalizes the SDI input and provides two reclocked SDI outputs at the receiver in accordance with SMPTE 259M, 293M and other similar digital video standards with speeds that can exceed 360Mb/s; designed for use with multimode optical fiber; supports distances up to 2km with no degradation of signal; 516-273-0404; fax 516-273-1638; [www.commspecial.com](http://www.commspecial.com)

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### Monitor series

**Sony monitors: BVM G Series:** includes 14- and 20"-models that use HR Trinitron CRT technology; features an advanced auto white balance capability; switchable 4:3/16:9 aspect ratio; can be fitted with a separate control unit from which the user can run up to 32 individual units. **PVM Series:** a 9-inch monitor series that provides improved degaussing function, including manual degause, and a switchable 4:3/16:9 format ratio with a switch on the front of the monitor; includes 250-line and 450-line resolution monitors; 800-635-SONY; fax 201-358-4058; [www.sony.com](http://www.sony.com)

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### Digital audio cable

**GEPCO 5524EZ:** features improved performance at a lower price; 1110Ω AES/EBU single-pair cable features two 24-gage conductors and a high-speed foam dielectric; can be used for runs of up to and beyond 650 feet; completely shielded by a bonded aluminum/polyester tape with a 24-gage drain wire; the outer jacket is an easy-to-strip, gray UL-list type CM PVC compound; the pressurized jacket keeps the physical spacing between the pairs and the shield consistent; 312-733-9555; fax 312-733-6416; [www.gepco.com](http://www.gepco.com)

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### Free software upgrade

**Videonics Version 1.1 Effetto Pronto Effects for Macintosh:** a combination of compositing and effects software and a PCI hardware accelerator; offers instant feedback on effects processing, unlimited layering capabilities, sophisticated tilting and color correction; adds RAM and disk caching capabilities to the product; 408-866-8300; fax 408-866-4859; [www.videonics.com](http://www.videonics.com)

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### Video server products

**Quantel Cachebox and Clipbox:** the Cachebox distribution server has increased power through extended storage and additional channels, and supports 4X real-time transfer; its current port configuration is extended to eight ports to provide a family of server products spanning a host of multi-channel transmission applications; the new storage option enables the current six hours of DVCPRO storage to be increased to 24 hours; the Clipbox editing server gains optional native DVCPRO compatibility; 800-218-0051; fax 203-656-3459; [www.quantel.com](http://www.quantel.com)

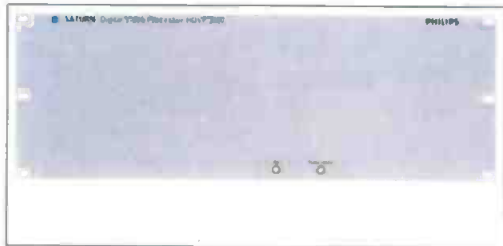


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## HD video processor for Saturn master control system

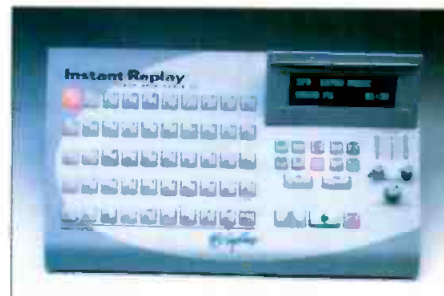
**Philips HDVP-3500:** a 1.5Gb HD video processor configurable for 1080i/60 or 720p/60 signal formats; can be operated as a standalone unit or networked to a Philips switcher system; uses the GS-400 16x16 Gb routing switcher for source selection and integrates to the Jupiter control system; besides the output busses used by the processor, 11 outputs are available for HD routing using any of the standard Jupiter control panels; allows for simultaneous multichannel operation of up to 15 channels of analog, digital and HD processors from single or multiple panels; 801-977-1611; fax 801-972-0837; [www.broadcast.philips.com](http://www.broadcast.philips.com)



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## Hard-disk audio player

**360 Systems Instant Replay 2.0:** a self-contained professional digital audio player and recorder; provides immediate access to 1000 audio cuts; offers high-quality linear and Dolby AC-2 digital compression technology; stores frequently used cuts to 50 panel-mounted buttons for immediate access in 10 user-defined groups; each cut is stored with a name and ID number; individual cuts can be organized into playlists and triggered remotely; audio can be recorded, titled, arranged and played with no length limitations; 818-991-0360; fax 818-991-1360; [www.360systems.com](http://www.360systems.com)  
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## Real-time clocks and logos application

### Inscriber Technology

**Clocks&Logos:** enables TV stations to display time, temperature and logos on-screen during live broadcasts; runs on the NT operating system; allows for placement of real-time data fields anywhere on the TV screen; the clock component includes a screen for customizing the look of a variety of digital clocks; the logo module imports and places logo files in several file formats; includes a temperature field that displays temperature data in real time from an outdoor thermometer; 519-570-9111; fax 416-391-1999;

[www.inscriber.com](http://www.inscriber.com)

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## SDTI interface

**NDS SDTI:** developed in collaboration with Panasonic, the interface enables the transparent carriage of DVCPRO Native over an MPEG-2 transport stream; allows the quality video and audio of DVCPRO to be maintained from acquisition to the newsroom or post-production; will be available for NDS' new E5000 encoders, including its Mobile Contribution encoders and DSNGs; 949-725-2500; fax 949-725-2505; [www.ndsworld.com](http://www.ndsworld.com)

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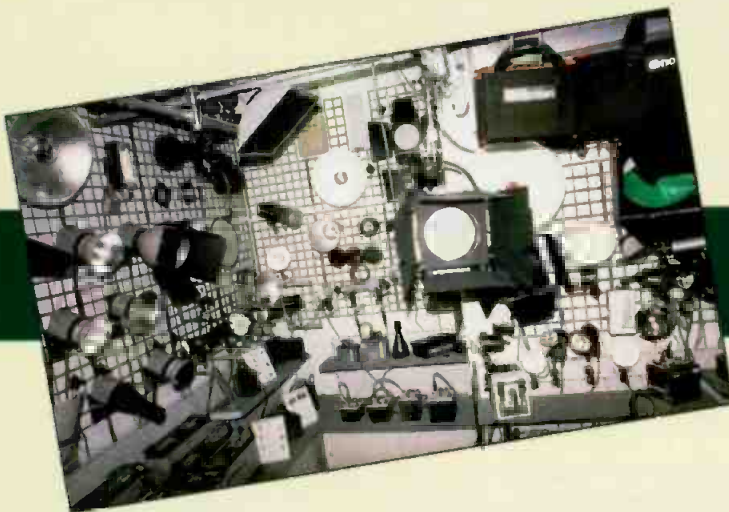
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## SONY

### 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/R1, 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:

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- 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 at 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 worldwide 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 phosphors 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 phosphors 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 two 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 Feedback 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 output can 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. Inputs/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 TBC's and digital dropout compensation assure consistent picture performance. Remote TBC adjustment can be done using the optional BVR-50 JBC 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.
- 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-2650 Only**
- Dynamic Tracking (DT) playback from -1 to +3 times normal speed.
- **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 WJ-MX50 Digital A/V Mixer



- Four input switcher and any two sources can be routed to the program buses. • 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.
- Wide 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. It incorporates all IF+ features, plus is the only lens (besides the J9ax5.2B IRS/IAS) with a Van-Polar lens hood, enabling rotation of attached filters.



## 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

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.

### CADDY systems

- 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 camera balance for ENG camcorders, industrial CCO 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 locking
- 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 #330 - 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 PRO-130 SYSTEMS

The Pro-130 tripod systems are perfect for today's on the move ENG cameramen. Lightweight, these systems have been specifically designed to provide a wider balance range to suit the latest DV, DVCPRO, DVCAM camcorder and camera/recorder combinations. All systems come complete with the PH-130 fluid pan & tilt head, choice of single or 2-stage ENG tripod, floor spreader and soft carrying case for easy transportation. The PH-130 pan & tilt head incorporates Vinten's continuously variable LF drag system to provide smooth movement and easy transition into whip pan, together with a factory set balancing mechanism. Both the single-stage and two-stage legs are toggle clamp tripods are made from strong, durable aluminum with excellent height range capabilities.

### VISION 8 AND 11 Lightweight Heads for the Future

Superbly engineered and designed for use in professional broadcast, educational and corporate productions, the Vision 8 and Vision 11 simultaneously provide the ultimate in lightweight support with exceptional robustness - even in the toughest shooting conditions.

#### Vision 8 Pan & Tilt Head

- The incredibly lightweight Vision 8 provides smooth shots, whip pan action and quick set-up while supporting up to 23 lbs. Add the single-stage carbon fiber tripod and you have the lightest combination possible for that all important event - without sacrificing the reliability and robustness that you require.
- Simple external adjustment for perfect balance over the full 180° of tilt
- Infinitely variable drag with proven LF technology
- Calibrated drag knobs
- Flick on/flick off Pan and Tilt brakes
- Single rotation counterbalance
- Leveling bubble standard
- Standard 100mm leveling ball • Lightweight, only 5.9 lbs.

#### Vision 11 Pan & Tilt Head

- Slightly heavier the Vision 11 offers additional capacity (up to 29 lbs.) plus it has illuminated controls to allow fast camera balancing and leveling even in poor lighting. Combine with a two-stage carbon fiber or aluminum tripod and you have a package with the biggest height adjustment yet the smallest to carry. Ideal for all ENG assignments.
- Simple external adjustment for perfect balance over the full 180° of tilt
- Infinitely variable drag with proven LF technology
- Back-lit and calibrated drag knobs
- Flick on/flick off Pan and Tilt brakes
- Digital counter-balance readout
- Illuminated leveling bubble • Standard 100mm leveling ball
- High load to weight ratio • Lightweight - only 6.2 lbs.

## antonbauer

### 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 14.4 v 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.

### 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 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 has the module and is the ultimate professional power system.



### HyTRON 50 Battery

Weighing a mere 3 1/2 (380 grams) and packing 50 Watt-hours of energy - enough to operate a typical ENG camcorder for two hours, the HyTRON 50 is the most advanced lightweight battery in the industry.

- Made possible by recent advancements in a cell technology originally designed for the mobile computing industry, it incorporates nickel metal hydride cells that provide the highest energy density of any rechargeable cylindrical cell available. High performance is further assured through the integration of Anton/Bauer InterActive digital technology.
- Equipped with an on-board "fuel computer" which monitors energy input and output as well as critical operating characteristics and conditions. This data is communicated to the InterActive charger to ensure safety and optimize reliability.
- In addition, remaining battery capacity information is available by means of an LCD display on each battery and in the viewfinder of the most popular broadcast & professional camcorders.
- Special low voltage limiter prevents potentially damaging overdischarge.

Specifications: 14.4 V, 50 WH (Watt Hours) 5-3/4 x 3-1/2 x 2-1/4", 1.9 lbs (88kg) Typical runtime: 2 hours @ 25 Watts 3 hours @ 17 Watts

### Dual 2702/2401

#### Two-Position Power/Chargers

The DUAL 2701 (70 watt) and 2401 (40 watt) are sleek, rugged, economical two position Power/Chargers that have all the features of InterActive 2000 technology including CO 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. Compact, lightweight design makes them the ideal for travel. They can also be upgraded with the Diagnostic/Discharge Module and/or with Expansion Modules to charge up to 6 batteries of any type.

## PROFESSIONAL VIDEO TAPES



PG-30.....	2.39	PG-60.....	2.59	PG-120.....	2.79
Broadcast Grade VHS Box					
BGR-30.....	3.29	BGR-60.....	3.99	BGR-120.....	4.49
H471S S-VHS Double Coated					
ST-30.....	6.79	ST-60.....	7.49	ST-120.....	7.99
M221 Hi 8 Double Coated					
Metal Particles			Metal Evaporated		
P630HMP.....	4.99	E630HME.....	7.69		
P660HMP.....	6.39	E660HME.....	10.29		
P6120HMP.....	8.29	E6120HME.....	13.59		
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.).....	7.99	23M.....	9.49	33M.....	11.99
63M.....	21.99	64L (Lg.).....	22.99		
94L.....	32.99	123L.....	42.99		

## maxell

Hi8 Metal Particle (XRM)					
P6-120 XRM.....	6.99				
Broadcast Quality Hi8 Metal Particle					
P6-30 HM BO.....	5.39	P6-60 HM BO.....	6.09		
P6-120 HM BO.....	7.99				

P/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				

BQ Broadcast Quality VHS (Box)					
T-30 BQ.....	3.89	T-60 BQ.....	3.99	T-120 BQ.....	5.99

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ST-126 BQ.....	7.49	ST-182 BQ.....	13.99		

Betacam SP					
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B30MSP.....	16.99	B60MSP.....	27.99	B90MSP.....	39.99

## Panasonic

Mini DV Tape					
AY DVM-30.....	7.99	AY DVM-60.....	8.49		
AY DVM-60 (10 Pack).....	each 7.99				

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.....	6.49	P6-60 HMEX.....	10.99		
P6-120HMPX.....	8.89	P6-120HMEX.....	14.99		

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-30BA.....	3.49	T-60BA.....	3.99	T-120BA.....	4.79

MQ Master Quality S-VHS (In Box)					
MOST-30.....	7.49	MOST-60.....	7.79	MOST-120.....	7.99

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 (In 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.....	17.99		
DVM-30EX "No Chip".....	12.99	DVM-60EX "No Chip".....	14.99		
DVM-30PPR "No Chip".....	9.99	DVM-60PPR "No Chip".....	11.49		

Full Size DV Tape with Memory Chip					
DV-120MEM.....	25.89	DV-180MEM.....	29.99		

PDV Series Professional DVCM Tape					
PDVM-12ME (Mini).....	18.99	PDVM-22ME (Mini).....	20.99		
PDVM-32ME (Mini).....	23.99	PDVM-40ME (Mini).....	25.99		
PDV-94ME (Standard).....	34.99	PDV-124ME (Standard).....	38.99		
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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's 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-antialiased 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

#### 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.
- Adjust a wide range of character attributes. Wide choice of composition tools.
- Characters, words, rows and fields can color flash
- Character 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.
- 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
- 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 DLE objects, WinBit! 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



## 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 authors 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 Millennium 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-2940LW 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 ..... \$5995.00  
 With TARGA 1000 Pro (component input/output) ..... \$6495.00



## 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 rack-mount chassis they accept and route (on the vertical interval) virtually any video signal, including off-the-air and non-limebase 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-led 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-vo! NTSC or PAL video signal input to any or all video outputs.
- Accept and route two-vo! 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 Readout, 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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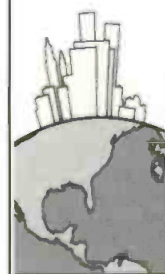
## Help Wanted

**CHIEF ENGINEER** WZDX-TV, Fox 54, Huntsville, AL has an immediate opening for a hands-on chief engineer. The successful applicant will have extensive UHF transmitter and studio equipment maintenance experience, and will oversee master control operations. Ideal candidate will have at least 5 years experience as chief or assistant chief engineer. Send resumes, including salary requirements to: Gloria Johnson, WZDX-TV, PO Box 3889 Huntsville, AL 35810, or fax to 256 (533)-5315. EOE.

**SOFTWARE ENGINEER** Gainesville, FL. Develop algorithms for television automation using expert system rules to discriminate between program materials & commercials, in absence of discrete data that would identify the existence or location. Design new version using newest technology available & transform to Windows NT system. Evolve hierarchical storage management system for digital video resident in caches & video file servers. 40 hrs/wk; 9AM-6PM, M-F; \$46,000/yr; requires B.S. in Computers or Math & 5 yrs. exp. in job offered or 5 yrs. as Systems Analyst. Send resume to: Dept. of Labor, Bureau of Workforce Program Support, PO Box 10869, Tallahassee, FL 32302-0869. Job Order: FL-1871112.

**MAINTENANCE TECHNICIAN** Requires self starter having experience with Beta, VPR-3, PC's, DVC PRO, and other studio equipment maintenance. Experience with microwave, satellite, VHF & UHF transmitters, CADD ability and FCC General Class Licenses preferred. Contact Charles Hofer, Manager of Engineering Maintenance, WTNH-TV, 8 Elm Street, New Haven, CT 06510. No phone calls please. EOE

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**TELEVISION MAINTENANCE ENGINEER** needed for UHF TV/FM/AM Remote truck/Uplink facility in upstate New York. Work involves troubleshooting all facilities' equipment to the component level. This position will provide a continuous flow of technical problems to challenge your imagination. Experienced staff members will provide support and assistance with maintenance and construction projects and provide educational opportunities at this aggressive station. Preferences are given for training and experience in: Sony video cassette transports; satellite receive/uplink; digital/computers; UHF, FM, and AM transmitters; linear and non-linear editing systems; SBE certification; and previous installation work. We offer a competitive salary. Rochester has a 4-seasons climate, an international populous with a technology base, with good sports, cultural, and recreational opportunities. Send cover letter, resume and salary expectations to: WXXI Human Resources, PO Box 21, Rochester, NY 14601. EOE.

**CHIEF ENGINEER WTSP-TV** is seeking a Chief Engineer to direct all of the technical operations of the television station reporting directly to the General Manager. Candidate must have experience in all aspects of broadcast engineering, including in-depth knowledge in the transition to digital technology. As technology and industry demands develop, the duties of this position will grow to meet those challenges. Responsibilities will also include all aspects of capital planning and expenditures. Advanced computer skills are desirable. FCC license/SBE certification are preferred. Favorable candidates will have five or more years of technical management experience in a broadcast environment and proven ability to manage a large talented technical staff. WTSP is an equal opportunity employer and encourages women and minorities to apply. Send resume to: Noreen Parker, Vice President & General Manager WTSP-TV P.O. Box 10,000 St. Petersburg, Florida 33733

**CHIEF ENGINEER - KBMY TV** Duties include: UHF Transmitter Maintenance & Repair, Microwave and Studio Maintenance & Repair, Good working knowledge of computers & automated broadcast systems. Apply to: KBMY Box 7277 Bismarck, ND 58507 Call: (701) 223-1700 Equal opportunity employer supports a drug free workplace.

**MAINTENANCE/RF ENGINEER** Looking for someone with a strong TV maintenance background. Experience in maintaining 1" tape equipment. This is also a DVC Pro house. Need experience with Panasonic and Sony Equipment as well as studio cameras and Odetics Spotbank systems. Windows 95 and Windows NT Experience a must. We are also looking for a RF Engineer for both TV and Radio transmitters as well as RPU, Marti and microwave systems. Please no phone calls. Send resume to: Stephen Gimbert, Director of Engineering, Equity Broadcasting, #1 Shackelford Dr., Suite 400, Little Rock, AR. 72211 or Fax (501) 221-3955.

**MASTER CONTROL OPERATOR** Applicants will be considered who have previous experience as Master Control Operator. Must be familiar with affiliate operations, satellite and microwave equipment. Knowledge of NTSC standards required. Must be willing to work nights/weekends and overtime as needed. To apply, send cover letter and resume to Human Resources Director, ABC25 WJXX, Inc., 7025 A.C. Skinner Pkwy, Jacksonville, FL 32256. Fax (904) 332-2527. No phone calls accepted.

**CORPORATE CHIEF ENGINEER** Lockwood Broadcasting Group seeks Corporate Chief Engineer. Candidate must have a minimum of three years experience as Chief Engineer and should possess strong working knowledge of VHF transmitters, microwave STL/TSL, digital storage/routing and station operations. Above average computer, technical and people skills are necessary. Candidate must be able to repair all electronic studio and transmitter equipment. Reply to: Station Manager, KTEN-TV, P.O. Box 1068, Denison, TX 75021. EOE.

**MTV NETWORKS SENIOR POST-PRODUCTION TECHNICIAN** Begin a career with MTV Networks, one of the world's most successful entertainment companies. As part of the Viacom family and comprised of MTV, VH1, Nickelodeon, NICK and NITE, NICK at NITE's TV Land and M2, we offer outstanding opportunities for professional growth. We currently have a challenging opening for an experienced Post-Production Technician. In this role, you will support and maintain all broadcast graphics and post-production systems. Key responsibilities include maintaining and repairing technical equipment, troubleshooting linear and non-linear editing systems, and providing operational instruction and technical support to users. To qualify, you must have 2+ years of industry related experience with strong knowledge of high-end video and computer graphic equipment such as GVG, Sony, Avid, Quantel, and SGI. Post production system operation and A/V equipment troubleshooting and repair skills are essential. Solid analytical and interpersonal skills are musts. A college degree is preferred (High school with vocational or technical school training acceptable). We offer a competitive salary and benefits package. For consideration, send your resume and cover letter with salary requirements to: MTV Networks, Staffing Resources-Dept. JP-AV, 1515 Broadway, 16th Floor, New York, NY 10036. We regret that we can respond only to those candidates who meet the above requirements. We are an equal opportunity employer.

**MAINTENANCE ENGINEERS NEEDED.** WAMI-TV69, Southern Florida's most progressive television station needs qualified engineering personnel. Studio experience required. Transmitter experience and SBE certification a plus. Great work environment & excellent Miami Beach location. Please fax resume to: (305) 604-0406 Attn: Human Resources. Equal opportunity employer. No phone calls please.

**EMPLOYMENT OPPORTUNITY** Pappas Telecasting Companies, a major group owner of radio and television stations, is accepting applications for engineering positions at two network affiliated television stations currently under construction in the State of Iowa. Be a key player in the construction and maintenance of these state of the art all digital DTV ready studios and production facilities together with ultra modern high powered transmission sites equipped with 240 KW Harris Sigma II transmitters. The successful candidates should possess a formal technical education as well as current experience in a "hands on" broadcast engineering environment. Competitive salaries are offered. **CHIEF ENGINEER, KPWB-TV, Des Moines:** The position requires the hands on supervision and maintenance of the high-powered UHF transmitter facility and the digital studio together with the supervision of master control operations. Other duties include preparing operating and capital budgets and the maintenance of FCC logs, Public Files and the broadcast plant including computer network and building equipment. The ability to form a cohesive team with other station departments is critical to this position. **TRANSMITTER SUPERVISORS, KPWB-TV Des Moines, KPTH-TV Sioux City:** This position requires current experience in the maintenance and troubleshooting of full powered UHF transmitter equipment including microwave systems and remote control equipment. Duties also include maintaining FCC and station logs and the maintenance of the station's studio equipment and facilities. Please send applications or apply in person to: Pappas Telecasting Attention: Personnel 4625 Farnam Street Omaha, Nebraska 68132 No telephone calls please. Pappas Telecasting is an equal opportunity employer.

**MAINTENANCE ENGINEER** New England Cable News in Newton, MA seeks a F/T Maintenance Engineer to join our talented team. Qualified candidates must have 3-5 years maintenance experience in a cable or broadcast operation, a solid background of computer and electronic skills, and the ability to perform component-level maintenance on a variety of electronic equipment. Computer experience should include skilled PC troubleshooting and previous work with Windows NT and I-S technology. Previous Internet experience desired as we are currently running a state of the art streaming video website. SBE certification and/or technical degree preferred. We are in the 3<sup>rd</sup> phase of an extensive expansion project, and we are looking for the right person to help facilitate that growth. Interested candidates should send their resume with cover letter to: Nancy Buzby, Operations Manager, NECN, 160 Wells Ave., Newton, MA, 02459, or fax to (617) 630-5057.

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### BROADCAST TECHNICIAN

Multi-channel cable TV facilities in Littleton, CO. Duties include installation and repair of all types of broadcast video and audio equipment. Minimum qualifications include 3+ years of broadcast video, audio equipment repair and operations experience. The preferred candidate will also possess an Associates Degree in Electronics and experience in maintenance and repair of analog and digital studio and editing equipment, including cameras, multiple format video tape recorders, video switchers, digital video effects, character generators, still stores, audio mixing consoles, Avid non-linear editors and CMX edit controllers. Other duties, weekend and shift work as required. A drug and background check will be required for successful applicants. Non-smoking environment. Please submit resume with salary information to:

TCI-National Digital Television Center  
4100 E. Dry Creek Road, Littleton, CO 80122  
Attn: Studio Engineering Supervisor  
NO PHONE CALLS PLEASE. EOE.

### VIDEO ENGINEER

The MSG Metro Traffic & Weather Channel is looking for a Video Engineer to be responsible for doing systems level to board level diagnosis, repair and maintenance on DVCPRO VTRs, HP MediaStream disk recorders, Louth automation, Probel routers and control systems. Must possess strong computer skills (PC/Windows, Mac, Unix) and LAN experience, and be a self-directed individual able to work independently. Valid driver's license and clean driving record required.

Please send cover letter and resume to P.O. Box 999-JB, Woodbury, NY 11797. EOE

Engineering

### MANAGER TECHNOLOGY

Encore Media Group, the nation's largest provider of premium movie networks, has an immediate opening. Individual will provide technical support to both internal and external customers. Qualified candidates will have 5 years of progressive technical experience in satellite and cable television including audio/video, RF, digital system/networking skills. Ability to manage multiple projects and communicate effectively with senior management, field sales and system technicians. BSEE required. Send resume and salary history to: Encore Media Group, #544, P.O. Box 4917, Englewood, CO 80155. Successful candidate will be subject to a drug test. EOE.

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### Maintenance Engineer

THE WEATHER CHANNEL, Atlanta, GA is looking for a motivated and reliable individual to join our team. This is an excellent opportunity for someone who wants to expand their knowledge. The selected candidate, for maintenance Engineer, must have at least three years experience repairing and maintaining Broadcast related equipment. You will be part of the Engineering team dedicated to maintaining a brand new, State-of-the-art digital facility. Computer proficiency preferred. Please fax resumes to The Weather Channel, Director of Engineering (770) 226-2943 or send them: 300 Interstate North Parkway, Atlanta, GA 30339 EOE/M/F.



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ASC, headquartered in Burbank, CA, is seeking experienced engineers for their Broadcast Video File Server Division who desire a challenging, fast paced environment working with the newest broadcasting technology.

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525-2588, or E-Mail to  
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### MAINTENANCE ENGINEER

Move to Phoenix before winter begins! Join the AVR team and work for the fastest growing dealership in the southwest Mon. thru Fri. 8-5. We are looking for a candidate with the right attitude to repair and maintain broadcast level VTR's, cameras, and associated equipment. Experience should include 5 years in a station or dealership environment preferably with factory training on Sony, JVC, and Panasonic equipment. Generous salary, benefits, & 401K. Drug test required. Fax resume to J. L. @ (602) 274-7416

**STUDIO SUPERVISOR** Engineering Supervisor for studio operations at KOB-TV. Should possess minimum of Associate Degree in Electronics. A minimum of five years experience in the repair of Beta, SP machines, cameras, studio production equipment, video servers, and have a solid background in computer systems. Analog and digital troubleshooting skills, plus the ability to communicate with others. FCC Radio Telephone Operator License desirable. Send resume to: KOB-TV, Job #46-98, 4 Broadcast Plaza, SW, Albuquerque, NM 87104. EOE/M-F.

**MORRIS CERULLO WORLD EVANGELISM** is seeking a Television Engineer to manage, maintain all equipment (Beta SP, Sony 3100 1", 3/4" VTR's Panasonic D3, Grass Valley 200 switchers, K-Scope, Router, 100 Switcher, Sony BVP 7 cameras, Chyron 4200 & Super Scribe, Audio Consoles. Requires strong working knowledge of RS170A timing standards. Experienced with DOS. Contact at MCWE, P.O. Box 85277, San Diego, CA 92186-5277 or fax to (619) 277-5111.

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## For every action

BY PAUL MCGOLDRICK



**W**hen was the last time you dropped into Leidschendam for a business meeting? The town, just east of The Hague, The Netherlands, is about a 30-minute drive north from the Rotterdam airport. During IBC in Amsterdam, it is certainly a good place to drive to, thereby ensuring that there are no other convention delegates at the same restaurant wondering what you are so earnestly talking about. I should be happy because the group of 12 who met in Leidschendam is, intentionally or not, going to throw a monkey wrench into the works of Wintel's Advanced Television Enhancement Forum (ATVEF) (see EOM, September 1998). Unfortunately, I'm not fully convinced I should smile all that much.

Certainly, some of the ATVEF members are not happy with this group and the initiative they are founding for what they term *Advanced Interactive Content* (AIC). The proposal ties various multimedia platforms as content into the same datastream. ATVEF is focused on limited interactive Internet. I worried about the ATVEF proposal because it appeared to be another avenue by which we would be force fed marketing messages.

The founders of AIC (read "ace") have the backgrounds and histories to quickly get some standards made. AIC points out that it is not another standards body. Its goal is to get information to the multimedia committees concerning the direction required to harmonize standards. The fact that these founders will be reporting developments from their various committees is, in itself, something we ought to be blessing and praising. A central reference point for these technologies is long overdue.

The main thing AIC has in common with ATVEF is providing content for the DTV environment. While the Win-

tel direction is Internet content, AIC wants to integrate BHTML (broadcast HTML) with MPEG-4, VRML and BIFS (binary format for scenes). BHTML is being written in XML (extensible markup language) which is tight with Java and one of the two competing formats being evaluated by ATSC's DTV Application Software Environment (DASE) group. The other format comes from, guess who? ATVEF, of course. The chairman of the DASE group is Aninda Das-

### It shares the same timing and clocks as MPEG-2 and fits like a glove in the datastream.

Gupta, one of the founders of AIC. (If I were an ATVEF proponent, that might worry me a little.)

#### Joining technologies

Apparently there aren't any insurmountable problems in joining the technologies together. However, there are several different directions they could take, including a natural one. MPEG-4 offers access to 2D and 3D objects as well as audio-visual streaming. MPEG-4 could also be the main supplier of content with additional material from BHTML language and VRML/BIFS textual/binary images. MPEG-4 is also a natural for the DTV channel. It shares the same timing and clocks as MPEG-2 and fits like a glove in the datastream. Assembling the syntax and tools to put BHTML and VRML/BIFS into MPEG tools also appears straightforward.

The 12 founders of AIC have set themselves an incredibly ambitious timetable:

- The first agreement on the specification is scheduled for this month.

- Validation testing should be complete by March 1999.

- Products are expected to be available by the last quarter of 1999.

The timetables of the various committees are being merged and member resources are being allocated to make sure this happens.

So, am I smiling? I am relieved to a certain extent in that none of these founders is content rich. Therefore, they are probably not pitching particular

sales in our direction.

However, those who can push such material are only a short hop away and are no doubt waiting in the wings. The founders believe the applications will be

the ever-popular program guide (rich in

graphics this time), video/audio streaming, outtakes, and the ubiquitous shopping opportunities we are all anxious to let our kids loose with.

Overall, I am withholding judgement on this one; it smells good. At best it kills ATVEF. At worst it dilutes it to be like one of cable's interactive offerings. The timing almost certainly means products will be in the market quicker, and everyone is anxious to get that 6MHz filled up.

For reference, the 12 founders and the committees they represent are: Olivier Avaro, MPEG-4; Don Brutzman, VRML; Leonardo Chiariglione, MPEG-4; Aninda DasGupta, ATSC; Rob Glidden, VRML; Rob Koenen, MPEG-4; Chris Marrin, VRML; Rick Rafey, VRML; Cliff Reader, MPEG-4; Pete Schirling, BHTML; Neil Trevett, VRML; and Ted Wugofski, BHTML. ■

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

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