

# BROADCAST engineering®

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## TESTING DIGITAL SYSTEMS A "how to fix" for digital video

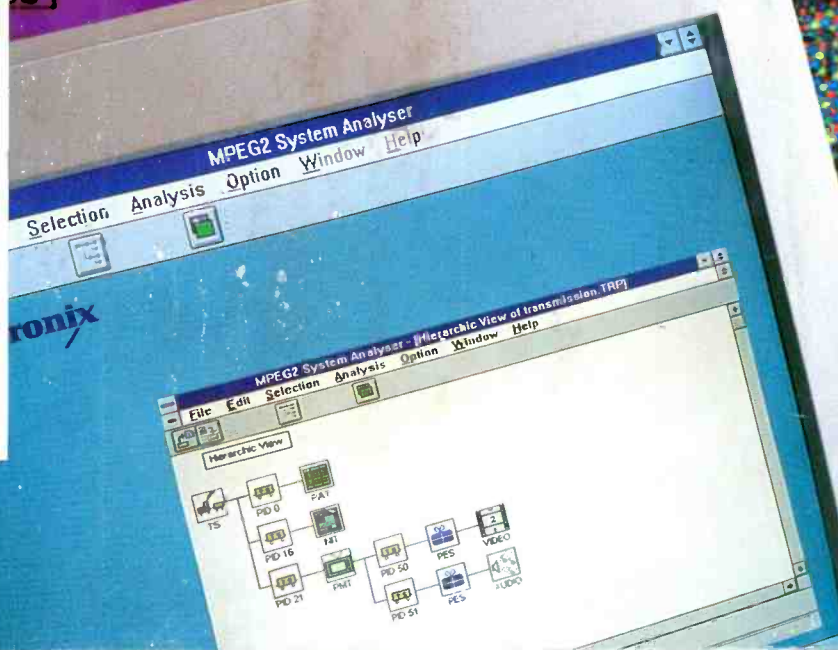
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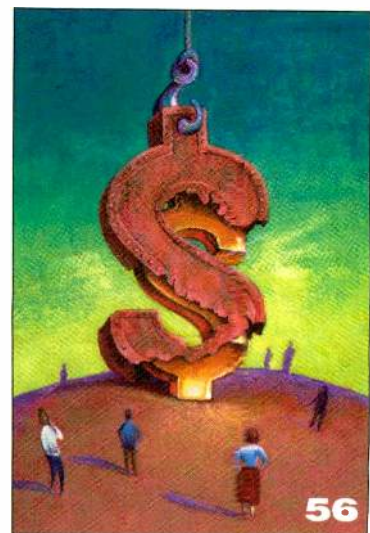
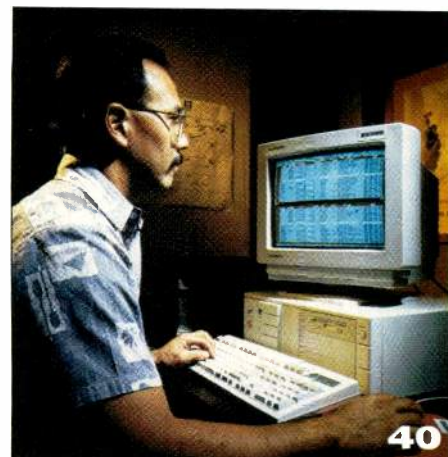
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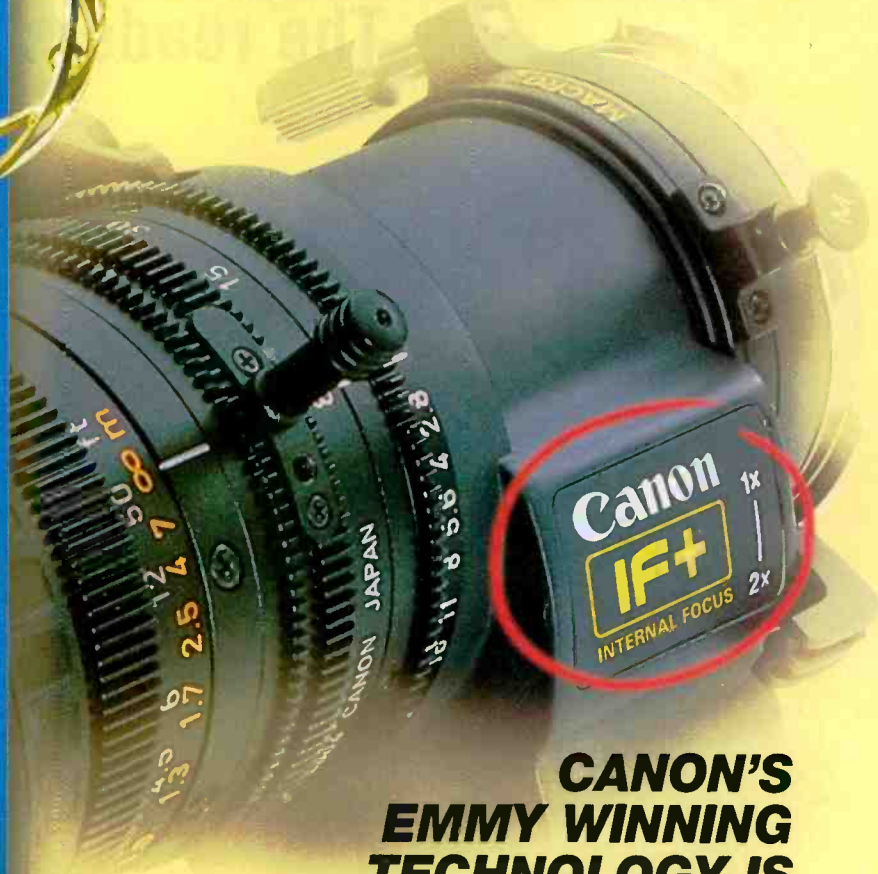
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**ON THE COVER:** As today's video equipment migrates from analog to digital-based technology, new sophisticated test equipment is often required. An example of this type of test equipment is the Tektronix MTS100 MPEG-2 protocol test system shown on the cover. Photography courtesy of Tektronix.

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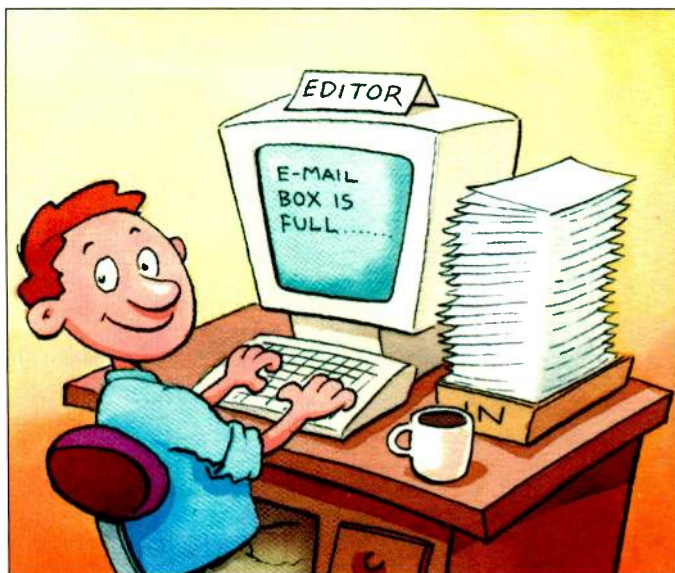
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## The readers' respond

**N**othing pleases me more (professionally speaking) than to receive feedback from my readers. This month, I thought I'd share some of the responses to two of my recent editorials.

I've yet to see a unanimous opinion on any single topic. And, it's this divergence of viewpoints that makes the responses so interesting and helps me better understand the issues from your perspective.

First, regarding the "mouse poop" editorial. None of my editorials have drawn as much (or as strong) of a response as the one on the computer mouse. And, it



seems that the general reader opinion lines up solidly against my hatred of the mouse. Readers are adamant in their love of their mouse.

One of my favorite letters on the mouse came from engineer Eduardo Lopez. He began his letter, "You're old aren't you?" (Ouch, that hurts. Nothing like a pointed remark to catch my attention.) He then equated my computer skills and preference for the keyboard with that of a *Jurassic Park* creature. "It took 14 years for the mouse to penetrate the computer industry enough to place the dinosaur-era command programs into the corner where they belong. I think you're wrong to blame the mouse and the GUI it represents." Watch it Eduardo. Call me old again and I'll hit you with my cane.

It was surprising (and extremely disappointing) that many readers did not support my call for industry

support of the Grand Alliance standard. Mark Chanez wrote, "It is folks like you that keep the public so confused and undecided on what they want. Are you God or someone who can foresee the future? Your article is not only one-way biased, but just plain self-centered and not focused on the opinions and wants of the public. Your ATV crap has nothing to show but just a lot of talk and plans. The Internet and web technology already supersedes your so-called ATV."

Hey Mark, if you think the TV industry is such a lousy place, how come you're a TV chief engineer? Given your opinion of the industry's future, maybe you had better look for another job. Also, why not let your GM see your letter? I'll bet he doesn't share your fatalistic view of your station's future.

Overall, Mark's opinion was in the minority category. Most readers supported ATV and urged the industry to get off its collective duff and get the FCC to approve the GA standard. For example, Kristen Michelle wrote, "What a terrific editorial you wrote in the August edition of *BE*. You hit the nail on the head! I am already taking advantage of the opportunities that ATV affords and strongly encourage the FCC to adopt the Grand Alliance standard now! Thank you for publishing what those of us who are waiting for ATV to take off in the U.S. have been saying over and over again."

Thank you Kristen. I couldn't have said it better myself.

What about you? Let me know your thoughts on these or other topics. All letters to the editor make the writer eligible for an official *BE* T-shirt. Enter the monthly drawing by writing me at the addresses below. Help overflow my E-mail system and fax machine.

*Brad Dick*

Brad Dick, editor

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# Letters to the editor



## More scoop on "plastic poop"

Hi Brad!

Just got around to reading your piece. Amen! Besides being plastic poop, a mouse is a loose cannon, a hand grenade with the pin pulled, just waiting to cause you disaster.

I refuse to use one. I tried a couple of times and decided that plastic poop was simply too dangerous. Worse yet, at the other end of the poop pointer are those damn icons! Just how many are there these days? They are multiplying! Are there now more icons than Chinese ideographs? The idea of having to guess what will happen when you activate some squiggly line with a dot next to it (even if I could hit it with the handful of poop. . .) is not compatible with my engineering

software researcher, developer. I have also developed software for the IBM-S/36 and software for the PICK operating system.

I agree with you on your concerns of the mouse. We are too dependent on it. I personally like to operate Windows with the keyboard. It is undoubtedly true that key stroking is faster than mousing. But, I am sure your point is that we, by depending on the mouse or some other automation feature, may be less productive (this is true if your mouse gets lost or it packs up). The mouse should be a feature that would enhance our productivity (to drag and drop or draw a picture).

I agree with you on the function key principle, the reason being that professionals would not use a large

## CAN THE GRAND ALLIANCE SURVIVE THE COMPUTER INDUSTRY'S CHANGES?



—BILL GATES PREPARES TO MAKE THE FIRST INCISION AS DR. KEVORKIAN ADMINISTERS THE ANESTHESIA...

mind. I don't "play" with the 25,000V that run through my transmitter. I don't pour water on sodium or acid to see what will happen. Guesswork is no way to run a complicated computing device.

What is lurking on the screen between the visible icons? I'll bet there is an invisible one that will launch all of the world's ICBMs! I want my commands in English (or French or Spanish or...). Phooey on GUI!

Don the Dos guy

Dear Brad:

I read your article on the mouse with great interest. However, the "To the Editor" column in the June '96 issue is what prompted this reply. Amongst others (TV, radio, electronics. . .), I am also a Windows and DOS

array of programs. For example, if you were using Word Perfect for your letter writing, you would continue to do so. Therefore, the software system should offer you either built-in or as-a-service a customization feature that would enable you to program your function keys for your various tasks. As you say, a professional writer's least concern is the font and the size.

Like one of your responses (rightfully) suggested, the mouse is a generic tool and not a specific tool.

Best regards to you and all.  
Priyanke (de Silva)

Send your thoughts to the editor at

CompuServe 74672.3124  
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## ATSC chairman refutes digital TV myths

Robert K. Graves, chairman of the Advanced Television Systems Committee (ATSC), tackled myths surrounding digital TV in his speech, "Sex, Lies and Videotape," at the Digital Audio & Video Workshop in Philadelphia. Graves debunked myths and fallacies from FCC standards, computer interoperability to spectrum auctions.



According to Graves, the notion that broadcasters are being given a \$100-billion government welfare payment in the form of additional spectrum for digital television is a fallacy. Broadcasters are actually to be loaned a second channel during a transition period so they can transmit analog and digital signals while consumers change to digital.

Graves also spoke about the spectrum auctions and urged those that are interested in efficient spectrum use and in raising public funds through auctions to hasten the conversion to digital, then turn off the analog transmissions, repack the digital channels more tightly and recover upward of 150MHz of spectrum in large nationwide blocks.

Graves remains confident that the decade-long effort to implement world-leading digital TV technology will bear fruit. He predicts that with the strong support in Congress and by three of the four FCC commissioners, that the FCC will approve the standard by the end of this year and will assign the new channels to broadcasters no later than April 1997.

## New TVs on sale in Japan for first enhanced broadcasts

More than 14 million Japanese were treated to a commercial broadcast of enhanced broadcasting last month. The enhanced broadcasts included additions to



regular programming, such as push-button access to golf information, stock quotes, weather forecasts and trivia questions. This new technology is different from the Internet-over-TV trend.

Special televisions by Toshiba support these new enhancements, which are based on a technology created by U.S. company Wink Communications of Alameda, CA.

Three elements define Wink-enhanced television: programmers, networks and advertisers can add enhance-

ments to broadcasts; the enhancements do not require major changes to televisions and set-top boxes; and the enhancements do not require dramatic upgrades to infrastructure. The system in Japan uses existing free broadcast signals and phone lines.

The Wink-enhanced broadcast standard has been promoted by members of the InterText Consortium including NTT, Toshiba, Sony, Matsushita, Samsung, Sanyo, Sharp, NEC, Pioneer and Mitsubishi and national and local broadcasters, such as NHK.

General Instrument's CFT-2200 will be the first analog cable set-top to support Wink — and the company's DCT-1000 will be the first digital set-top. Scientific-Atlanta and Pioneer are also offering products for Wink's open standard.

Wink's technology will roll out early next year in the United States on a city-by-city basis.

## Broadcasters still battling for ATV

In a continuing effort to reach an agreement on an ATV technology standard, broadcasters and industry representatives gathered in Washington at the National Association of Broadcasters' headquarters. Their one purpose was to jump start FCC action on the ATV technology standard.

Broadcasters want the commission to adopt the Grand Alliance standard on Nov. 28 — one year after an FCC Advisory Committee recommended it as the next U.S. broadcasting system.

With FCC chairman Reed Hundt riding the fence, the computer, film and cable industries wanting a scaled-back standard or no standard at all, FCC commissioner Rachele Chong is one of ATV's supporters. According to Chong, the FCC should adopt the Grand Alliance standard now and review it in the future to address any concerns raised by the computer industry and others.

## SCTE issues Cable-Tec Expo call for papers



The Society of Cable Telecommunications Engineers (SCTE) is soliciting proposals for technical papers and/or workshops to be presented at the Cable-Tec Expo '97, June 4-7, in Orlando, FL. Accepted papers will be presented at the 21st annual engineering conference.

Submissions should include an abstract of the proposed paper or workshop and should be sent no later than Dec. 1 to Bill Riker/Roberta Dainton c/o SCTE, 140 Philips Road, Exton, PA 19341-1318. For more information, contact SCTE national headquarters at 610-363-6888 or fax to 610-363-5898.

When the Quincy Group decided to convert to nonlinear for their five midwest broadcast stations, they turned to Panasonic's POSTBOX.

"The system is well-constructed, well thought-out," says Quincy's Director of Capital Projects, Brad Dreasler. "Everyone likes the Windows® operating system, which contributes to the system's over-all ease-of-use." Dreasler says that they had confidence in Panasonic as a broadcast company, "...not a computer outfit. In Panasonic, we have a partner of considerable size and longevity—both important considerations."

Now the Quincy stations are using POSTBOX for on-air promos, as well as commercials, PSAs, and industrial and training videos. WGEM Production/Promotions Manager, Jim Lawrence says in the first month, the POSTBOX doubled their production capability. "It's a myth that you have to spend \$100,000 to get the right equipment. POSTBOX does everything we need at 40% of that cost."

Around the stations they say that productivity is up. And, "with POSTBOX, we don't need a lot of time—we're doing better spots in less time!"

**"In the first month, POSTBOX  
doubled our production capability."**

JIM LAWRENCE, PRODUCTION/PROMOTIONS MANAGER, WGEM, QUINCY, IL

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## FCC may revisit public file rule

Over the past three years, three different parties have filed petitions asking the FCC to amend its rules to permit a station to maintain its public file at its main studio when the main studio is located outside the station's community of license. Currently, a station may keep its public file at its main studio only if the studio is located within the community of license. (Although an exception is made for stations, which as of July 1987, had special authorizations to keep their files at their main studios outside their communities of license, only a few stations have such authorizations.)

Since 1987, the FCC has permitted stations to locate main studios outside their communities of license as long as the studios are within the stations' city-grade contours. As a result, many stations now operate main studios outside their communities of license. Such stations may not, however, keep their public files at their main studios. Instead, they must find a place within their communities of license to keep their files, such as a library, chamber of commerce office, city hall or attorney's office.

This can be difficult because the station's main studio and offices may be miles away from the public file location. Also, in some communities, libraries and other facilities charge hefty annual fees to maintain public files. In some cases, stations have been forced to pay dues to a chamber of commerce in order to keep their public files at the chamber's offices. Even though a station has no control over its public file at a location other than its main studio, the FCC fines stations for violations of its public file rules. Maintaining public files away from main studios is particularly burdensome because statistics show that stations often have only one or two requests from the public over a period of several years to view their public files.

For three years, the petitions asking the FCC to allow a station to maintain its public files at its main studio when the main studio is located outside the station's community of license have languished at the FCC. Recently, the FCC issued a public notice announcing it had received the petitions, but the FCC has not determined whether it will initiate a rulemaking to make the requested change, and, if so, when such a rulemaking

might be expected. If a rulemaking is initiated, a notice of proposed rulemaking will be issued and comments from the public requested.

### Rumor has it . . .

Rumor has it that the FCC intends to act on some of the rulemaking proceedings that have been languishing at the commission — in some instances for years — by the end of this year or early next year. With several major impediments out of the way (the enactment of new rules to implement the directives arising under the Telecommunications Act of 1996 and the reduction of

the backlog of the assignment applications), the FCC staff is now free to work on lost-but-not-forgotten items. Among those items are finalizing the technical standard, TV table of allocations and new rules for advanced TV service; establishing comparative criteria for determining which of a group of competing applicants for a new facility will be awarded an FCC authorization; completing review of the TV ownership and attribution rules (ultimately determining whether to eliminate/modify the rule prohibiting the ownership of two TV stations in the same market or with overlapping signals); and finalizing the proposed fine guidelines for violations of the Equal Employment Opportunity rules (EEO).

Given the level of station and group assignments and other problems related to the items themselves, whether action may occur on some or all of these matters by the end of the year or even early next year may be little more than "pie in the sky."

■

*Harry Martin and Richard Estevez are attorneys with Fletcher, Heald & Hildreth, PLC, Rosslyn, VA.*

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Currently, a station may keep its public file at its main studio only if the studio is located within the community of license.

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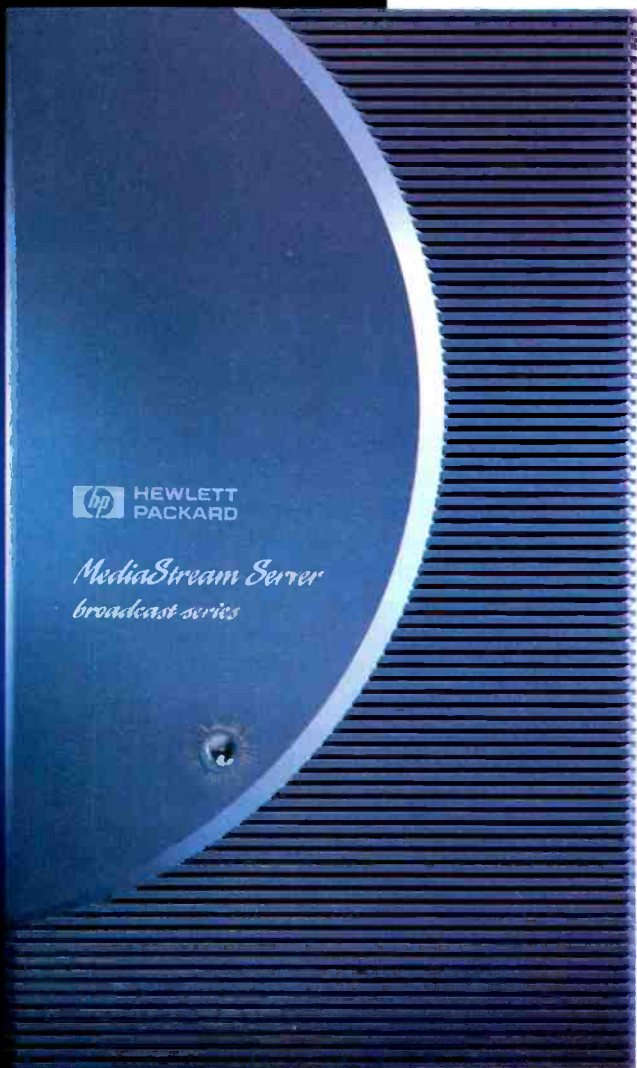
### DATELINE


Commercial stations in the following states must file their annual ownership reports by Feb. 3: Arkansas, Kansas, Louisiana, Mississippi, Nebraska, New Jersey, New York and Oklahoma. TV stations in the following states must file their license renewal applications by Feb. 3: Arkansas, Louisiana and Mississippi.

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## Down to the wire

If you have not yet educated yourself about the new Emergency Alert System (EAS), you'll have to take a crash course — and soon. The EAS must be operational at all broadcast stations by Jan. 1, 1997. There isn't enough space in this column to get you completely up to speed, but what follows are some suggestions for finding the information you will need.

First, contact your State Emergency Communications Chair (SECC). If you don't know who your SECC is, contact the FCC's Bonnie Gay at 202-418-1228. The SECC can tell you what your station's designation is and what sources you are mandated to monitor with your EAS decoder. Although a minimum of two sources are mandated to make up your national and state web, most SECCs are suggesting additional frequencies to aid in your connection to local emergency sources.

You'll also need the frequency of your nearest National Weather Service (NWS) transmitter. It's another source that you'll want to monitor with one of your EAS decoder inputs. This is especially true if you live in a section of the country where weather events can contain life-threatening force. The National Oceanographic and Atmospheric Administration (NOAA, the parent of NWS) is busy upgrading facilities to attain 95% national coverage while installing equipment to transmit the *Specific Area Message Encoding* (SAME) headers preceding weather alerts. These codes are contained in FCC Part 11 EAS rules and will trigger your EAS decoder.

### Local input

Chances are good that someone at your station is a member of a local Society of Broadcast Engineers (SBE) chapter or that you at least have a chapter in your area. Most SBE chapters are busy working on local EAS plans and, therefore, they have valuable information for you. This information will help you establish specific connections with local emergency sources so that you can inform your audience of any local non-weather emergencies as they occur. (The SBE also offers the *EAS Primer*, an excellent basic resource for broadcasters on EAS, and a book that should be on every station's reference shelf.)

Many local emergency officials are installing EAS encoders on government channels, and they will deliv-

er messages to your station already EAS-encoded and able to be relayed. You simply need to purchase receivers on their specified frequencies and interface their audio to your EAS decoder inputs. While you and your local emergency officials are currently limited to the event codes contained in Part 11 EAS rules, the FCC has promised an additional list of local event codes in an upcoming third Report and Order. To find an SBE chapter near you, contact Peggy Hall at the SBE National Headquarters in Indianapolis at 317-253-1640.

### Surfing for data

Finally, if you have access to the Internet, you have the ultimate resource of EAS information at your fingertips. A recent World Wide Web search using the words "Emergency Alert System" netted more than 200 listings of sites containing information on various aspects of the new system. Among these are equipment manufacturers who have sites describing their equipment in detail. Some of them solicit input from you on suggestions for future software enhancements.

Another site on the list is the SBE at [www.sbe.org](http://www.sbe.org), which has pages of EAS information updated regularly. This site includes links to the FCC rules pertaining to EAS and the entire listing of SECCs sorted alphabetically by state. There are also some EAS state plans that come back as part of an EAS web search. These are of interest to any SECCs looking for ways to enhance their own state plan.

Other listings are from some Internet service providers who seem determined to find a way to make the Internet become a valuable tool to emergency alerting during an actual event. These providers are interested in your input on that process. The Internet has been cited by some as a huge waste of time, but in the case of an EAS search, it can prove itself well worth the price of admission. ■

*Leonard Charles is an engineer at WISC-TV, Madison, WI, and chairman of the SBE EAS Committee.*

---

**The EAS must be operational at all broadcast stations by Jan. 1, 1997.**

---

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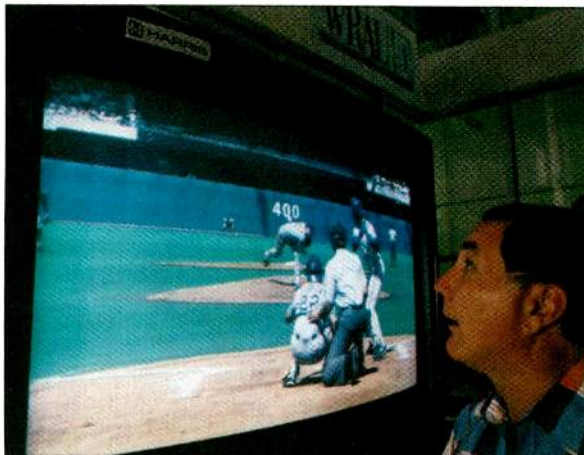
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## Calculating the cost of ATV, part 2

Last month, we looked at the basic models for ATV facilities. This month we will examine power requirements for ATV transmission and the costs of assembling an ATV facility.

### Transmission power models

Based on the height of an existing or new transmission tower, the ATV coverage area is determined by effective



Bob Weirather, director of the TV product line for Harris Broadcast Division, watches a baseball game on a digital TV receiver at WRAL-HDTV, Raleigh, NC.

radiated power (ERP). The decision on how much ERP is needed can be made based on the desired ATV coverage area. Theoretically, an ATV station can be operated at 12dB lower ERP and will replicate its NTSC coverage on the same channel. However, a VHF station that has been paired with a UHF ATV assignment will require a significantly higher ATV ERP in order to replicate its NTSC coverage. For these stations, a low- or

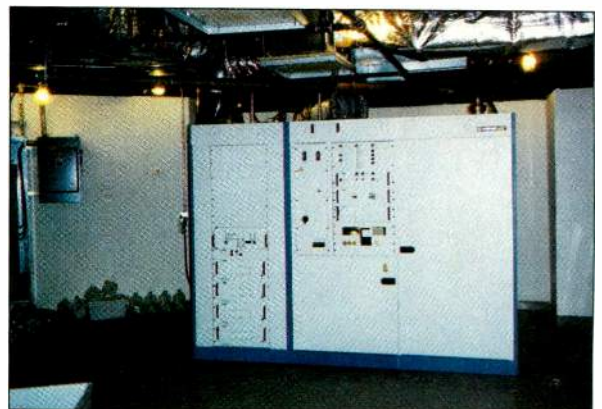
CATEGORY	LOW VHF	HIGH VHF
ERP	6.3kW	20kW
LINE LOSS (1000 ft)	1dB	1dB
ANTENNA GAIN	4-5	7-8
TRANSMITTER (average power)	2kW	4kW
TRANSMITTER (peak power)	9kW	18kW
TRANSMITTER TYPE	SOLID STATE	SOLID STATE
TRANSMISSION LINE	3"	3-1/8"
TRANSMISSION LINE TYPE	FLEX	RIGID
HAAT	1000 ft	1000 ft
COVERAGE	65 MILES	58 MILES

Table 1. Assumptions used for the VHF models.

CATEGORY	LOW POWER	MED. POWER	HIGH POWER
ERP	10kW	320kW	2500kW
LINE LOSS (1000 ft)	3dB	3dB	1dB
ANTENNA GAIN	20	30	30
Tx (average power)	1kW	21kW	104kW
Tx (peak power)	4.5kW	95kW	468kW
Tx TYPE	SOLID STATE	IOT	IOT
Tx LINE	3"	6-1/8"	13-17"
Tx LINE TYPE	FLEX	RIGID	WAVEGUIDE
HAAT	1000 ft	1000 ft	1000 ft
COVERAGE	40 MILES	50 MILES	60 MILES

Table 2. Assumptions used for the UHF models.

medium-power approach may make more economical sense. This approach attempts to cover a majority of the NTSC service area, or more importantly, to cover the majority of the population currently served. Some stations capable of operating their ATV transmitter at the ERP required for NTSC coverage area replication may also elect to start at lower power. In either case, stations will want to move to full licensed ATV power when NTSC operation is phased out or when a sufficiently



The Comark transmitter used at the Model HDTV Station, WHD-TV, in Washington, DC.

large ATV audience has been developed.

For VHF, 6.3kW and 20kW ERP are used. These ERPs are 12dB lower than the 100kW and 316kW maximum NTSC ERPs used for low and high VHF. For UHF, three power levels are assumed representing low-, medium- and high-power models. The low-power model is based on 10kW ERP aiming for coverage of 40 miles. The medium one is 320kW ERP based on 12dB lower ERP than 5MW, maximum NTSC UHF power. For those stations with an NTSC



CATEGORY	MINIMAL MODEL		TRANSITIONAL MODEL	
	LOW VHF	HIGH VHF	LOW VHF	HIGH VHF
Tx EQUIPMENT	\$183K	\$260K	\$183K	\$260K
BROADCAST EQUIPMENT	\$265K	\$265K	\$759K	\$759K
DIGITAL STL SYSTEM	\$173/119K	\$173/119K	\$173/119K	\$173/119K
MONITORING/TESTING	\$60K	\$60K	\$60K	\$60K
TOTAL	\$681/627K	\$758/704K	\$1.175/1.121M	\$1.252/1.198M

Table 3. Cost of VHF transmission facility (without STL multiplexing).

VHF channel and a UHF channel assignment for their ATV channel, the ATV facility has to be operated at an extremely high power level to replicate the NTSC coverage. The high-power model is selected to replicate VHF NTSC coverage with UHF ATV service. This high-power model is based on 2.5MW ERP. Details of the assumptions are summarized in the tables.

Based on these assumptions and the broadcast origination models (minimal and transitional) discussed earlier, we came up

with some cost estimates. Using the models previously defined, we can develop cost models for ATV transmission facilities with different ERP levels. For equipment that is not currently available, estimates are based on high-end NTSC equipment. Some costs will be relatively constant across all facilities, e.g., \$60,000 for monitoring and test equipment. Other costs will be entirely dependent on the transmitter ERP and other choices. By current estimates,

CATEGORY	LOW POWER	MED. POWER	HIGH POWER
Tx EQUIPMENT	\$390K	\$1.005M	\$1.49M
BROADCAST EQUIPMENT	\$265K	\$265K	\$265K
DIGITAL STL SYSTEM	\$173/119K	\$173/119K	\$173/119K
MONITORING/TESTING	\$60K	\$60K	\$60K
TOTAL	\$888/834K	\$1.503/1.449M	\$1.988/1.934M

Table 4. Cost of UHF transmission facility (minimal model without STL multiplexing).



“LOOK WILCOX, THE DIGITAL COMMUNICATIONS TREND IS CATCHING ON EVERYWHERE,” WHISPERED SNELL.

## transition to digital

CATEGORY	LOW POWER	MED. POWER	HIGH POWER
Tx EQUIPMENT	\$390K	\$1.005M	\$1.49M
BROADCAST EQUIPMENT	\$759K	\$759K	\$759K
DIGITAL STL SYSTEM	\$173/119K	\$173/119K	\$173/119K
MONITORING/TESTING	\$60K	\$60K	\$60K
TOTAL	\$1.382/1.328M	\$1.997/1.943M	\$2.482/2.428M

Table 5. Cost of UHF transmission facility (transitional model without STL multiplexing).



The ribbon-cutting ceremony for the Model HDTV Station, WHD-TV, in Washington, DC.

to transition a facility to ATV will cost anywhere from \$834,000 to \$2.5 million, and this does not include the costs of a new tower/site if needed.

The broadcast industry is facing a revolution — from analog NTSC to digital ATV. Due to the complexi-

ty of the technology and high cost of ATV implementation, broadcasters must start as early as possible. ATV implementation strategy will be determined by a station's financial resources, as well as consumer demand. By developing ATV cost models, broadcasters can position themselves for a successful transition. ■

*William Y. Zou is a communications systems engineer for the Public Broadcasting Service, Alexandria, VA.*

### READER FEEDBACK

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## Excellence and the art of smiling

**excellence** \ 'ek-s(e-)len(t)s\ n (14c)

**1:** the quality of being excellent **2:** an excellent or valuable quality: VIRTUE

**3:** EXCELLENCY

The word *excellence* is heard constantly. Whether you hear it on the radio while driving to work or see it on book covers in your local java and book shop. Yet, what does it mean to the broadcast industry?

### First impressions

Many of us have been in facilities that just seem to have that extra something that makes them. . .well, excellent. When visiting such a place, your impression



may have begun with your first phone call to the station. The receptionist sounded professional, energized and cheerful. Upon your arrival, you were greeted in a similar manner at the front desk.

As you walk through a facility, you can get a sense of the health of the organization. Look to see if anyone is smiling. It may sound crazy, but too many companies have too few people smiling. If you ever find yourself in such a spot, run for the hills!

### Do the right things

Organizations that are excellent do the right things at the top. Station managers and chief engineers who embody excellence create an environment that fosters incredible work and initiative. Stations that encourage excellence enjoy great rewards — efficiencies soar, work quality is enhanced and there is increased profitability.

If senior management communicates frankly and openly, with all employees, they are halfway there. Without open communication, an environment of distrust frequently festers. Politics, though always present in one form or another, become the standard rather than the exception without communication from above.

### Excellence has never been so exciting

Broadcasting is a dynamic environment. Station chiefs cannot say they work in a boring industry. It is in this

invigorating environment that we shape office philosophies. Open communication is a giant leap forward. Good old hard work goes a long way, too.

Because the world is more competitive, you will be putting in extra effort and hours. The reward is that you love what you do. Few industries have the importance and impact of broadcasting and everyone at the station plays a role in this.

Next on the list of things to do to create excellence is to work smarter. It's easy to fall into a day-to-day grind. If you feel yourself immersing into the gloom, break out of your paradigm. Ask yourself if you really need to be doing what you're doing. Question your activities as well as your employee's activities. At the next staff meeting discuss why things are done as they are. It could be that much time is wasted doing it *like we've always done it*, when work could be done more efficiently.

Finally, be open to change. There's constant change in broadcasting. If you welcome change as a natural progression, excellence will come much easier. Organizations that recognize change as an ever-present reality, and accept it as an opportunity, will thrive in an environment of excellence.

If you find change difficult, do everything you can to overcome these feelings. Many people harbor ill will toward change. The trick is to see change as inevitable and as a tool to your own success. Identify why you don't like change. Is it because you're scared of the unknown or because you allow change to impact your life in the unpredictable manner it sometimes takes?

One way to feel good about change is to be proactive toward life. Write down your goals and what you need to do to accomplish them. Seeing your thoughts on paper is a giant first step to beginning the change in your own life. If much of the change that occurs in your life is of your own design, it's amazing how quickly you'll come to relish change.

Excellence embodies power. It gives your station the foundation required to create the best work possible. Not only will your operation run smoothly from the greatly enhanced efficiencies, but you'll also have a better time at work, and who knows, you might even smile! ■

*Ross Josephson is manager of accounts at Chan & Associates, a marketing consulting service for audio, broadcast and post-production, Fullerton, CA. He can be reached at rossjo@ix.netcom.com.*



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## Recording SFX on DAT

**S**ound work for film and teleproduction usually involves a lot of sitting in dark, windowless studios. So when the time comes for recording sound effects (SFX) in the field, audio people get extremely excited. While studio work is controlled and detailed, field recording is wild and quick.

Portable open-reel audio recorders from Nagra Kudelski brought studio-quality recording to the field (and earned the company numerous industry awards in the process). More recently, some portable DAT recorders have maintained quality while significantly reducing weight, size and shoulder bruises. These attributes were of great value on a recent SFX recording trip to Costa Rica for *The Lost World: Jurassic Park* (the upcoming sequel to *Jurassic Park*).

### Roughing it

In many ways, field recording is like nature photography: You don't know exactly what you will get, and you can't fully anticipate the conditions. Costa Rica offers a great variety of ecosystems and exotic sounds. But July is the rainy season and sound equipment often fails in damp conditions. Knowing how well my portable DAT recorder holds up in harsh conditions (I use the HHB *Portadat*), I chose it as my primary record machine—but I still brought back-up equipment and plenty of silica gel. Nevertheless, I was surprised by how rough the rain forest conditions were.

The jungles in Costa Rica are more than wet—they ooze moisture so thickly that you feel like you are enveloped in a sea of heavy air and water. Often the ground is six to 12 inches of deep mush. Forget the high-tech yuppie footwear; only rubber boots will do. Most of the time mosquitoes are swarming and a bite can cause more than an itch. A woman I hired to make some customized equipment bags contracted *dangee* disease. I'll spare you the details.

In this environment, the recording equipment must be compact, light, easy to use and tough enough to withstand the banging around and the weather. Somewhat surprisingly, the DAT never failed, even when the mois-

ture became a problem for the microphones and other equipment. Other essential features on any field DAT recorder include easy-to-see and easy-to-use controls and meters. High-quality built-in microphone pre-amps also eliminate the need to carry other active outboard devices and extra cables.

### Tips of the trade

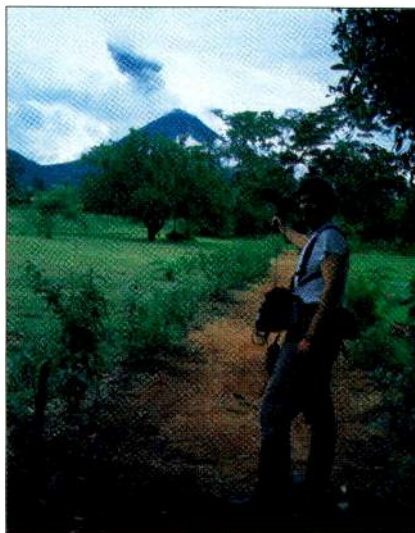
It's good to plan ahead as much as possible, but the first rule of sound effects recording is to be open to the unexpected. Ben Burtt, the sound designer of the *Star Wars* films, tells a story about going to a military base in search of the perfect spaceship rumble. He recorded all types of weaponry and rocketry, but wasn't happy with the results. Back in his motel room, he discovered that the window air-conditioner made a distinctive rumble, which, when slowed down, became the sound of the Star Destroyer passing overhead in the film.

In my hikes to find jungle ambiences in Costa Rica, I usually trudged through mud. So while some ambience waited, I spent a good deal of time recording the sucking and slurping of my boots in exotic Costa Rican mud. What will it be used for—a dinosaur eating? A lava flow? A dung heap? I didn't know, and it really didn't matter. Just get as many interesting and varied sound effects as you can. What they will be good for can be determined later, in the comfort of the studio.

Another rule of sound effects recording: To get unusual effects, use unusual recording techniques. If you are after elements for spaceships, dinosaurs, morphing metal

or other strange things, you can often place the microphone in a way you wouldn't see recommended in the textbooks. For *Backdraft* fires, we recorded a propane torch through a long metal tube. For *Jurassic Park* fossil bones collapsing, we recorded bowling pins knocked down from just an inch away. For the T1000 liquid metal morphing in *Terminator 2: Judgment Day*, we recorded bubbles blown in goop with the microphone in the goop (protected by a condom). We recorded a gas meter with

*Continued on page 120*



The author recording ambiences (with volcano in the background) for *The Lost World*, next year's sequel to *Jurassic Park*.



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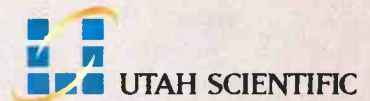
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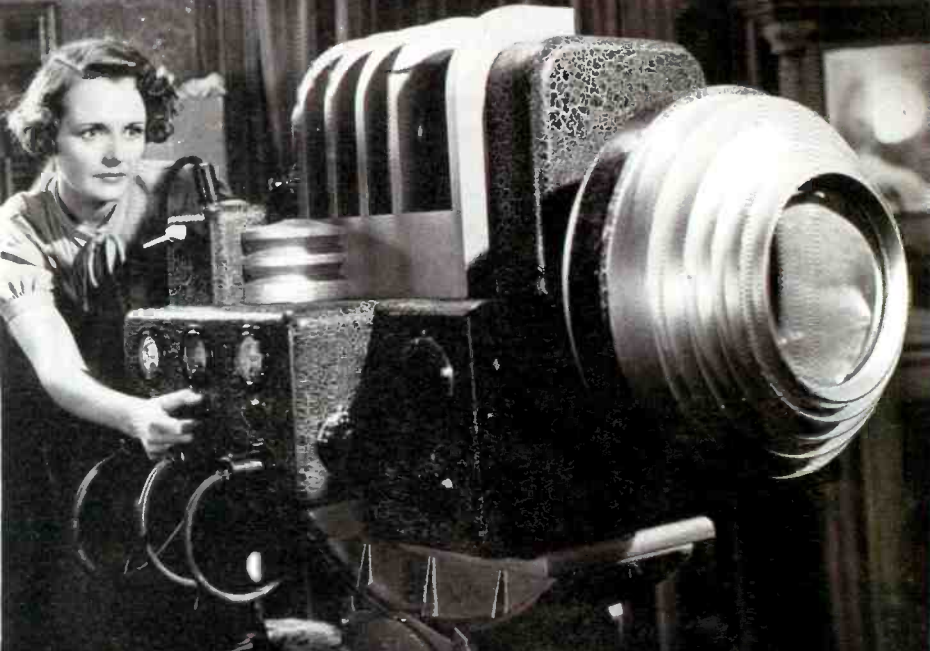
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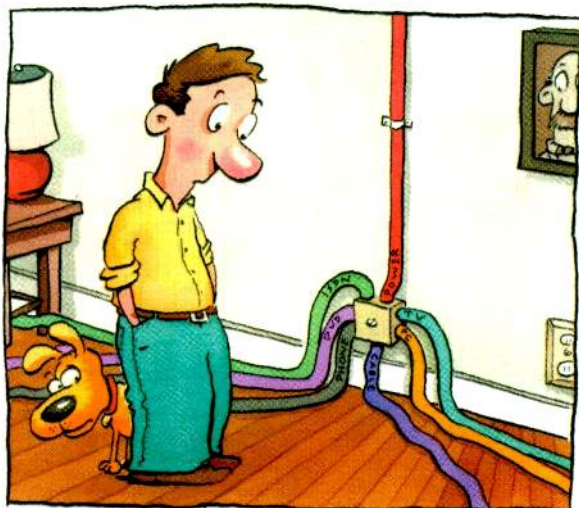


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## Networking your home

**A** long time ago (in the early '90s), consumers received electrical power, cable television and telephone services from three separate — and monopolistic — utility companies. The gauge of wire, specifications of the signal it carried and the devices they fed had no relationship to one another. (Imagine putting AC plugs on your cable TV coax and the telephone line and plugging both into the wall socket.)

Today, the utility monopolies are withering. Dozens of long-distance carriers, local carriers, cable/DBS services, and even electrical power companies, are vying for your business. Many of them conspire to call you regularly at dinner time asking you to “switch” service providers.



### The Residential Gateway: Standardized protocols for broadband and data services

Each of the utilities wants to provide some mix of video, telephony or data services to the home. In the end, they are selling some flavor of network service. But these different networks do not come together gracefully inside your home. Each requires a proprietary set-top box/modem/decoder usually feeding a single device in the home. Typically, this means an expensive ISDN modem for each computer, an awkward set-top box for each television, and a separate modem from the power company to provide intelligent control of the HVAC system.

About a year ago, some bright folks from a few leading technology companies gave some thought to this problem and sketched an outline for a standard-

ized home bus architecture they called the “Residential Gateway.” The comments of this Residential Gateway group serve as a basis for this discussion.

The Residential Gateway group realized that penetration of new digital services into the American household will be severely limited until several issues are resolved. This month, we’ll look at some of those issues and next month we’ll review some of the solutions.

Until recently, cable companies and Telcos controlled content because they controlled access. The Bell System provided an end-to-end solution for all your telephone needs: long lines, switches, local exchange and customer premise equipment. All of us know this monopoly is gone and recognize that lower long-distance rates and telephone answering machines are the partial results of this breakup. The Residential Gateway group now suggests that diversification and competition need to be re-examined and rationalized — not to restrict competition, but to enhance it.

There are four groups whose interests must be served: consumers, network providers, content/service providers and equipment manufacturers. Although the interests for each group vary, all are possible — when a standardized Residential Gateway comes to pass.

The Residential Gateway group suggests an approach to standardize protocols for broadband and data services that makes the confusing combinations of delivery technologies (copper wires, hybrid fiber coax, RF transmission, wireless, satellite) transparent to the end-user. It is essential to develop a set of interface standards between the broadband residential access network(s) and the communication services (the in-house networks) required by the residence.

For those of you knowledgeable in networking requirements for business and professional environments, the essential functionality of a residential gateway should sound familiar. It will provide two key gateway/bridge/switch functions: 1) the location to terminate all external access networks to the home, with multiple residential services being delivered over each type of access network; 2) the location for residential services to be delivered to the consumer, for example telephone, television and PC networking or the termination point for internal home networks.

Though it may seem unduly complex at first, such an approach in fact results in a simplification of the user environment. A single, flexible, intelligent interface is ideal to satisfy short-term analog needs and high-



# HOW DO YOU GET FIVE DISK SYSTEM MANUFACTURERS TO AGREE ON ANYTHING?



**A**

ctually, when it came time to standardize on one disk interface protocol, it wasn't that hard. The top ten manufacturers of disk systems overwhelmingly chose The Louth Protocol.

We'd like to tell you it was our impressive track record in broadcast automation that did it. Or our reputation for pioneering object oriented programming to make automation faster, easier and more flexible. But the truth is, disk manufacturers chose the Louth Protocol because it works. It's open. And it's free. 100% public domain.

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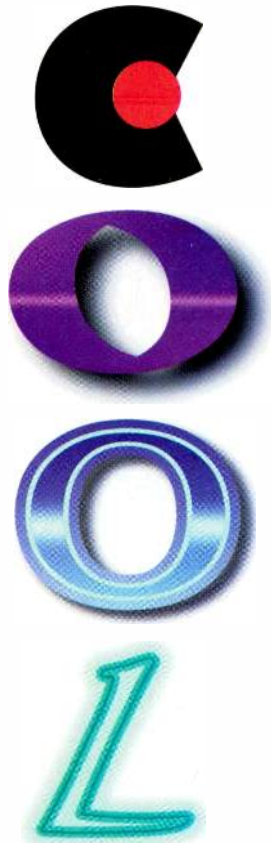
**WORKS WITH ANYTHING**

enlightened self-interest or investment spending, the fact is we didn't give the Louth Protocol away for nothing. We were looking ahead.

It has not only simplified applications such as Ad Insertion, Caching, Program Acquisition, Time Delay and Multi-Channel Management, it has made the future easier for everyone. By opening a pathway that is free of gatekeepers, toll takers, and proprietary potholes. That's why we agreed to make the protocol available to *our* competitors in automation, as well.

We believe in working with anything. Even when it's hard.

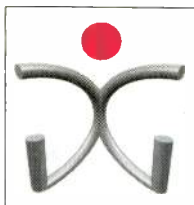
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## interactive

bandwidth digital services, such as Internet access, HDTV and services yet to come.

### Plug-and-play approach

The Residential Gateway plug-and-play approach provides consumers with the ease of use they demand, because installation and upgrades offered by service providers would be seamless. The Residential Gateway hides the complexity of multiple networks and keeps things simple for the consumer.

By making the specific transport technology a question of quality and price, not proprietary technology or monopolistic access, the consumer can focus on which service, at what quality on whichever device suits his or her needs. The challenge in the home is to do it in a consumer-oriented, plug-and-play design that can be managed by the customer. ■

*Steven Blumenfeld is vice president of technology and studio operations, and Mark Dillon is vice president, on-line services, with GTE, Carlsbad, CA.*

*Acknowledgment: The authors would like to thank Bellcore, GTE, Hewlett-Packard, IBM Reliance Comm/Tec and Sarnoff Research Center for their contributions to this article.*

## The Residential Gateway approach can make everyone happy

### Consumers can have:

- Access to multiple competing networks.
- Access that is transparent and seamless.
- The ability to choose more content services without regard to the physical network required to deliver those services.

### Networks can have:

- The ability to provide network connection cheaply.
- The ability to deliver an unrestricted variety of content services to homes.
- The ability to upgrade network technology without conflicts with content providers or equipment manufacturers.

### Content/service providers can have:

- The ability to provide a wide spectrum of service to customers.
- The ability to develop content with minimal concern for the topology or architecture of a specific network.
- The ability to display content in a home with minimal concern for the specific customer device, nor its network interface.

### Equipment manufacturers can have:

- Standards agreed to by network operators, service providers and all equipment manufacturers to enable the economies of scale.
- In-home networks that integrate with each other.
- A clean, in-home network infrastructure. ■

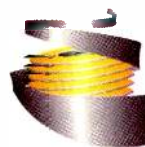


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## The verdict is in: FCC table is faulty

There currently is a three-phase industrywide campaign being waged by the Broadcasters Caucus to dump the FCC's DTV spectrum allocation plan. The Broadcasters Caucus is comprised of ABC, CBS, Fox, NBC, PBS, Chris Craft, ALTV, APTS, MSTV, NAB and Tribune. The campaign will be completed in a short time frame, so now is the time to come up to speed on the DTV process. The goals of the industry DTV campaign are: 1) to educate the broadcasters so that all stations are in a position to assist in the process, thus ensuring that stations receive a second channel that is maximized for their coverage areas; 2) to evaluate the FCC proposal table and improve upon those areas that need adjusting and refining; and 3) to make non-technical recommendations about such issues as how DTV channels should be designated and how channel assignments may be modified after the adoption of the table.

### Campaign results

This effort will result in joint comments being filed on behalf of a substantial number of the nation's broadcast organizations. The comments will address non-technical issues, as well as a recommended DTV channel assignment methodology. Also, they will include a modified table that improves upon the FCC's methodology and, as appropriate, incorporates individual stations' channel change requests.

### Regional coordinating teams

This campaign is initiating a series of Regional Coordinating Teams and the continental United States has been divided into 10 regions. (See Figure 1.) The teams will serve as a clearinghouse of DTV information. The information will be conveyed back to the Broadcasters Caucus for analysis and incorporation into joint industry comments. Likewise, information will flow from the caucus to the teams so that stations can learn what DTV channel options are available.

The Broadcasters Caucus has devised an allotment/assignment table that can be considered an improvement on the FCC table. However, even this table will require additional improvements.

### The basic DTV allotment process

The Broadcasters Caucus approach is to select a pool of DTV channels that are best-suited for a community and then to select a channel for each NTSC station that best replicates the NTSC channel's service area. It also attempts to pair adjacent NTSC and DTV channels at the same site to reduce adjacent-channel interference.

The approach assumes that NTSC and DTV stations will have the same antenna height and that the DTV station will operate with power levels based on the same factors considered and developed under the guidance of the FCC Advisory Committee.

### Coverage and population maximization

The concept of *maximization* means that all stations, particularly ones with smaller NTSC service areas, should be able to expand their DTV coverage beyond the bounds of their current NTSC service area —

provided that the increase in service causes no new interference to NTSC service.

NTSC service areas are defined as the Grade B service minus the interference from other NTSC stations. DTV service areas are defined as the Grade B service minus the interference from other NTSC and DTV stations. Service areas do not include the coverage

provided by translators. Under the FCC's and the Broadcasters Caucus approach, a significant number of translators will be displaced from their NTSC channels. Some of the displaced translators could be relocated to different frequencies.

Full replication is a 100% match between a station's NTSC and DTV coverage. Some stations will achieve more than 100% replication because the DTV service areas extend beyond the NTSC service area. In other cases, a station may achieve only 98% replication, but may reach a larger area and more people because its DTV area extends beyond the NTSC area in one direction, but excludes some of the NTSC area in another direction. Stations should focus on *where* they are getting DTV coverage, not just *replication* figures. It is important to remember that digital television requires

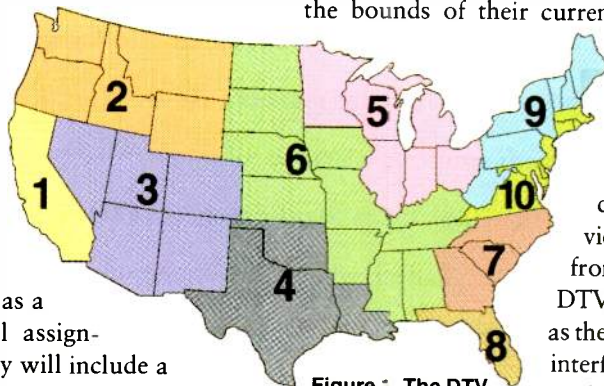


Figure 1. The DTV Coordination regions.

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## atv update

16 times less power than is currently required for analog television when operating on the same band.

### The numbers in the table

Some of the power levels listed in the FCC's table are unrealistic by today's technology standards. However, *first*, and most important, the power levels you see were developed for planning purposes only to protect the contour of your DTV coverage. Stations can begin the transition to DTV without building maximum facilities. If certain power levels are unattainable at the time construction begins, stations will be able eventually to modify and increase their facilities. *Second*, the transition to DTV will require many years, over which time technology will improve. And *third*, at the end of the transition, more stations will be able to operate on channels in the lower frequency ranges because they will be permitted to move their DTV operations to their NTSC channels. This is why the Broadcasters Caucus has developed the modified table with a view to locating as few stations as possible in the highest reaches of the UHF band, and with the highest powers, consistent with the goal of replication.

### The FCC plan vs. the Broadcasters Caucus plan

The primary difference between the FCC approach and the Broadcasters Caucus approach is that the FCC approach would pack DTV channels into the "core spectrum" — Channels 7-51. The FCC also would favor the auctioning of channels in the 60-69 range in 1998.

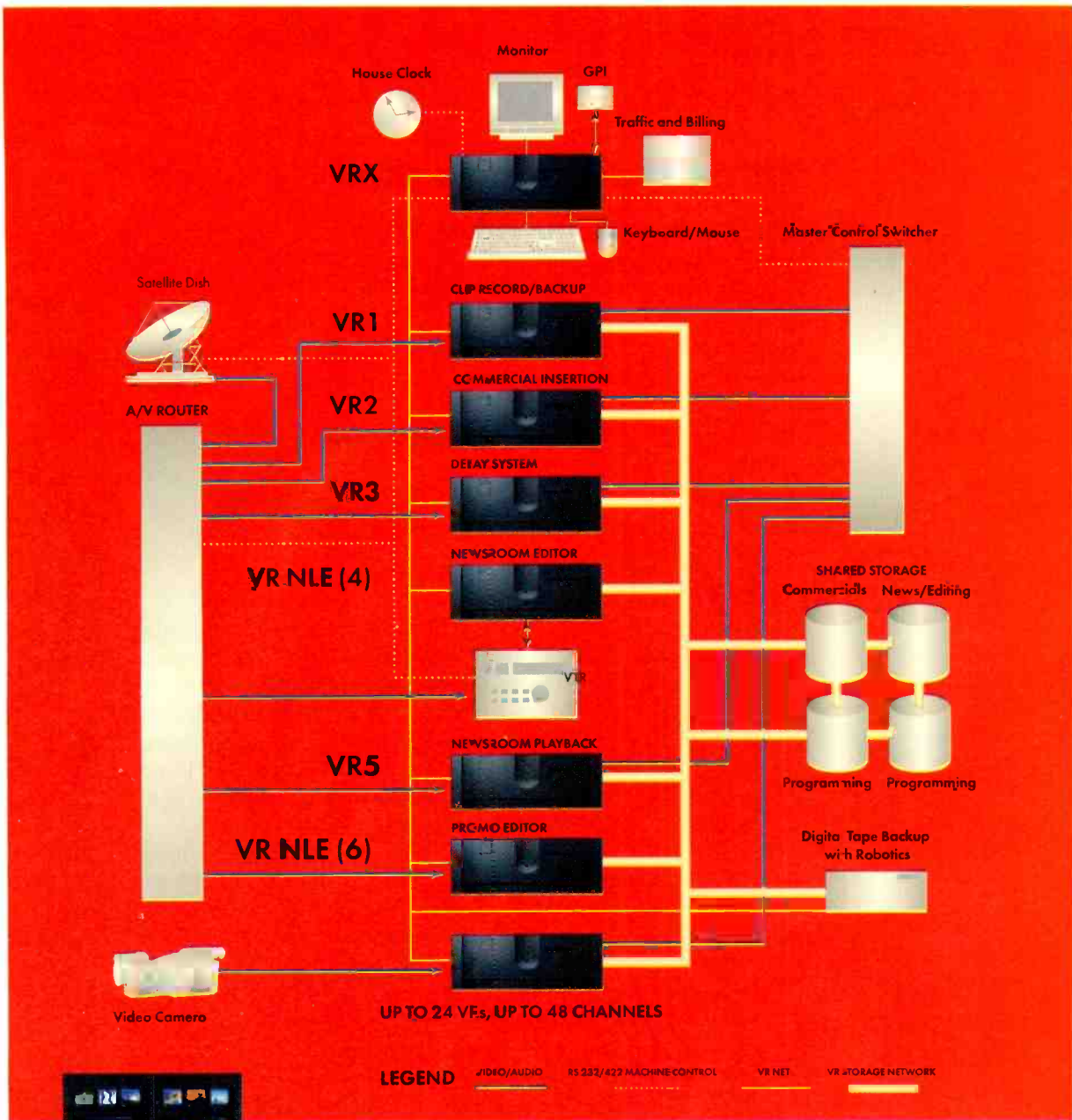
By contrast, the Broadcasters Caucus approach would use Channels 2-69 for the best transition to DTV. Under this approach, spectrum would be returned at the *end* of the transition. Because the entire spectrum band would be used, there would be more flexibility for channels and facility changes, in addition to more bandwidth with which to accommodate translators and LPTVs. ■

Louis Libin is director of technology for NBC, New York.

## Problems with the FCC's core spectrum approach

1. Inter-service sharing has proved to be an inefficient use of spectrum. It may be impossible for stations in the 60-69 range to operate alongside new non-broadcast services.
2. The increased interference and reduced coverage that could result from the core spectrum approach could frustrate viewer confidence.
3. This approach will limit options as more is discovered about DTV, signal propagation, where interference occurs and what spectrum ultimately services DTV best.
4. This approach could thwart a successful transition to DTV because auctioning Channels 60-69 or 52-59 will rob the transition of the flexibility needed to accommodate adjustments to the table as the public and industry begin to use DTV in the real world. ■

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# Testing digital systems

Testing today's new digital signals  
requires a whole new way of thinking.

By Kenneth Hunold

With today's chaos of VTR formats, compression schemes, color spaces and sampling structures, sure bets are elusive. One thing, however, is certain: tomorrow's formats and standards will be digital. Engineers are faced with converting their facilities to digital, regardless of what the future may hold. And just as surely as the digital sun will rise tomorrow, these digital systems must be tested and maintained.

For some parameters, new testing methods (or at least new to the broadcast engineer) must be employed. Oddly enough, most of the parameters measured are analog, however, they convey digital information. Generally, the most useful test equipment for digital systems is the type that gives a number of indications — whether the signal is good/bad, present/absent, etc. If all of the indicators are good, the system is most likely operating properly. If any indicators show potential problems, the test equipment should provide the tools needed to investigate further.

A set of reference-quality A/D and D/A converters is indispensable for testing digital circuits. These allow you to perform the battery of tests already developed for composite and component analog systems. Although frequency response might be a non-issue for most of today's digital gear, measuring traditionally analog parameters provides a quick "reality check."

#### THE BOTTOM LINE:

As TV stations and production facilities replace analog systems with digital ones, test and measurement requirements can become much more complex.

Troubleshooting can mean simply swapping out a board to complex digital signal analysis. Knowing what level of repair you need to do is only the first step.

The second is knowing what equipment is needed to perform that task. *Testing Digital Systems* will show you what signal parameters must be measured and what equipment you'll need to confidently complete the task. \$

Photo: At the ABC facility in New York, digital test equipment is being integrated into the QC Station alongside a variety of analog test equipment.





Eventually, all test equipment will operate with digital inputs, and digital generators will provide all the signals needed for testing in the digital domain. This will remove the extra stage (and inaccuracies) of external converters.

The first digital systems used a parallel digital interface (SMPTE 125M). A twisted pair of wires was required for each of the (up to) 10 bits of data, plus additional pairs for clock and status signals. Today, the most popular digital interface is the *serial digital interface* (SMPTE 259M or SDI). This is transmitted down a single 75Ω coaxial cable, an enormous advantage over the bulky parallel cable and large 25-pin "D" connector. For simplicity, from

now on we will only describe the serial interface.

### Serial digital bitstreams

An important parameter of the serial bitstream is the transmitted voltage level, also known as the launch level. SMPTE 259M specs the peak-to-peak output voltage at  $800\text{mV} \pm 10\%$ . (See Figure 1.) The digital data representing the video signal is coded in this analog waveform. The SMPTE standard includes composite and component digital systems. See Figure 2 for a quick summary of how the different video formats are generated. In the composite digital system, the entire analog composite signal is sampled at 4x the

appropriate subcarrier frequency, including sync and color burst. Therefore, the data rate varies according to the sampling rate and is 143Mb/s for NTSC and 177Mb/s for PAL.

The luminance and color-difference components are sampled individually for component digital signals. Once sampled, the data is serialized into a 270Mb/s datastream. The luminance component is sampled at 13.5MHz and the two color-difference components are sampled at 6.75MHz. The resultant reduction in chroma resolution is acceptable because of the lower color acuity of the human eye.

Along with voltage, another important parameter is jitter. This is the time



# Testing digital systems

difference between the observed transition and a transition of the original or ideal 270MHz clock signal. In devices where the digital signal is processed, such as reclocking DAs, jitter can be introduced in the reclocking or reshaping of the signal.

Originally, the maximum permissible jitter was 0.5ns. Recently, the standard was modified to describe jitter tolerances in *unit intervals* (UI), which is a fraction of the clock period. The standard now states that jitter should be less than 0.2UI. The maximum jitter allowed is, therefore, different for each data rate (143, 177 or 270Mb/s). Using an oscilloscope with sufficient bandwidth (1GHz), jitter is measured by overlaying many transitions of the 270Mb/s signal and triggering with a stable 270MHz source. The scope cursors can then be used to measure the "width" of the accumulated rise and/or fall times. Jitter can also be easily determined using special test equipment specifically designed for measuring SDI jitter.

When observing the waveform of the serial digital bitstream, it is important to note that a high state does not always



The audio test bench at the ABC Engineering Laboratory in New York shows a range of test equipment available to test signal parameters.

ized or scrambled. Equipment that breaks the serial signal down to the parallel format for internal processing (DVEs, processing devices, videotape and disk recorders) must extract the clock signal to properly de-serialize the data. This is often done with a phased lock loop (PLL) that tracks the signal. Certain data patterns stress the PLL's response and ability to recover the serializing clock. Two of these two sig-

placed by end and start of active video (EAV and SAV) pulses, which use special reserved codes. If these codes are used by video data, receiving equipment could incorrectly assume that a scan line has ended or that a new scan line has just begun. In between the EAV and SAV signal (the old horizontal blanking interval), other ancillary data can be encoded into the signal. These include audio signals (embedded audio) and error detection and handling SMPTE RP 165 (EDH). Not all equipment handles ancillary data the same way, either passing the data or properly re-formatting it depending on the function of each device.

The standard allows multiple audio channels to be included, or embedded, into the serial digital bitstream (up to 16 for component serial digital signals). This allows single-wire distribution of video and audio. Many digital VTRs will accept audio signals embedded in the serial digital bitstream and some will also embed them into the output. If you intend to use audio signals embedded in the digital bitstream, make sure they are preserved as the signal passes through DAs or frame synchronizers.

Error detection and handling is a system of including a checksum and reporting mechanism into the serial data-stream. Briefly, the system works as follows: at the signal source a Cyclical

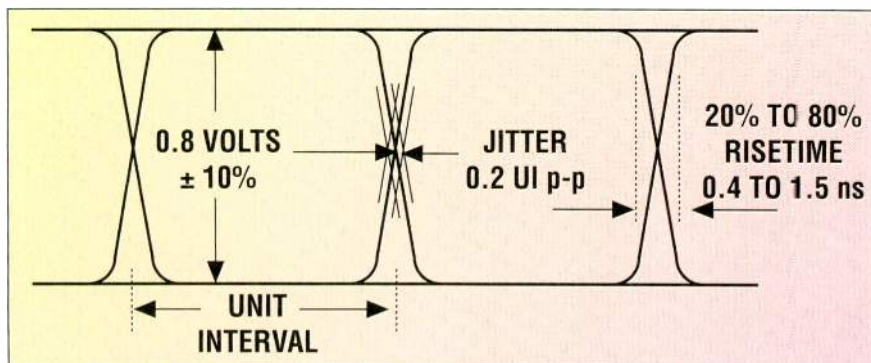


Figure 1. The waveform used for serial digital transmission has a peak-to-peak voltage of 0.8V±10%. New specs call for jitter to be less than 0.2UI (unit intervals).

equal a logic 1. Rather, a logic 1 is indicated by a transition from one state to another (high to low or low to high). Also, the basic type of coding used is, strictly speaking, not self reclocking. While the transitions occur at clock intervals, there is not a transition for every clock cycle. To increase the number of transitions (and aid the process of clock recovery), the data is random-

nals are combined into an SDI check-field and are specified in SMPTE RP178. (For more information, see "Transition to Digital," November 1995.)

## Ancillary data

In addition to video, other information is coded into the digital signal. In component digital signals, sync pulses are not digitized. Rather, they are re-

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# Testing digital systems

Redundancy Code (CRC) is generated and coded into the ancillary dataspace. Two CRCs are generated per video field, one for the active picture area and one for the "full field," including the vertical interval. At the input of a receiving device that supports EDH, the CRC computation is repeated and compared to the value extracted from the ancillary data. If the received CRC matches the transmitted CRC, it is assumed the transmission was error-free. If not, an error flag mechanism is used to indicate when an error is detected and equipment is alerted downstream.

A few special situations require some interpretation of the CRCs. In digital processing equipment that changes the image (such as a DVE), alters the "video gain" or changes the position of the picture in the raster, the output CRC will be different from the input CRC due to image differences. This requires a new CRC to be calculated and inserted into the digital data.

EDH is a powerful tool for testing and evaluating digital video systems. Therefore, EDH errors will often be detected before any errors are observed in the picture. Using EDH means errors can be detected by unattended monitors, letting you know if any errors have occurred over a long period of time. For more information, see "EDH: Monitoring Networked Video," April 1996.

Recall that the serializer clock must be

recovered from a digital signal. And, while digital DAs also can automatically adjust input equalization to compensate for cable lengths, they must be used properly if the clock is to be correctly recovered. This is another area where the SDI check-field signal can be used. Because of its ability to stress the equalizer and clock PLL, it makes a good stimulus for determining how close to the digital "cliff" you are operating.

Typically, serial digital receiver chips are capable of equalizing up to 300 meters of high-quality coaxial cable. Depending on the type of cable used, "your mileage may vary." Test your system (using a generator that supports EDH) with one of the pathological signals (e.g., the SDI check-field). Then, using equipment that indicates EDH errors, see if any EDH errors are detected. If any are detected, then some work needs to be done. Possible solutions include using a higher-quality cable (with less high-frequency loss) or, if feasible, installing an equalizing and reclocking DA at a con-



Fully testing all the parameters of audio and video signals requires numerous test setups and a variety of equipment. Shown here is a portion of the test setup in the ABC QC Station in New York.

venient midpoint in the link. If no EDH errors are detected, add approximately 50 meters of cable to the link and re-test. If no errors are detected with the additional cable, you can be reasonably sure that you are operating with enough margin. The error rates in digital TV circuits are such that if no errors are reported in a few minutes of operation with the extra 50 meters of cable, it will probably operate for years without error on the actual shorter length of cable.

## Is serial digital RF?

The serial digital interface is designed to operate with a coaxial cable interface. This cable must have a characteristic impedance of 75Ω. One of the primary frequencies of interest in serial digital circuits is approximately one half the serializer clock frequency or 135MHz for a 270Mb/s component digital signal. The many harmonics of this rectangular wave extend to more than 1GHz. Because of the frequencies involved, serial digital video is more like an RF signal than a low-frequency

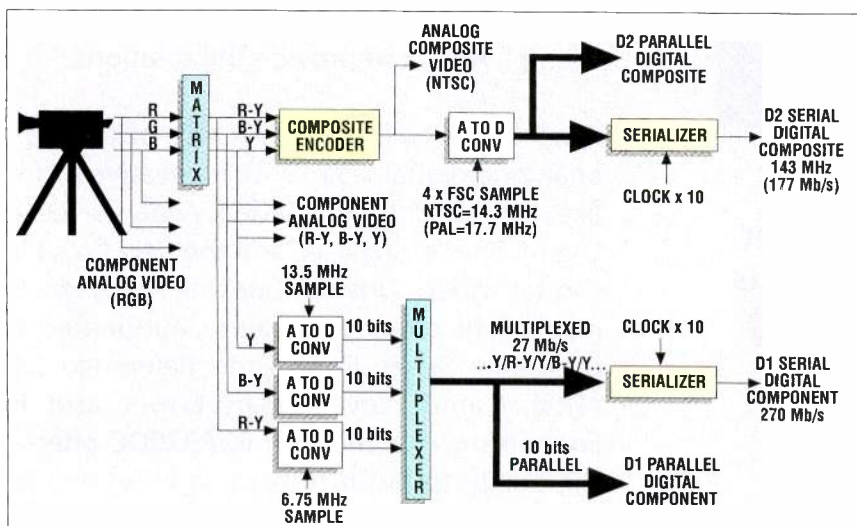
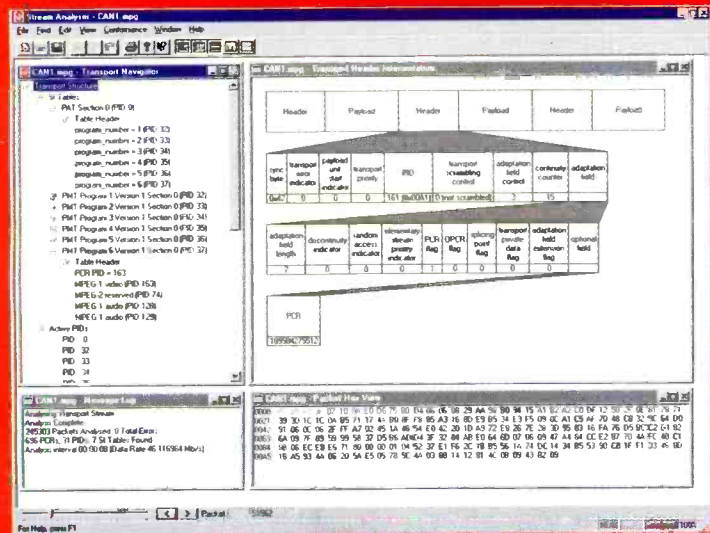
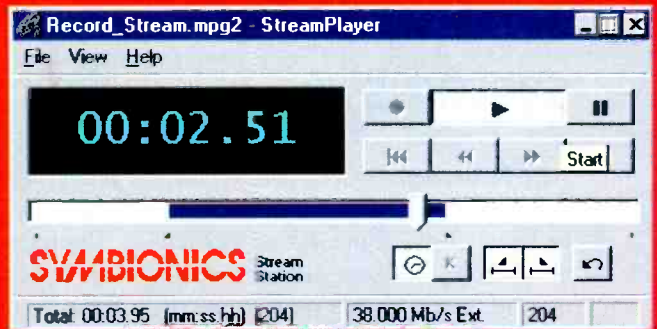
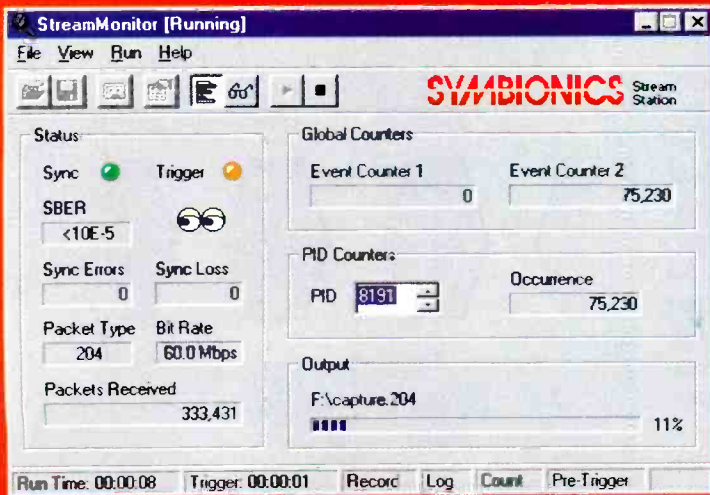


Figure 2. Block diagram of the processes used to derive the various types of video, both analog and digital, component and composite.



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# Testing digital systems

(6MHz) baseband video signal. As such, impedance mismatches can cause reflections on the transmission line (coaxial cable). The accuracy of the 75Ω interface impedance is specified by the "return loss." SMPTE 259M specifies a return loss of greater than 18dB at one half the serializer clock frequency. This equates to a VSWR of 1.28:1. The eye pattern and an eye opening are used as an aid in monitoring digital circuits. (See Figure 3.) If this eye is closed or reduced by reflections, low-frequency smearing, overshoots or other effects, the receiver may not be able to recognize a transition or determine a digital high or low state.

Much has been written about the impedance of connectors, cables, feed-throughs and patch panels. Will a single 50Ω connector bring down a serial digital link? Probably not, but that's not the point. The effect of mismatched components is cumulative. Use the cor-

rect impedance connectors, cable, etc. whenever possible, according to good engineering practice.

Contrary to popular belief, digital transmission will not be the solution to all the world's problems. Digital recording and transmission do offer dramatic improvements in the ability to store and distribute consistently high-quality copies of the original signal. However, the need for testing has not been eliminated. What has happened is that some of the analog impairments have been replaced by digital impairments. The focus of testing procedures must, therefore, shift to reflect these new parameters.

Armed with an understanding of the digital and analog factors that affect the performance of digital video sys-

tems, you can now incorporate these methods into your overall testing and maintenance program. This will allow you to keep your digital system operating at peak reliability into the next millennium, regardless of what the relentless technological advances bring. ■

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

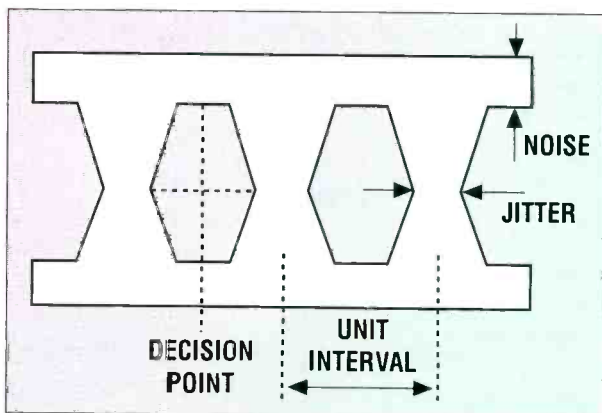


Figure 3. Once the serial datastream reaches the receiver, it is equalized. The amount of noise and jitter on the signal will determine the size and shape of the eye pattern, and if the receiver can properly retrieve the digital data.

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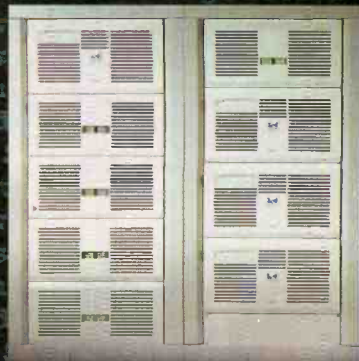
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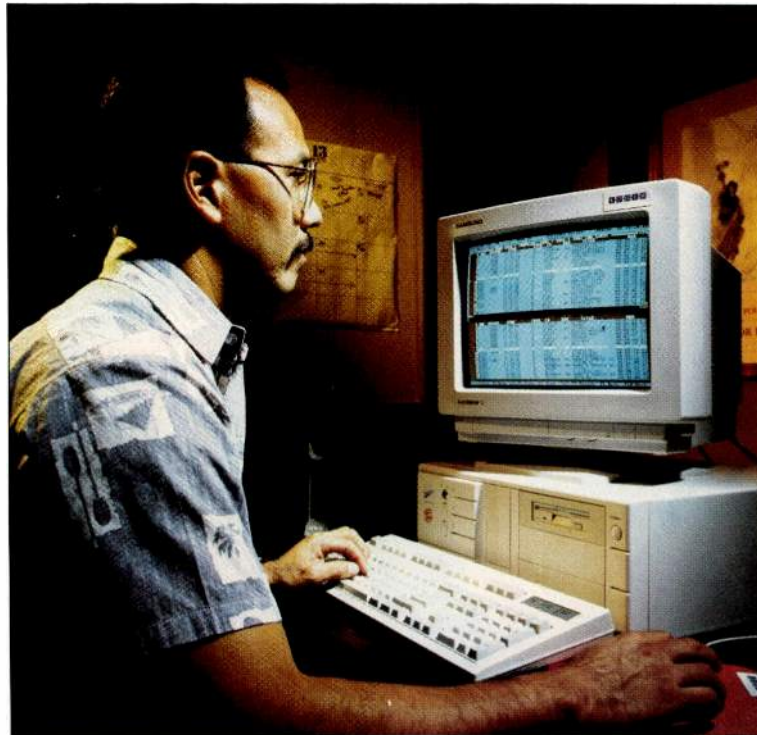
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# Using automation



#### THE BOTTOM LINE:

In the face of growing competition from new technologies, TV stations need all the help they can get to stay profitable. Today's automation systems can help by allowing stations to add program services without proportionally increasing staff or facility size. Reliability and cost-effectiveness of computer-based automation systems have improved substantially of late, making them particularly attractive to smaller-market stations. \$

**A well-designed automation system can keep a station competitive.**

**By Charles Goode**

In today's rapidly changing world of broadcast television, broadcasters must compete with an ever-expanding group of program delivery systems, such as DBS and wireless cable. The proliferation of these and other emerging program-delivery services has directly contributed to the decline of broadcasters' share of market revenue. To remain competitive, broadcasters must continually search for more revenue streams while striving to keep operating costs at an absolute minimum. Therefore, the station's operating staff is continually being asked to do more with less. Virtually all of the functions that once required a crew the size of a basketball team are now performed by one or two persons per shift.

Photo courtesy of Louth Automation.



# One to 200.



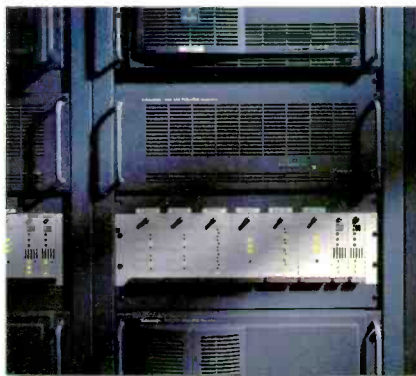
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# Using automation

One of the most significant tools available to today's broadcasters for developing a more cost-effective operation is computer-based automation. Today's computer automation systems help broadcasters program multiple chan-

proportional to the broadcast facility's operational requirements and equipment architecture.

## Advantages for smaller stations

Of all the broadcast installations using automation, it is the small- to medium-market facilities that stand

sive, highly skilled personnel.

For example, KIMO-TV in Anchorage, AK, is a small-market station that decided to take advantage of the significant cost savings and operational benefits offered by computer automation. The station programs multiple channels and delays its entire day of network programming by three hours.

With a single operator on duty per shift, KIMO-TV delivers three streams of local, syndicated and network programming, each with its own independent local spot-insertion, to the Anchorage, Fairbanks and Juneau markets.

By first determining its operational goals, then carefully selecting and implementing its computerized automation system, KIMO-TV is now realizing an annual operational cost savings of \$300,000 to \$400,000. In addition to the cost savings, the station's on-air look has greatly improved.

KIMO-TV was able to accomplish all of this with an Odetics *SpotBank*, two Grass Valley *Master 21*

switchers and the Odetics network delay system. The *SpotBank* is a three-channel, disk-based caching system with 18 hours of commercial storage and the capacity to control up to eight external devices. Each of the *Master 21* switchers is equipped with event



At KIMO-TV, Anchorage, AK, three separate streams of automated programming are recorded and played back using a combination of tape and disk-based storage.

nels and enter into local marketing agreements (LMAs) without the use of additional personnel. These systems never complain of being overworked or underpaid (although they do require occasional maintenance), and they almost never forget a station break.

The process of selecting, configuring and implementing an automation system takes on an importance that must not be underestimated. Considerable forethought and planning are a vital part of this process if it is to be ultimately successful. All of the functions that the automation system is expected to perform clearly must be identified prior to its purchase.

The complexity of an automation system can range anywhere from a set of simple contact closures to a flotilla of file servers interconnected with local area networks (LANs). The size and complexity of a cost-effective automation system should be directly

to reap the most benefit from computer-based automation systems. The generally increasing costs of employee's salaries and benefits, plus the difficult task of locating and keeping qualified personnel willing to work in small markets are helping to make the cost

of computer automation increasingly attractive to the small- to medium-market stations. The computer automation system can provide small stations a much cleaner "big-market" on-air look, without the added cost of employing and retaining more expen-

---

Functions that once required a crew the size of a basketball team are now performed by one or two persons.

---

stackers. The network delay system is capable of automatically receiving and storing programming for up to six hours.

## Setting up for multichannel

With a little planning and fore-

thought, broadcasters can transform their control rooms into highly efficient, cost-effective operations. For example, most library management systems are capable of controlling a variety of external devices. Most manufacturers offer, as an option, external machine-control ports. A station can connect its VCRs that are routinely used for playing back syndicated programming to these machine controls. The system will then roll the program tapes and insert the spots at the appropriate times, while freeing the operator to perform other functions.

The automation system can also be set up to roll VTRs that are ready to record incoming satellite feeds. Each function that you assign to the computer automation system becomes one less function that the master control operator must perform.

---

An automation system can range from a set of simple contact closures to a flotilla of file servers.

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For broadcasters who want to distribute targeted spots to selected audiences, but who do not have sufficient capital for the purchase of lots of additional equipment, a good first step is to take inventory of existing equipment. The station may already have equipment that, with a little creative planning, could perform these functions.

Consider the station that already has a multi-output commercial insertion system. There might be a way to accomplish multiple-channel spot insertion without the expense of installing additional master control switchers. Most multichannel spot insertion systems come equipped with a small routing switcher dedicated to each channel. The systems are routinely programmed to automatically switch to a predesignated channel (the "default channel") after the completion of a commercial break. One approach con-

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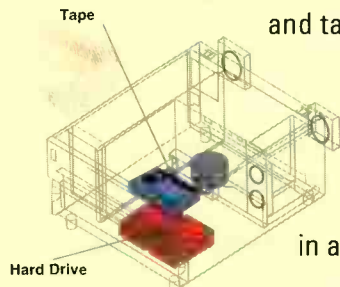
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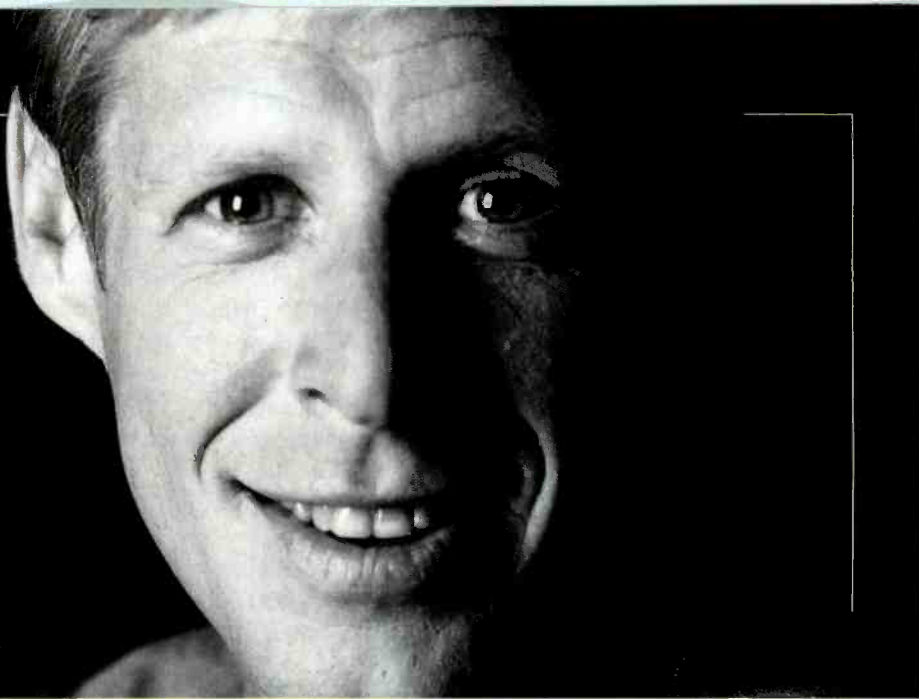
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## Using automation

nects the program output of the existing master control switcher to the default channel of one or more of the insertion systems' routing switchers. The output of the spot insertion's routing can feed several program streams with spots inserted to a desired destination.

Installing the spot-insertion equipment *downstream* of the master control switcher instead of upstream relieves the operator of the stress derived from attempting to simultaneously insert separate commercials into multiple channels.

This idea will work well for those broadcasters who wish to do multichannel *spot* insertion only, keeping other programming common across multiple feeds. The broadcaster who wants to independently program multiple channels will need some additional equipment. In this case, it's a better idea to install a master control switcher for each program stream.

The switchers should be identical to each other and equipped with some form of computer automation that is capable of communicating with the spot insertion system and other control room equipment. Identical switchers are important, because the operator must be able to locate and access sources quickly. Familiarity of the switcher is important for the operator in achieving speed and accuracy, the key ingredients for a clean on-air look.

### Thinking it through

Developing an efficient, cost-effective operation does not necessarily require a huge capital investment. It does, however, require planning and

forethought. In some cases, simply rearranging the control room equipment will make the operation more efficient. Placing the equipment in such a way that it minimizes the reach and number of moves required to perform an operational function can significantly improve the efficiency and accuracy of the master control operator. Identify the facility's operating re-



Multiple identical switchers are recommended when you need to create fully independent programming streams.

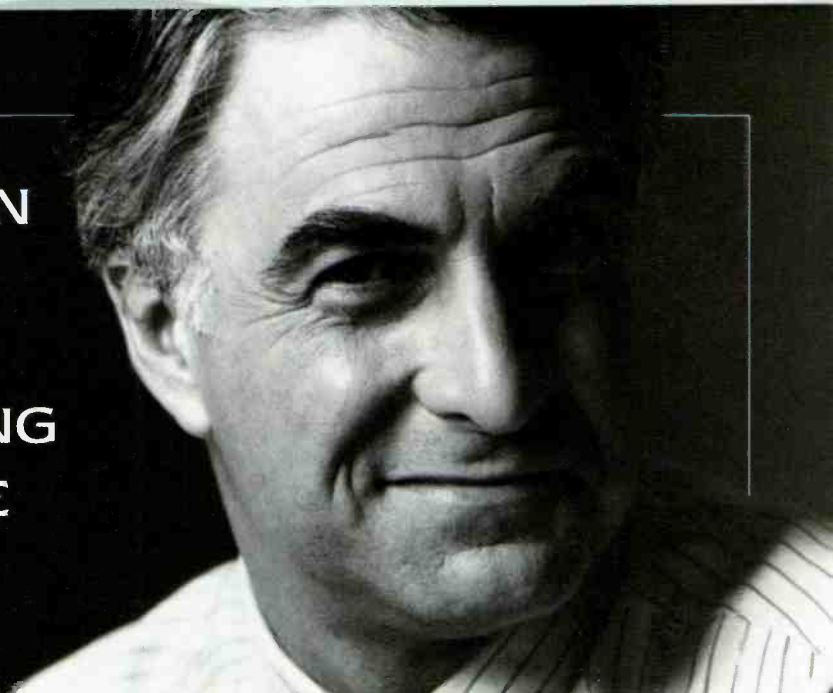
quirements, carefully select the equipment that can perform these requirements, and plan the installation and implementation of the equipment to ensure a smooth-running, cost-effective broadcast operation. ■

*Charles Goode is vice president, engineering, at Smith Broadcasting Group, St. Petersburg, FL.*

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Information**

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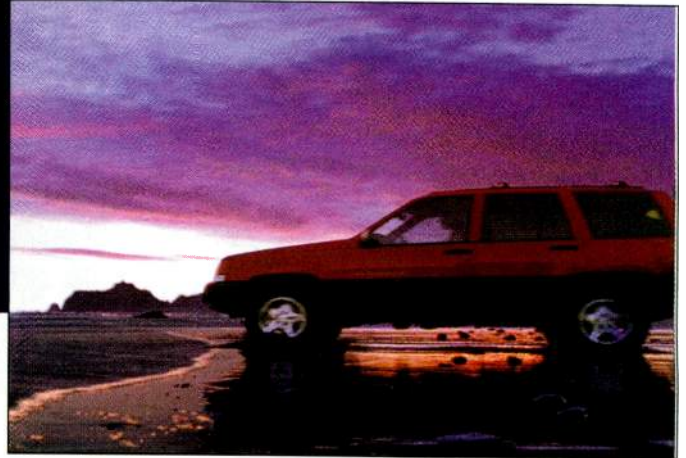
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# Compositing and effects



**Today's powerful graphics systems  
provide the tools to build almost  
anything in post.**

**By Jeff Mazur**

**THE BOTTOM LINE:**

High-end graphics systems have brought incredible power to the desktop. Even today, with computer prices dropping steadily, the horsepower required can be extremely expensive.

In addition to the cost of hardware and software, maximizing the potential of a graphics system requires an investment in creative artists capable of operating systems near their limits.

While producing quality compositing and effects requires a major investment, it can reap huge benefits. \$

**O**

ver the past 20 or so years, the world of TV production, post-production and broadcast has seen radical changes. Digital technology has been at the heart of many of these changes. Digital techniques have been instrumental not only in changing the way industry professionals think and operate, they have also provided a whole new range of opportunities. In most cases, digital technology provides the means to carry out a project much more efficiently and cost-effectively.

All levels of TV production have benefited from the improved picture quality and production flexibility that digital technology has introduced. The world of graphic design is no exception. Designers are no longer restricted to the simple creation and manipulation of single or static images. Today they can work simultaneously with a host of moving pictures, layered elements and add a wealth of complex and sophisticated digital video effects.

**Compositing**

The technique encompassing this simultaneous multilayering and Jeep photos courtesy of Digital Magic Company, Los Angeles.



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HIGHER THINKING

# Compositing and effects

design process is often referred to as compositing. Although this may be perceived to be a contemporary technique, it is not all that new. Within the film industry, the first forms of compositing can be seen as far back as the turn of the century. Early films used superimpositions and split-screen techniques. However, real compositing for television didn't actually come about until recently, during the early 1980s.

In its simplest form, compositing involves the layering, or keying, of one video image over another. This multiple image is then recorded off to tape or disk where it can be recalled later as the background image for the next layer.

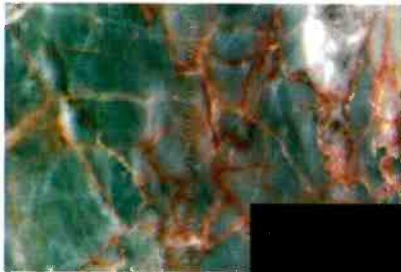
In its simplest form, compositing involves the layering, or keying, of one video image over another.

This allows an entire image or video clip to be built up one layer at a time.

Unfortunately, each time the image is laid off, say to tape, the previous layers go down another generation in quality. With analog tape recorders, such as 1-inch or Betacam, it only takes a few generations for the image quality to become unusable. With the advent of digital recorders (most notably the D-1 format), layering up to 50 or more passes became possible because there is virtually no

generational loss.

More recently, it became possible to store video frames on computer disks. Early disk units were limited to one or two minutes of video; not long, but adequate for creating short graphic elements. Because disks can access any frame instantaneously, this eliminates the preroll time associated with linear editing systems. Thus, a complete edit suite could be



Six layers were used to complete this composite of the ABC logo.

built in a single box with non-linear editing, keying and digital video effects all controlled by a single operator.

Digital video also sparked a revolution in the field of graphic creation. The Quantel Paintbox was marketed as the first true electronic compositing system. Although it only worked with still images, it opened up a new set of possibilities to the graphic design commu-

nity. It contributed to much of the pioneering compositing work with its capacity for keying, matting and texture effects.

Recently, this type of digital technology has allowed a variety of compositing techniques and systems to evolve. These range from dedicated compositing systems designed purely for effects work to the PC/Mac-based solutions. The latter have similar compositing functions, but typically work at slower speeds and/or lower resolutions.


## Weighing the factors involved

Choosing the type of system best-suited for your operation depends on your application, quality requirements, time constraints and, of course, budget. Any capital equipment decision will ultimately be dictated by a number of operational parameters. Each system has its own pros and cons, and these must be weighed against the type of work to be performed. When making these compar-

isons, don't forget to include the "human factor" — that is, the operator who

will run the equipment — because this can have a dramatic effect on the quality, speed and cost of running such a device.

At the ABC network promotion department in Los Angeles, we first faced this decision in 1989. We were spending more than \$2 million a year on graphics production, mainly promotional graphics, net IDs and occasionally show opens for daytime and primetime programming. All of this was being done "out-of-house" at various post-production facilities. We looked



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# Compositing and effects

into the possibility of bringing graphics compositing in-house to achieve cost efficiencies and gain more control over the entire process.

We originally purchased a Quantel Paintbox and Harry to run alongside our Macintosh computers. Our designers would storyboard and design

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Without a serious investment in creative artists, the systems will never be used to their full potential.

---

the graphics elements on the Macs and then import the graphics into the Paintbox for embellishment. Animation and compositing would then occur in the Harry in conjunction with a Grass Valley Kaleidoscope.

At the time, Harry was an ideal tool for the demands of on-air promotion. It offered fast-paced compositing. It also had a wealth of other tools, such



To provide quality compositing, an incredible number of pixels must be computed. Some systems are capable of doing this in real time, while others require rendering.

as color correction, time shifting and various effects. Harry enabled designers to bring in a variety of different elements — from art work, live action and from computer graphics systems — and put them all together in a relatively transparent fashion. Because it operated solely within the CCIR-601 digital video standards, layer after layer could be added while keeping the video signal as pristine as possible.

## Flexibility is crucial

In addition to the quality demands, our graphics department needs to be flexible. The nature of our business is such that after spending all day working on a graphic, you may find that someone higher up wants some of the elements changed.

In the mid-to-late '80s, we felt Harry was the only box we could use for our compositing, but it still had a number of limitations that we needed to address. We began looking around for a replacement machine. For us, the number one criteria was the capacity to make revisions quickly and easily.

Any compositing system had to be able to accommodate such last-minute changes. The major problem with digital edit suites at the time was that they essentially worked in a serial fashion. The compositing process involved starting at the beginning and proceeding in a linear fashion until the project was completed.

You gradually built up an effect until . . . you guessed it, the director or producer changed his or her mind!

With early compositing suites, changing something on the first or second "bed" in a 30-layer graphic was time-consuming. It could take almost as long to rebuild a graphic after making a small change on one of the first layers as it took to build it in the first place. In many ways, it was

like peeling off the layers of an onion to make a change inside and then carefully reassembling the pieces back together.

We needed the ability to make changes quickly and not tie up the suite for the whole day. We purchased a Henry in 1995 to cope with this problem as



Before (top) and after (bottom) images composited by Digital Magic for an upcoming Jeep spot.

well as our increased graphics demands. The system makes it possible to combine up to six layers (soon to be eight) into a single "pack." Each layer within the pack can contain its own color correction, effects, texture and keying information. The rendered output from one pack can then be used as a layer in another pack.

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Each system has its own pros and cons and these must be weighed against the type of work to be performed.

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The beauty of this scheme is that every parameter associated with each layer — such as the DVE settings, color correction setup and keying controls — are all saved along with the pack. Thus, if the pack is brought back

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# Compositing and effects

in at a later time, any setting on any given layer can still be altered independently from the others.

This style of uncommitted editing really pays off when last-minute changes are commonplace. Other features, such as the ability to marry a matte channel to any video clip (thus effectively working in the 4:2:2:4 domain), can drastically improve the efficiency of a compositing system. This is ideal for the bread-and-butter type compositing we do. In general, this involves simple layering, manipulation and basic DVE effects, with the emphasis on quality and throughput of work.

Other systems for compositing include digital edit suites and standard computer platforms. Layering edit suites can be effective for certain kinds of compositing, but they suffer from the inherent drawback of working in a more or less serial or linear way. It is possible to go back and make changes in a linear suite, but it can be a painful and slow process. A linear suite is sequential in the way it builds up composited images.

Standard computer platforms can produce excellent results, particularly in the field of 3-D and for the actual creation of elements. Where computer-based systems tend to fall down is in the actual combination of these disparate elements. There are several reasons for this. The first and most obvious problem is the speed at which many of these systems work. Although general-purpose computer technology has made great progress in terms of quality and speed, typically they still cannot operate as fast as a dedicated system in the compositing world. Rendering takes time. And although this may be acceptable in a 3-D environment, for the majority of broadcast compositing purposes, real-time operation is essential.

An additional drawback of using general-purpose systems for compositing and effects is that they are not that effective at interpreting non-computer-generated information. Their forte lies

more in the generation of pictures than in the processing of CCIR-601 broadcast-quality images.

## Cost considerations

With all that said, where do you start and how do you choose the best system for your facility? First, define exactly what you want to do. Compositing systems have a wide range of uses including wire removal for film work, graphics generation and even digital effects. Each of these capabilities can be an art in itself and easily overwhelm



**Complex images can be seamlessly composited with a variety of systems available today.**

personnel and budget.

Second, set a budget and see what is available. Prices for desktop systems start around \$10,000 and can easily double once software, storage and memory requirements are met. Mid-range systems are going to be in the \$50,000-\$100,000 range and also may require additional storage and memory. High-end systems and real-time dedicated boxes can easily extend up into the half-million dollar range. The hardware cost, however, is only the beginning. Other costs include technical personnel, networking and storage/back-up, as well as operations personnel.

Starting with technical personnel, many systems are not plug-and-play. Your engineers may be familiar with the PC/Mac platforms and may be able to make these lower-end systems work, but at what cost?

Mid-range and some higher-end computer-based systems are much closer to plug-and-play, but typically require someone familiar with UNIX to get them up and running.

The high-end dedicated boxes are usually plug-and-play, and for the most part, can be easily set up by video engineers, but at that price, it is expected.

In any case, connecting one of these systems to a network typically requires some level of computer expertise, as does setting up the network in the first place. In most cases, some investment will be required in technicians with computer expertise.

Finally, without a serious investment in creative artists, the systems will never be used to their full potential. Here is where the choices become even more difficult. Once you have made a serious commitment to one or more artists, how much time are you willing to allow them to sit around waiting for the system to render?

A considerable amount of rendering can be accomplished overnight, but what about those last-minute changes that have to be done today? Choosing graphics systems often boils down to trade-offs between cost and speed. How much speed can you afford vs. how long can you wait?

Digital systems have certainly changed how we work and have allowed us to explore new avenues. On the other side of the coin, as the technology has advanced, so too have the demands for even more sophisticated effects. In the end, the most cost-effective system is the one that does what you need today and tomorrow, in the least amount of time for the least amount of money, and time is money. ■

*Jeff Mazur is director of graphic systems, on-air promotion, ABC, Los Angeles.*

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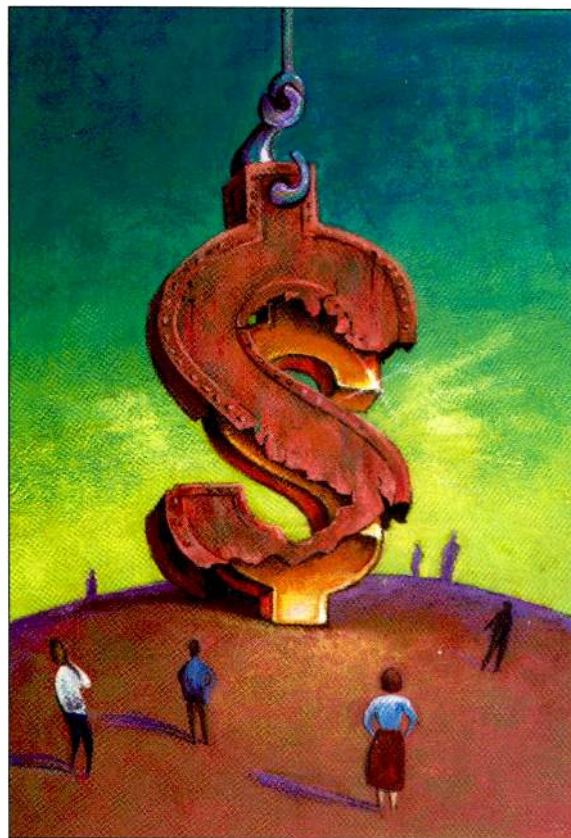
**Have you talked to Tektronix?**

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# New \$\$\$ opportunities with ATV

**Though ATV is years away, new technologies allow broadcasters to explore revenue opportunities today.**  
**By Charles Waltner**



#### **THE BOTTOM LINE:**

TV broadcasters face a new environment, but it's one not purely defined by technologies. Changes in programming content and the shifting habits of consumers will affect broadcasters' future as much as any new technology. An understanding of the difference between the *content* and *service* elements of the broadcast business will be a key to future success, as will renewed emphasis on local programming. \$

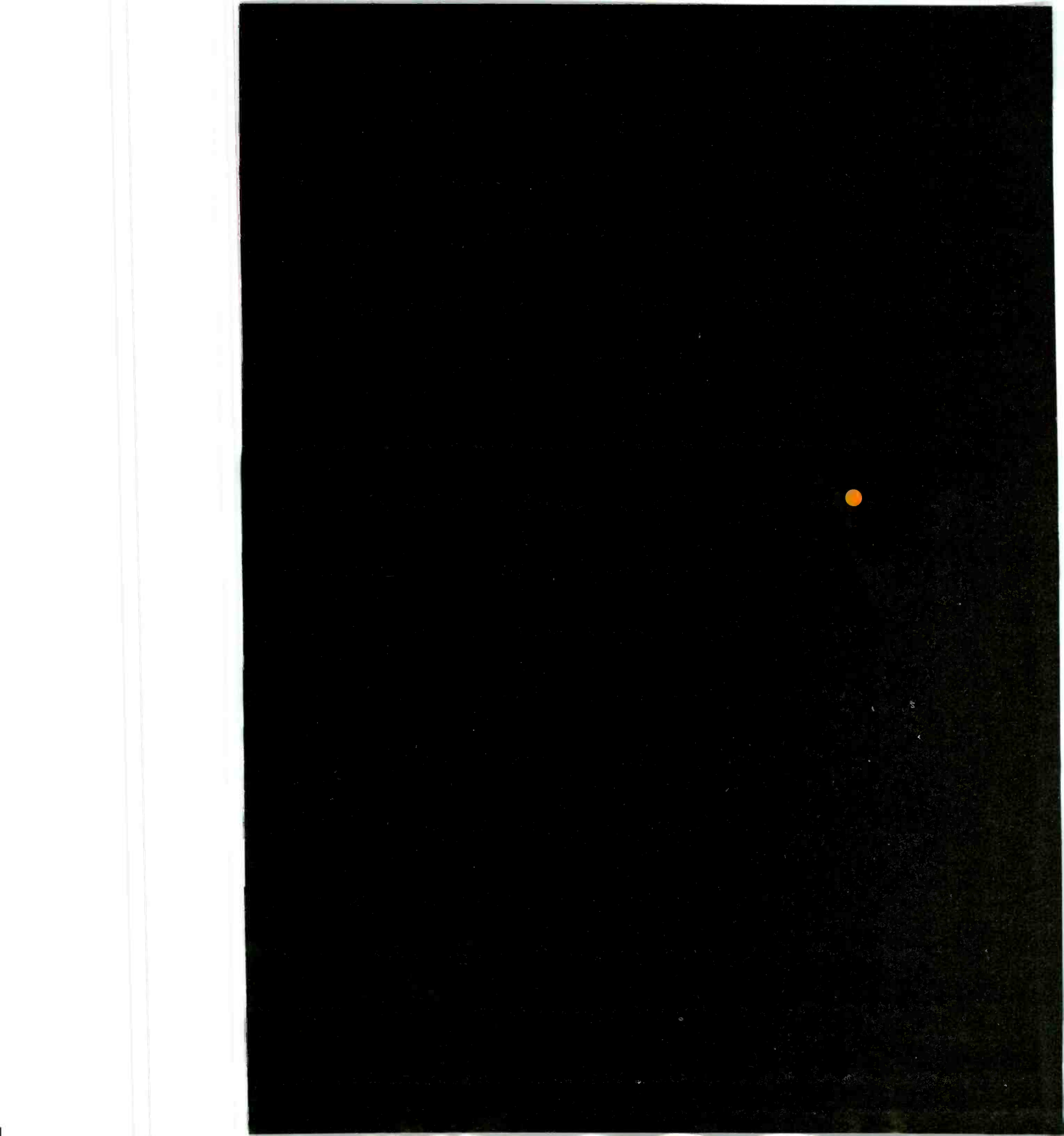
**T**he horizon for the debut of Advanced Television (ATV) is receding rapidly. Widespread implementation of digital broadcasting now looks more than 10 years away. The once fervently anticipated technology has become a nagging worry for broadcasters. The equipment to transmit digital signals (both SDTV and HDTV) will cost each station several million dollars, even if prices drop dramatically. As yet, there is no clear economic advantage for broadcasters to adopt ATV except one — survival.

Broadcasters realize they must make the transition to a digital TV signal or be left in the dust of their electronic revolution rivals. Yet, broadcasters have dramatically ratcheted back their expectations of ATV. Highly publicized failures, such as Time Warner's Orlando interactive TV trial and reassessment of data broadcasting options, have left them humbled. As time has gone on, broadcasters have scaled back plans for implementing such interactive marvels as video-on-demand, multiplayer gaming and automated shopping services. The technology is just not there, nor



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## First Compressions Count



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# New \$\$\$ opportunities with ATV

will it be for many years to come.

Also, executives are now concluding that applications of ATV, which move broadcasters outside their area of expertise, will prove foolhardy. Data broadcasting via auxiliary channels created by digital television, for example, which just a few years ago was the talk of the industry, has now lost favor. Broadcasters realize that they have little expertise in delivering such products as stock quotes, paging or other similar information — and competition for such services is already fierce.

With this sobering knowledge, the most that many broadcasters hope for from ATV is to stay competitive with other industries, such as cable operators and direct broadcast satellites.

According to a recent report on digital television by Forrester Research of Cambridge, MA, digital television will not begin to establish a market foothold until after the turn of the century. According to Emily Green, a senior analyst at Forrester, any revenue from ATV is five to 10 years away.

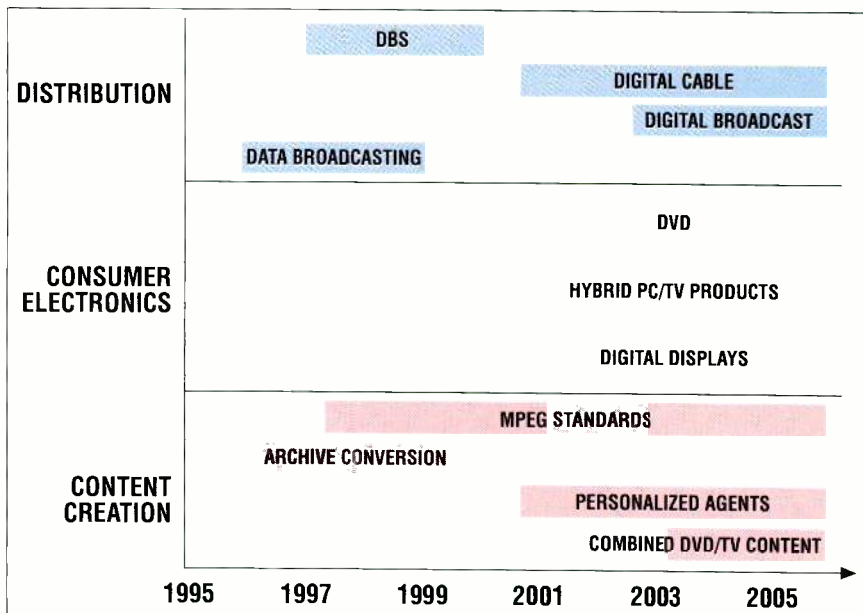


Figure 1. As ATV develops, other digital television and related services will also come on-line.

## Content is key

But there is hope. Forrester, as well as other industry experts, encourage broadcasters to work with emerging hybrid PC/TV technology to learn about creating interactive content. The good ideas for creating revenue from exciting interactive programming will come out of these explorations.

Indeed, most broadcasters see pro-

gramming as the most viable way they can improve their bottom line. If they can attract viewers, then they can get more money for advertising on their programs.

Certainly, broadcasters are adept at creating entertainment and news programming. Affiliate stations, in particular, are well-suited to deliver local information, a strategy also being adopted by their cable counterparts to battle the DBS "Death Star." Digital broadcast satellite, which now has a technological leg up on cable and broadcasters, is intrinsically limited to providing national or international programming. It is unable to provide breaking local coverage of news in a particular market, for example.

In particular, interactive experts encourage broadcasters to learn how they can provide community-related information via cross-over technologies. Already, many stations are experimenting with the Internet by providing updates of local news, sports, weather, and more specifically, fishing reports, high-school football scores, and coverage of elections for city, county and state officials.

## Internet practice

Unfortunately, most of the efforts by local broadcasters on the Internet have been lackluster. The broadcasters are partly to blame for not committing the

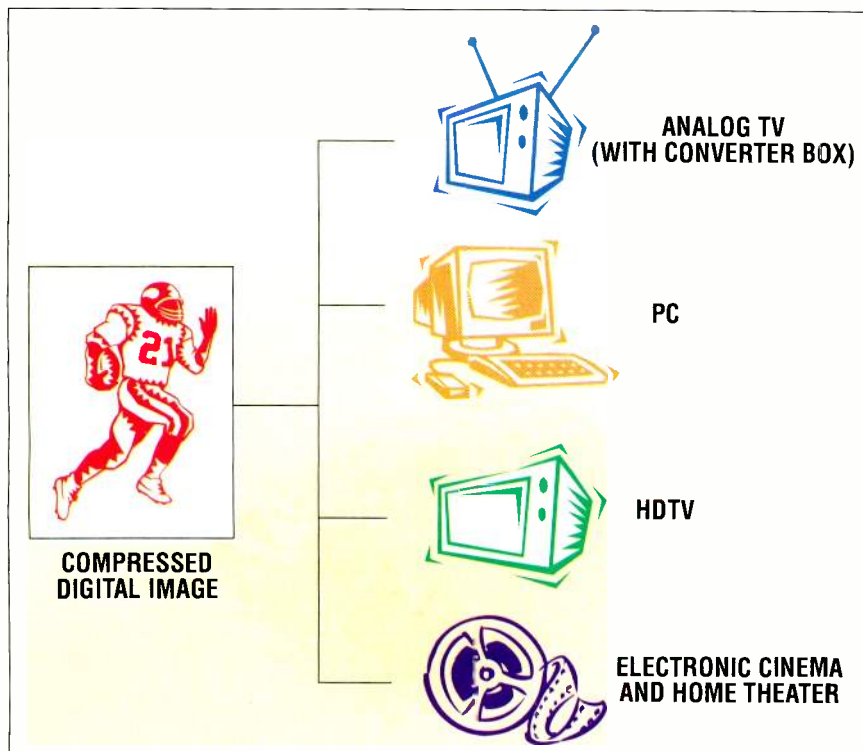


Figure 2. Unlike the analog past, the "convertibility" of digital signals allows them to serve various end-user formats simultaneously.



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# New \$\$\$ opportunities with ATV

time, energy, resources and management to developing such Internet-based projects. But, they have also been limited by the technology and available information. Broadly based use of the Internet is a phenomenon that's just more than two years old, so precious little is known about the medium, as yet.

Technology and knowledge of the Internet are rapidly changing, however, and now there are more than enough tools and resources to create interactive content that provides information in ways traditional TV broadcasting could never achieve.

For example, consider the work of Paragon Cable in Portland, OR. Although it is a cable operator, its use of

the Internet applies equally well to over-the-air broadcasters. Jeff Henry, vice president of marketing for Paragon Cable (a Time Warner system), has gone far beyond "brochureware," the derogatory term for the passive — and boring — practice that companies have of slapping up static text-based infor-

ETV is an application that customers download, which is updated periodically with a new database of programming. Consumers can search by titles, times, topics or any other possible criterion.

Besides providing a unique value-added service, Henry also views ETV as a

Applications of ATV that move broadcasters outside their area of expertise will prove foolhardy.

mation, such as press releases, dry company descriptions or lists of personnel on the World Wide Web.

In one of the most innovative uses of the web by a cable company, this summer Paragon launched Electronic Television (ETV), an interactive program guide created by TV Host magazine.

potential profit center. He is currently testing pricing strategies and expects to charge 99 cents to \$1.99 a month for the service. The initial download of the application will be free.

Paragon also has plans to set up a service that will allow customers to directly access their cable account information by using a customer PIN number. From Paragon's web site ([www.paragonpdx.com](http://www.paragonpdx.com)), Henry is also running contests to increase visitor traffic and offering discounts on Internet access to expand Paragon's repertoire of telecommunications services. Contrary to many reports about the Internet, Paragon is actually able to sell its services via the revolutionary medium.

### VBI offers baby ATV

Broadcasters have other opportunities to test the digital TV waters and devise new ways to appeal to viewers and advertisers. Several companies are making use of the vertical blanking interval (VBI) in the current TV signal to embed various forms of information. For all intents and purposes, these VBI technologies roughly replicate some of the programming opportunities that broadcasters will have with fully digital TV signals.

The major difference is the rate at which data can be delivered. Some equipment manufacturers for VBI data broadcasting equipment claim data delivery speeds of up to 2.3Mb/s, roughly equivalent to ISDN rates. In practice, these rates travel more slowly, but still operate several times faster than current computer modems for standard phone lines. Digital TV signals, on the other hand, will be able to deliver data at

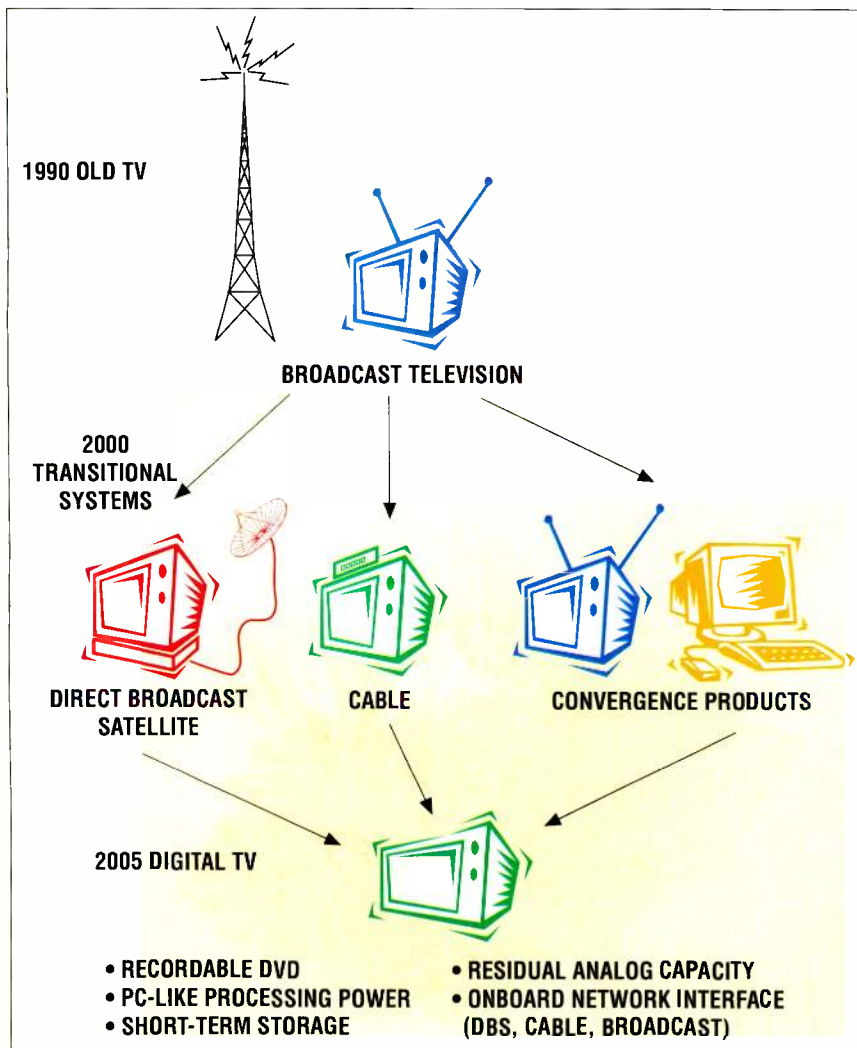


Figure 3. The divergence of systems evident in the late 1990s may reconverge in the next decade to a common, multiformat platform for digital audio, video and data signals.

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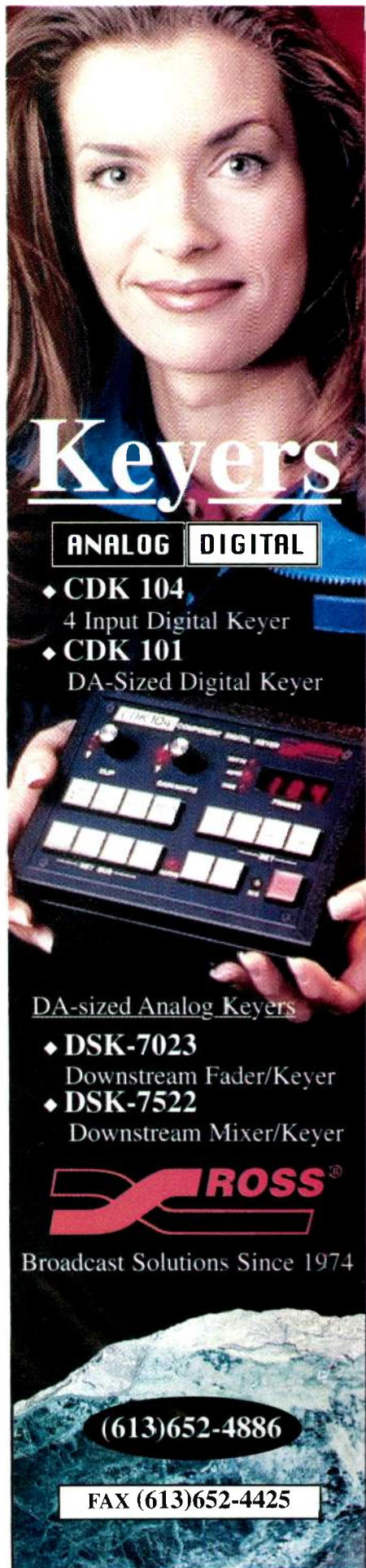


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## New \$\$\$ opportunities with ATV

3Mb/s to 4Mb/s over a 6MHz channel.

Though all parties concerned agree that VBI technology is an interim solution, it stands to be viable for many years, while digital TV takes a decade or more to gear up. Meanwhile, VBI applications are likely to increase in sophistication and interactive capability over time.

Currently, the most noteworthy application of VBI technology for broadcasters is Intercast. Created by the Intel Corporation, Intercast works by embedding HTML (*hypertext markup language*, the coding used for WWW content) in a TV signal's VBI. Consumers with computers equipped with an Intercast receiver can watch the video portion of the signal while simultaneously viewing related web pages sent by a broadcast or cable TV network. Computers equipped with modems will also be able to link from the Intercast pages to the Internet. Intercast debuted earlier this year and is now working with NBC and an assortment of cable operators. It plans to bring on local affiliates in the near future.

The most that many broadcasters hope for from ATV is to stay competitive with other industries.

Intercast goes beyond most other applications of VBI data broadcasting because it integrates data with TV video, providing a broadcast multimedia experience. Analysts agree that Inter-cast is a clever and inexpensive means for the TV industry to learn more about delivering multimedia programming.

Beyond access issues, most executives familiar with Inter-cast feel that the success of the technology rests on the TV industry's ability to create compel-

ling multimedia content.

Most content providers are optimistic that they will make money with Inter-cast, partly because it will require few additional resources. CNN, for example, plans to use Inter-cast to drive consumers to its Internet site to create a bigger advertising audience, while QVC will provide in-depth information on its products via Inter-cast pages.

Unfortunately, most efforts by local broadcasters on the Internet have been lackluster.

Another company, En Technology, has launched a service similar to Inter-cast that delivers digital content and TV video to computer screens. Technologically, its approach is slightly different than Inter-cast, but provides similar grounds for experimentation.

Also, such products as Gateway 2000 hybrid computer/television with a 31-inch screen and modem link are perfect products for delivery of programming created for Inter-cast or En Technology. Many similar hybrid platforms are in the works.

Broadcasters have many opportunities to test new forms of programming, but the question remains: Will any of these efforts lead to ways to create greater revenues for broadcasters? That's difficult to predict. Will they help broadcasters survive another few decades? Absolutely. ■

*Charles Waltner is a Seattle-based writer on new media technologies.*

*Author's note: Thanks to Forrester Research, Cambridge, MA, for information used in this article and its illustrations.*

**READER  
FEEDBACK**

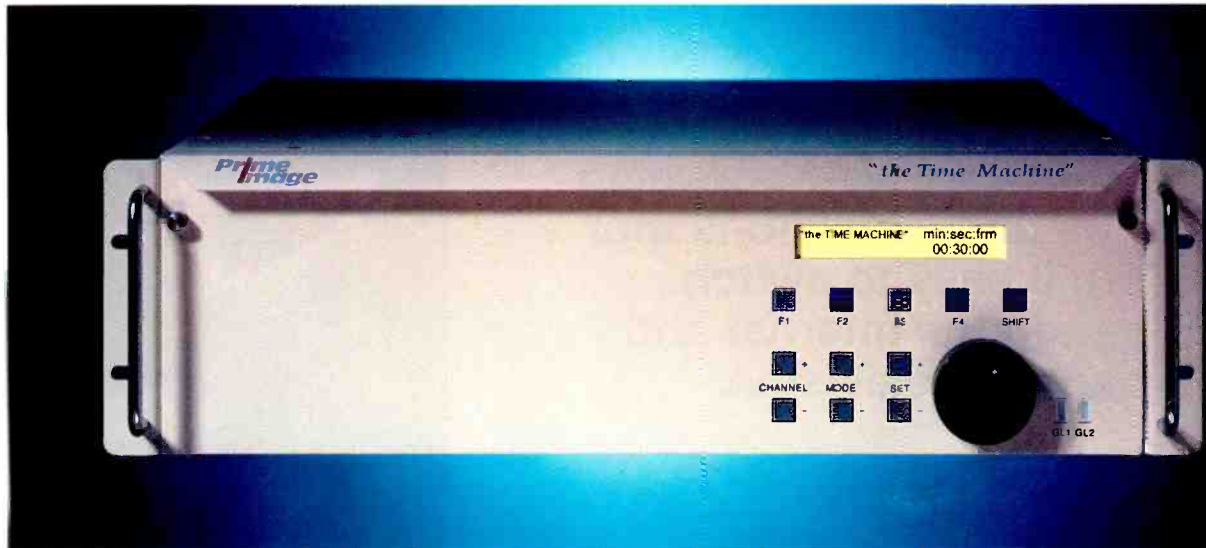
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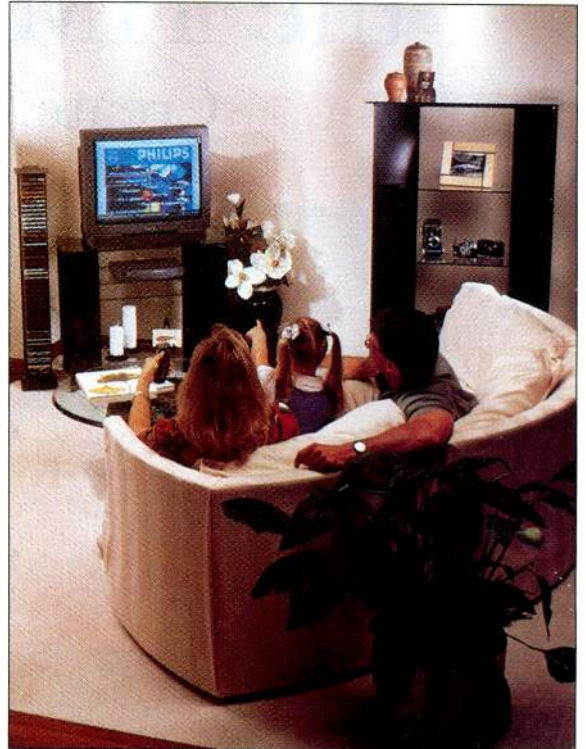
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# BROADCAST 2000

## *The web is coming to your TV, Part 1*

**The race is on for dollars from web-browsing boxes and televisions that make it easy to switch between the Internet and broadcast television.**

By Marjorie Costello



Introduced so the public could watch broadcast signals, the TV set has gone on to become the display device of choice for the VCR, cable box, videodisc player, video game and satellite receiver. Today, in the age of convergence and the Internet, the television is taking on a new role. Consumer electronics and computer companies are coming up with new boxes, televisions and TV/PC hybrids that they hope will move web browsing to the living room.

Today, the race is on to transform the conventional television into the friendly face for some new sites, previously only available on a computer display courtesy of the World Wide Web. These Internet TV boxes, web-browsing televisions, PC/TVs and Internet appliances will be competing for the public's attention and dollars, as well as for screen time on the television. However, since many of these

**Above photo: The Philips WebTV box makes it possible for consumers to cruise the web with two items commonly found in homes: a TV set and a phone line.**

new devices make it relatively easy to switch between the Internet and broadcast television, they should also provide some new marketing and sales opportunities for broadcasters.

### **Wraps come off Internet TV boxes**

This two-part article will discuss the TV-related stand-alone boxes, PC/TVs and Internet appliances that are available or expected from major consumer electronics and video game and computer companies. We will also take a look at some new alliances, services and technologies that are likely to accelerate the melding of on-line services and traditional TV programming.

The move is propelled by several forces, including the growing popularity of the Internet and the reality that most Americans either do not own a PC or find connecting to the web with a PC a daunting task.

In this column, we will focus on the box making the biggest splash, devel-

oped by WebTV Networks, Inc. and also review other TV-related Internet terminals and televisions with built-in browsing. Several top TV marketers, such as Sony and Philips, are moving these new Internet boxes to the top of their marketing plans, hoping for a web Christmas.

One reason behind the move is that the expected hot product for the upcoming holiday selling season, DVD, has been delayed. DVD's copy protection and regional coding issues were not resolved in time for a fall 1996 national rollout. Another factor is that these devices finally let consumer electronics companies break out of their slim-margin hardware businesses and share in service (or software) revenues.

### **WebTV debuts**

Starting at the end of September, WebTV boxes from Philips and Sony were available across the United States. Developed by Silicon Valley start-up WebTV Networks, Inc., the WebTV

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As part of the search process, DiscBrowser users can actually view video clips at their desk, then "mark" the clips for later use. The system automatically creates a reel list from the selected material,

including descriptions and durations of the clips, and a "rough edit" order.

For an engineer, editor or producer, DiscBrowser eliminates the need to physically search the vaults for any desired video footage and return with it to an edit bay for viewing. Of course, if another staff person has the material you need, somebody's project has to wait. With DiscBrowser, multiple users can access the library without disturbing its contents.

The base system consists of a single terminal with MPEG encoding/decoding and application software, and a 500 disc CD-R autochanger. But for multi-user and/or large video library

facilities, DiscBrowser can be expanded to include up to 40 retrieval terminals, system and network server, a library terminal, and multiple autochangers. MPEG files of compressed video are transferred onto discs, with each video clip tagged with relevant, text-based identifiers. All tag entries are then saved into a database and transferred to the network server.

Without question, DiscBrowser is by far the most versatile and efficient video storage, access and review system to be found in the industry today.

If you're interested in learning more about DiscBrowser, please give us a call.

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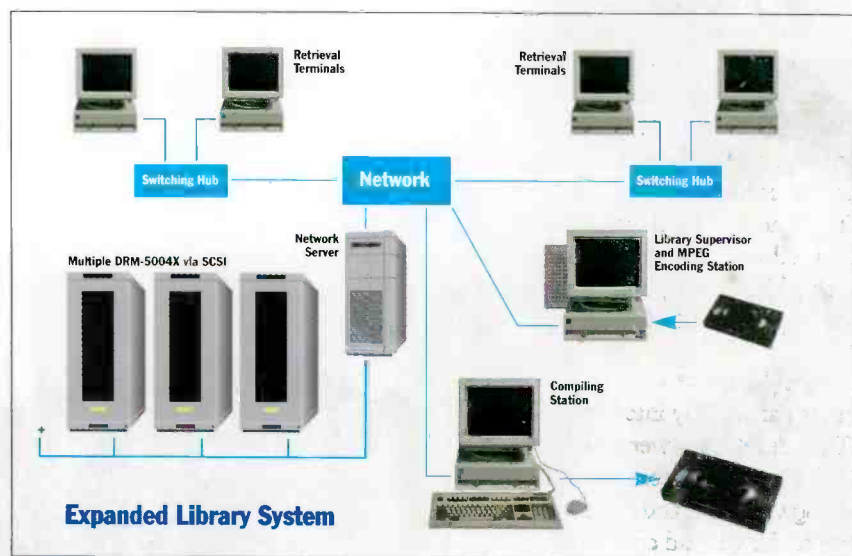
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box makes it possible for consumers to cruise the web with two items commonly found in homes: a TV set and a phone line. Formed by three Apple Computer alumni, WebTV, based in Palo Alto, CA, set out to develop a low-cost box that could display crisp, high-resolution, flicker-free web pages on a conventional television. Based on what we have seen of WebTV and other TV-related web-browsing devices, as of now, WebTV's approach offers the best display of web pages currently available on a television.

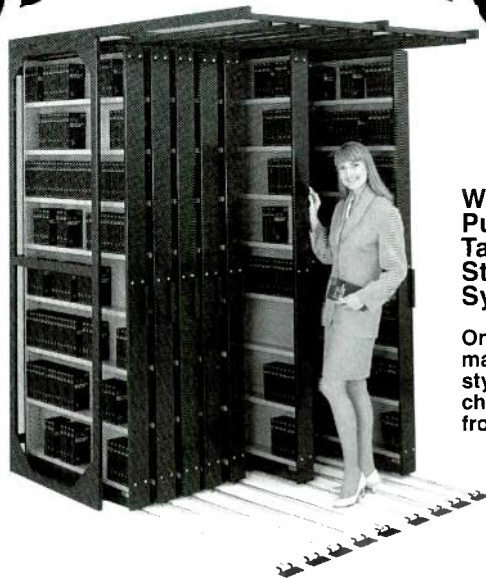
While at Apple, WebTV's CEO Steve Perlman was part of the team that developed the first color Mac, and he later went on to co-found Catapult Entertainment, which sells a modem for on-line video game playing. His WebTV co-founders include Bruce Leak, who created QuickTime multimedia software and QuickDraw, and Phil Goldman, the developer of Multifinder, the heart of the Mac operating system. Originally funded by Microsoft co-founder Paul Allen and other venture capitalists, WebTV has been quietly developing the technology since June 1995. The company officially announced the technology in June 1996, and demonstrated the first boxes publicly this past July.

As the first boxes arrived at retail stores from Philips and Sony, WebTV added some other big-name investors, including Microsoft, Citicorp and Times Mirror. Also signaling the software giant's support, as well as its interest in supporting non-PC platforms, Microsoft formed a strategic relationship with WebTV. The two will collaborate to develop technologies and standards for delivering high-quality Internet browsing for display on televisions.

### Back to TV basics

What is particularly interesting is that WebTV's developers went back to the original TV specs to come up with the technology. Perlman and company tackled one of the CE and computer industry's major challenges: Converting a computer signal into a quality video picture and designing a system that is easy to use. Central to WebTV's technology foundation are sophisticated image enhancement techniques that enable all types of televisions to display

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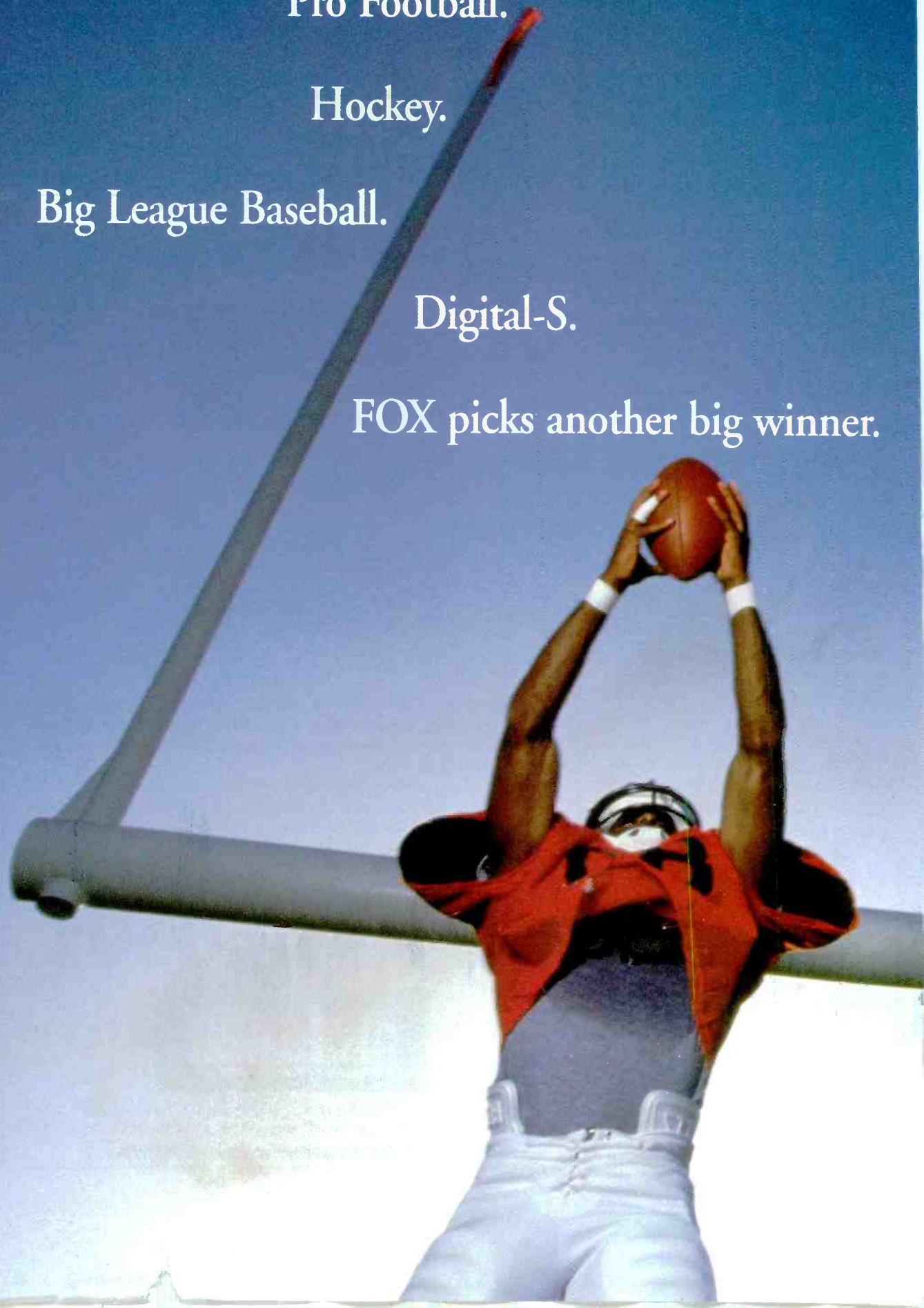
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FOX picks another big winner.





Fox has a history of picking winners. And, when it came to selecting a primary format for their in-house recording and post-production, they knew they had to select another star performer. So, for their

new 24-hour cable service, FOX NEWS Channel, they chose JVC's Digital-S. And the reasons are clear.

**PICTURE QUALITY.** Fox found the picture quality of Digital-S to be superior, even through multi-generation editing. Better than any analog system, better than any 4:1:1 digital system — it even rivals the quality of the most expensive 4:2:2 digital systems.

**AFFORDABLE PRICE.** Linking up to big time winners like Digital-S usually costs a lot of money. So Fox was pleasantly surprised when they learned how reasonably priced it was. Nowhere else can you find such exceptional picture quality and affordability. And, that's always a winning combination.

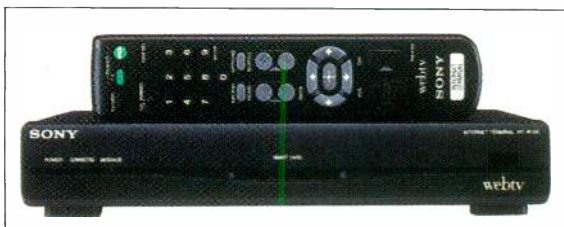


**AMAZING FLEXIBILITY.** Producers everywhere, prefer equipment that enhances their creativity. The same is true at Fox. The 4:2:2 digital signal processing of Digital-S is extremely flexible, and delivers the kinds of layering effects and keying that producers demand.

After considering all of the alternatives, only Digital-S satisfied Fox's most stringent requirements, making it the obvious choice. And, the affordability puts it in a class of its own. To learn why Digital-S should be your editing format of choice, visit our Internet web site at [www.jvc.ca](http://www.jvc.ca) or call 1-800-JVC-5825 and mention **Product Code 183 0**.



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Sony is moving the new Internet boxes to the top of its marketing plans.

web pages with unprecedented quality.

To develop its patent-pending technologies, WebTV's founders went back to the NTSC design guidelines from the '40s. According to Perlman, the design uses digital image processors to generate the signal that an ideal camera would produce to simulate a perfect picture. Describing the specifications of the WebTV reference design, licensed by companies like Sony and Philips to build their WebTV boxes, Perlman says his company was aiming for D-1 quality.

The reference design claims D-1 class, 4:2:2 video output or digital studio quality. The box features S-video output and RF output with an optional adapter, as well as NTSC, PAL and SECAM support. As a result, it is easy to connect the box to any television's A/V or RF inputs.

### Inside the box

The computing engine for the WebTV reference design is a 112MHz 64-bit MIPS RISC CPU, which Perlman claims outperforms the MIPS processor incorporated in the new Nintendo 64 game system. Another standard feature is a 33.6kb/s modem, enhanced with WebTV's patent pending Lineshare technology, allowing incoming calls while the box is used on a call-waiting-equipped line.

On the sound end, WebTV — through its processor and digital signal processing — provides CD-audio quality and MIDI compatibility without a sound card. The system can synthesize more than 200 music instruments, as well as special effects, and tunes from a music library.

### The browser and controls

In addition to the reference design, WebTV developed a browser that is compatible with HTTP, MIME, HTML and virtually all Netscape 3.0 and Microsoft Explorer 3.0 extensions.

that pops up by pressing a button on the remote and simplifies entering repetitive information.

The browsing box supports an infrared wireless keyboard; has a jack for a standard, wired computer keyboard; and includes an expansion port for peripherals, such as a cable or ISDN modem and printer.

### The network

WebTV Networks, Inc. also operates the WebTV Network, the on-line service that consumers are required to subscribe to in order to use the WebTV



Philips is gearing its set-top box toward the 40 million families waiting for easier access to the web.

box. As part of its on-line service, WebTV is simplifying other tasks. Consumers are not required to choose an Internet service provider (ISP). WebTV automatically selects the best ISP with a local access number and makes the connection.

To also make the Internet easier to navigate, WebTV has developed an Internet directory, previewing more than 1,000 of some of the best sites on the web. WebTV Network is also aggregating — or pre-selecting — content for consumers in other ways, including localized information for 50 metropolitan areas. WebTV offers E-mail, with five addresses available per box. A customized version of the Excite Search service has been created for WebTV, which also includes parental control options.

A significant component of WebTV's alliances with TV brands is the plan to share revenues generated by monthly service fees, advertising,

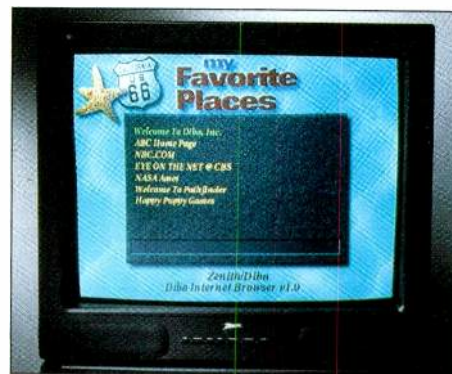
transactions and premium services. To make on-line transactions possible — as the system goes forward — the WebTV box includes an ISO smart card slot that supports ISO-compliant Visa, MasterCard, cash card and ATM smart cards.

### Web browsing like channel surfing

The box and the service are designed so the typical consumer can attach the box to a television and a phone line, register with the WebTV Network and begin exploring the Internet — all within 15 minutes. The company charges a flat \$19.95 monthly for unlimited Internet access and E-mail.

WebTV's CEO Steve Perlman calls his company's approach to the Internet, "A genuinely affordable, easy-to-use product that leverages the TV set and the telephone line found in virtually every household." The product is positioned as Internet access for the masses, making web browsing as easy as channel surfing.

Perlman's view is echoed by CE executives from the companies first out of the box with WebTV boxes, built under licenses from WebTV. According to Philips senior vice president, Ed Volkwein, the set-top box is geared toward "the 40 million families waiting for easier access to the web." Volkwein says his company has conducted research indicating that while the public was aware of the Internet, "the cost of computers is prohibitive to many Americans." At Sony, the enthusiasm for WebTV is similar, with James Bonan, vice president for new business development saying, "Con-



Zenith, using technology developed by Diba, Inc., will be selling several televisions with built-in web browsing by the end of this year.



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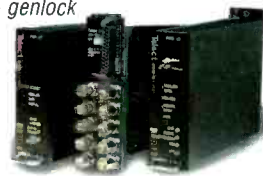
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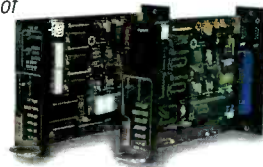
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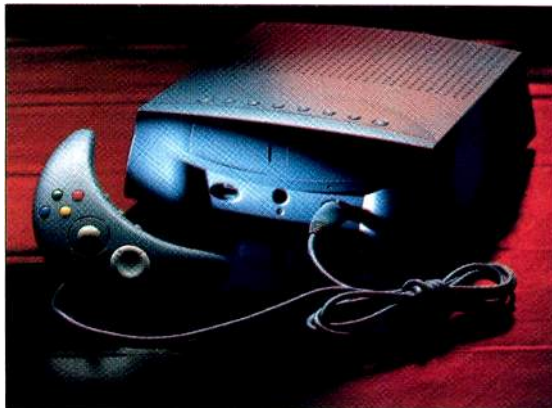
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sumers are about to experience the first TV-based Internet device designed for the mass audience."

### The Philips and Sony WebTV boxes

Philips decided to launch a new co-branding strategy with its WebTV entry, with the Internet-browsing box the first of several Philips digital products expected to carry the "Philips Magnavox" label. The Philips Magnavox WebTV is priced at \$329, while Sony is selling its WebTV Internet Terminal, model INT-W100, for \$349. The Sony version includes a book about the Internet and is smaller than the Philips Magnavox model. Both companies are building their WebTV boxes in the United States.

To take advantage of WebTV's E-mail capability — sure to be one of the service's major appeals — consumers will probably want to use a separate dedicated keyboard. Philips and Sony are selling accessory wireless WebTV keyboards in the \$60 to \$100 range. Because there is a port designed to accept peripherals, including a print-



The Cyber/CD by Bandai combines a web browser with a CD-ROM player.

er, Philips and Sony will offer this add-on in late 1996 or early 1997.

### Future plans

We are likely to be hearing more about WebTV in the future, since Sony and Philips have also signaled plans to incorporate WebTV's reference design in televisions and VCRs — and even DSS. And WebTV is talking with other brands about licensing its technology since neither Sony nor Philips has an exclusive on the product.

### Bandai, Sega and CD-I browsing

Bandai introduced its Pippin @World device this fall for \$599. Bandai, famous for the Power Rangers action toys, licensed Apple's Pippin technology, which uses a MacPowerPC as its engine. Called a Cyber/CD by Bandai, the product combines a web browser with a CD-ROM player. While focusing on the consumer market, Bandai is also marketing Pippin @World to business and industry for training and corporate communications applications.

Sega, to keep Sony PlayStation and Nintendo 64 from selling rings around

Saturn, launched its Net Link modem and browser peripheral at the end of October. This extra for the \$199 Saturn 32-bit game system also lists for \$199.

Philips is also marketing Web-i, designed to connect to a TV set and work with the company's CD-i player. Web-i includes a modem, proprietary software, a custom browser and is code written to convert graphics and text on-the-fly for NTSC TV display. Web-i is available either as an upgrade for a CD-i player (that

already includes a digital video cartridge) at \$250 or at \$750 for a complete package, including a player. A \$50 optional keyboard is also available. Web-i is being sold by Philips Media Systems, which markets and supports CD-i in the business, educational and entertainment markets.

### Zenith, Mitsubishi and others go web

Zenith will be selling several televisions with built-in web browsing by the end of this year. The company is using technology developed by Diba, Inc., based in Belmont, CA. Diba, in another example of the convergence of the PC and CE industries, was founded by an Oracle veteran and recently added the former president of Zenith, Albin Moschner, as vice chairman. Diba's web browser is also incorporated in a television that will be sold by Samsung this Christmas — but only in Korea. Samsung will likely export the web-browsing television to the United States next year.

Mitsubishi has announced that it will be selling its DiamondWeb televisions with built-in web browsing by next

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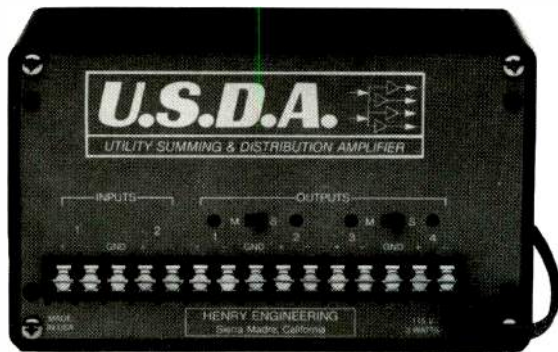


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summer in the United States. Sharp and Sanyo, among others, could also be marketing televisions with built-in web browsing here in the future.

As we went to press, Thomsom (RCA) said that it would sell a set-top web-browsing box, based on Oracle's Network Computer (NC) design, in spring 1997.

### Viewcall calling on CE brands

Indicating the business opportunities beckoning from offering web browsing on televisions, another company — not as well-known as the others — went public this past fall with its plans and business strategy. Viewcall America, located in the Atlanta area, announced that its On-TV Internet service would be the preferred Internet service and content provider used by the firm's Norcross neighbor, Mitsubishi, for DiamondWeb.



Viewcall's goal is to bundle its on-line service On-TV with all Internet televisions, Internet set-top boxes, Internet appliances and network computers targeted at the consumer market.

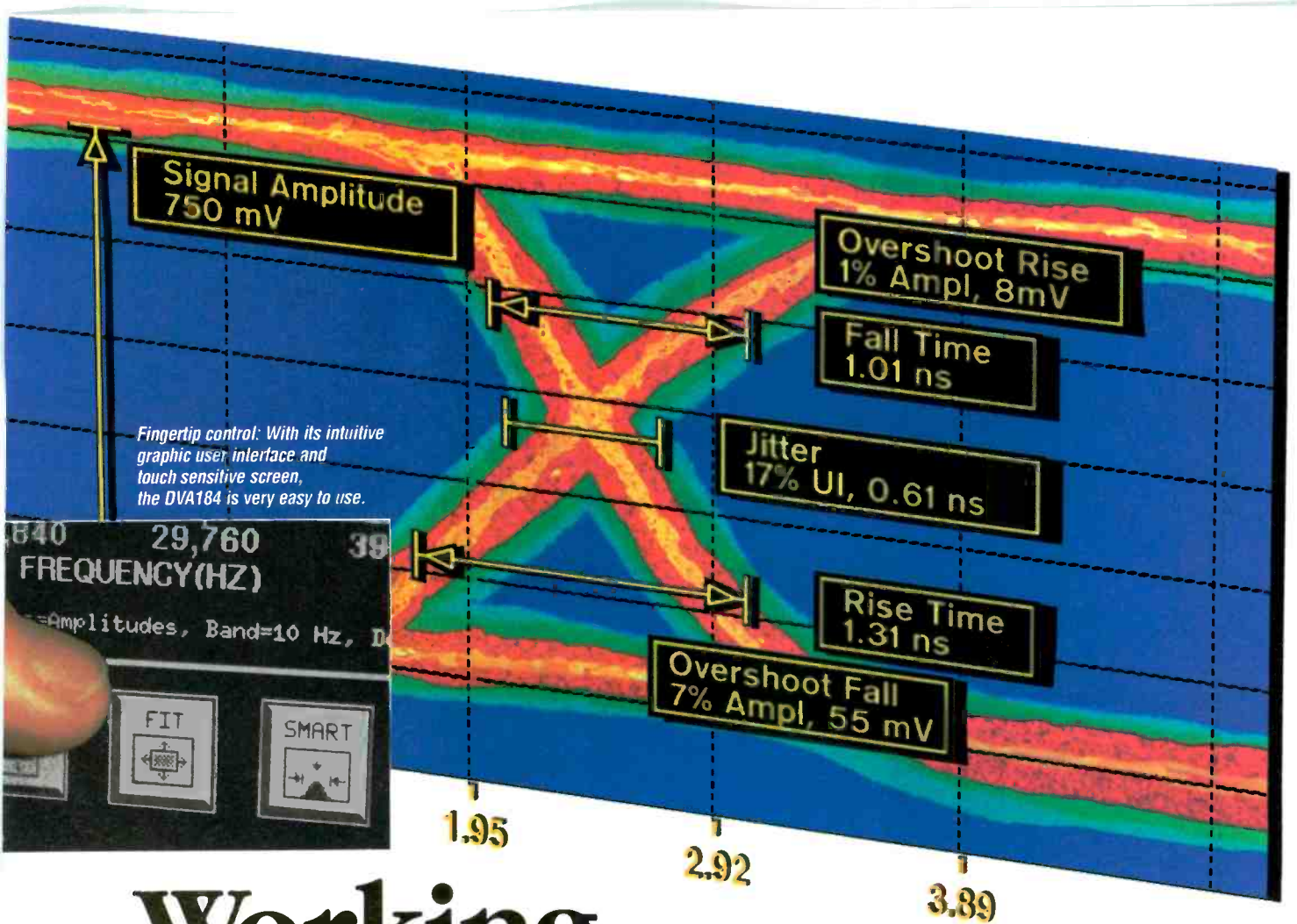
In some ways, On-TV is similar to the WebTV Network, the service that is required for use by boxes built under license from WebTV Networks, Inc. Both on-line services aggregate content, provide connection to the Internet and support E-mail. However, according to Viewcall, On-TV is an open system and provides access from multiple platforms. Viewcall's goal is to bundle On-TV with all Internet televisions, Internet set-top boxes, Internet appliances and Network Computers targeted at the consumer market.

Viewcall is also offering two other technologies that are available for licensing, although the company views On-TV as its primary business. They include Viewcall's WEBster TV-centric browser and set-top box reference design, which incorporates an ARM 7500 processor. However, Viewcall's On-TV partners are not required to license the Viewcall box or browser. Hardware companies that bundle On-TV with their hardware as the Internet service can participate in service revenues.

### We jump back on the web again

Next month, I'll bring you up to date on other devices and technologies that expand the web's presence on the home screen.

Marjorie Costello is a broadcast and video industry consultant and Broadcast Engineering contributing editor based in New York. Respond via E-mail: [MACostello@aol.com](mailto:MACostello@aol.com).



Fingertip control: With its intuitive graphic user interface and touch sensitive screen, the DVA184 is very easy to use.

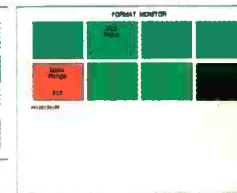
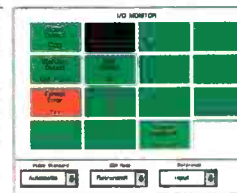
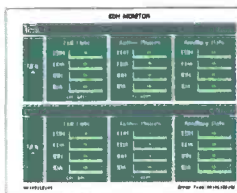
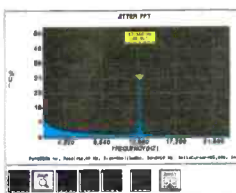
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# SPECIAL REPORT: Betacam SX

By Steve Epstein, technical editor



**A**ttendees at NAB '96 were among the first to see the new Betacam SX from Sony. Many were impressed, among them were the *Broadcast Engineering* Pick Hits judges, who awarded the DNW-A50 digital video hybrid recorder a Pick Hit. I recently had the opportunity to see the new equipment close-up and hands on.

Like much of the new tape equipment, these decks offer users more than just a new tape format; they offer a new way of getting work done. In the case of Betacam SX, the decks also offer backward compatibility to an existing analog format, Betacam (SP).

## The basics

The Betacam SX machines take advantage of much of the technology developed for Digital Betacam. However, while Digital Betacam uses a 2:1 bit-rate reduction, Betacam SX has a more aggressive 10:1 compression ratio using the 4:2:2 Profile. The 4:2:2 Profile used in

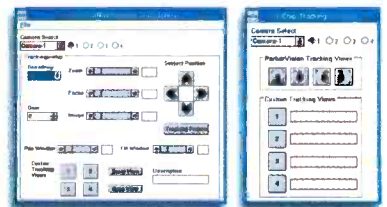
**Above photo:** The DLE-110 line editor provides GUI-based non-linear editing when used with the Betacam SX hybrid recorders.

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# Special Report: Betacam SX

Betacam SX is a part of the MPEG-2 4:2:2 Profile at Main Level. The same compression algorithm is used throughout the SX product line so there is no fear of having your video turn to mud due to different algorithms. Digital component video (8-bit) is recorded and 507 lines of active video are compressed. VBI information is preserved. Along with video, four channels of uncompressed 16-bit/48kHz audio and time code (LTC and VITC) can be recorded. The video compression results in longer record times, thereby making the low-cost metal particle tapes even more cost-effective. Small cassettes can record up to 60 minutes, with large cassettes providing up to 184 minutes of recording time.

Betacam SX studio decks have the added feature of built-in hard drives. Recordings can be made on either tape or disk and from tape to disk or disk to tape. Two 4GB drives offer 40 minutes of record time (DNW-A45). For increased storage time, two 9GB drives offer 90 minutes (DNW-A50/A100). An external SCSI connection provides for additional storage (of up to six hours) on external drives (from Sony). To make the disk (and tape) recordings reasonably efficient, the video data rate is held to 18Mb/s. However, internal bandwidth is much wider, and transfer from tape to disk and back can be done four times faster than real time (DNW-A100).

## Beyond the basics

The 18Mb/s data rate is an important design crite-

ria within the format. It is low enough to allow real-time transmission over a variety of existing paths including analog microwave. Using the Sony DSM-T1/R1 digital satellite modulator/demodulator, two 18Mb/s signals can be sent in real time, or one signal can be transmitted at 2x real time. Using Sony Digital Data Interface (SDDI), signals can be transmitted at 4x real time between Betacam SX recorders and SX-

compatible A/V servers.

The Betacam SX family of products includes studio decks, several camcorders, a dockable VTR, portable field editor and a digital satellite demodulator and modulator. The studio decks have internal editing capabilities and in addition, studio editors will be available soon.

Although the system is primarily designed for the fast-paced news envi-

ronment, it can serve a variety of production and on-air functions, as well. Because it is backward compatible to Betacam, aging Betacam decks can be replaced with little or no loss of functionality. The new SX decks are not capable of dynamic tracking playback from tape, but they can playback noiseless video from SX tape at jog or variable speeds or from disk at speeds other than play speed. The venerable BVW-75 protocol has been expanded for these new decks to provide access to the additional capabilities of the disk drives.

With Betacam SX, Sony is hoping to provide broadcasters and video professionals with a clear upgrade path from their current equipment to a future that is likely to include widespread networks and video servers. In many ways, the DNW-A100 hybrid recorder is an ideal bridge. Tapes can be played from the deck directly into a server. The deck provides the transport, control and conversion required to do this in an automated and cost-effective fashion.

## Non-linear editing on tape?

Well, not really. Non-linear editing *with* tape is probably more accurate. Tape equipment, despite its rugged reliability, has taken a beating



The DNW-7 camcorder has the ability to record "good shot" markers and record start markers, which can be used to streamline the editing process when used with the DNE-50 portable editor.



The DNE-50 provides both on-line and off-line capabilities. The unit combines a docking station with a notebook PC. A 3.5-inch magneto-optical disk drive can record 40 minutes of compressed off-line-quality video and audio material.



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## Special Report: Betacam SX

the past few years at the hands of non-linear desktop proponents. Many of the blows have centered on the high cost of maintaining tape machines.

A good deal of the cost is parts and labor for head replacement and transport alignment. In the DNW series, head prices are significantly lower, because the decks have no DT heads. Head replacement time is reduced as many of the adjustments required after a head replacement have been eliminated through the use of Sony's Automatic Alignment System. The automatic system minimizes the need for time-consuming manual equalization and servo system adjustments.

In a stand-alone mode, the decks are capable of non-linear playback from disk and editing direct from tape to disk. Editing from tape to disk can be done in manual and automated batch modes. The batch mode can be set up from the deck's front panel or simpli-

fied through the use of the DLE-110 Live Editor. The editor is a desktop computer that offers a GUI-based editing environment, much like many of today's non-linear systems. However, thumbnails, rather than actual video, are all that go through the system. This reduces the demands on the editor and does not subject the video to additional compression because of editor bandwidth constraints. The DNE-50 portable editor is based on an IBM laptop, and offers much of the same capability in a compact package that can be easily taken on the road.

### Moving toward the future

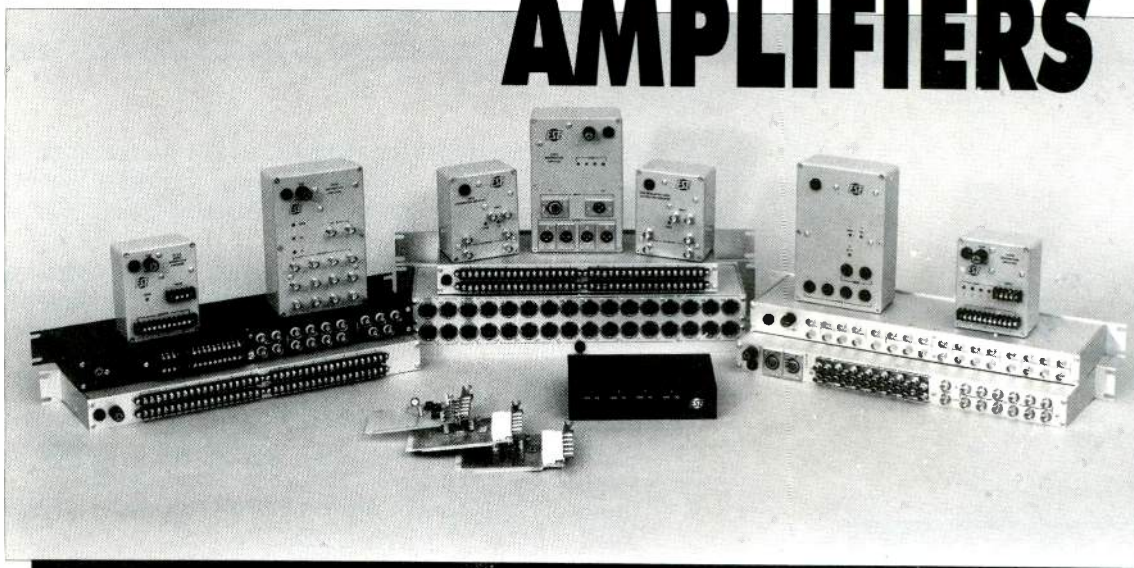
Many stations are faced with moving their news and production operations to digital. For example, CNN/SI recently purchased 29 of the DNW-A50 hybrid recorders for use in a joint venture with Time Warner. Plans call for the facility to use all-digital server technology fed by the hybrid VTRs. One of the factors that led to the decision was the positive experience

CNN had during the national political conventions with Betacam SX camcorders and studio decks. WPIX, New York, purchased the first DSM-T1/R1 digital satellite modulator/demodulator for use in its SNG truck.

The transition to digital is a slow process that will take years, not days. As this migration unfolds, it's sometimes difficult to identify long-range equipment goals while you're in the midst of rapidly changing technology. Professional broadcast equipment is costly and stations must use every piece of gear to its fullest potential. Because of this, most equipment purchases need to be made in the context of existing equipment and future needs. Technology that offers a bridge between the two is sometimes easier to swallow than systems that call for radical change. ■

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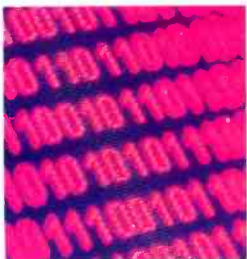
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## Auxiliary power systems

**M**aintaining continuous power to broadcast equipment has changed significantly over the past few years. Previously, the primary intent was simply to install a system that would return the station to the air in a reasonably prompt fashion. It was assumed the station would be off the air for a short period upon power failure. The acceptable period ranged from seconds in major markets to a few minutes in smaller markets. Not so any more.

### Brownouts and blackouts

In recent years, we have seen the dreaded specter of "brownouts." This is a condition where the line

standby power facility, leave it alone until the problems have passed. It will probably be good for the generator, will avoid multiple switches between systems and will certainly provide a more professional appearance to the viewers.

### Design considerations

The design of a modern standby power facility far exceeds the scope of this article. It should be undertaken with the counsel of an experienced electrical contractor and the station's consulting engineer. All of the major standby power facility manufacturers have detailed literature to aid in selecting and setting up a system. However, there are some areas common to all such systems that the station staff should keep in mind.

Simple generators are no longer adequate for a modern broadcast facility. Stations are now overloaded with small insect-looking devices called microprocessors. Most of the daily routine is monitored and controlled by these devices. Their job descriptions range from such mundane tasks as calling up a compact disc to massive editing systems.

Although these systems vary over an enormous range, they share one common thread: they dislike having their operating voltages haphazardly removed. At a minimum, programming and data can be lost. In the worst case, some of the devices will roll over and stick their little legs up in the air in a semiconductor version of death.

All such devices should be protected by UPS systems. The modern UPS varies from a simple battery-powered back-up providing some minutes of operation, to more complex systems that will monitor an entire network. The more complex systems will issue the appropriate instructions to the equipment to shut everything down in a controlled fashion prior to running out of power. It is best to work with the manufacturers of the systems you wish to protect. They will be most knowledgeable concerning the type of protection their systems need. For something simpler, such as a PC used for word processing or basic bookkeeping, a small system that allows the operator a few minutes to save active files and then shut down



Generators large enough to operate a transmitter facility have significant space, cooling and fuel requirements. According to Mike Batten (pictured), this 12-cylinder Caterpillar can produce 600kW.

voltage is reduced due to system overload. This can cause transmitters to overheat — or worse. Blowers slow down, pumps reduce coolant flow and operating voltages exceed allowable variations. The solution is to cease operation on the normal mains and switch to standby power systems until normal voltage levels are maintained on the lines. Note the word *maintained*. One common mistake in standby power systems is a rush to return to the main provider.

During brownouts or storms, power often fails several times. Normal power is restored for a few minutes only to fail again until either the storm situation is over or the demand on the power provider is reduced. Once the station is running happily on the



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the system is probably adequate.

UPS systems are fine for the studio, but really don't help much at the transmitter. There, bigger and more manly systems are needed (insert barking sounds). Standby generators vary from a couple of kilowatts up to systems as large as 500kW where large TV transmitters are concerned. However, there are some common concerns for all.

One major concern is the fuel. Small facilities can use gasoline. It is readily available and operation of gasoline engines is familiar to all. The biggest drawback is the explosive nature of vapors. If a gasoline-powered facility is selected, locate it in a well-ventilated enclosure of its own, outside of the transmitter building. The fuel supply, as is the case for all systems, should be sufficient for at least twice the longest anticipated failure time. In addition, make arrangements with the fuel supplier to refill the tank if even longer failures occur. Before installing a gasoline or any standby power system, check with the local building authorities concerning applicable codes and regulations.

The most common option is diesel fuel. It is not prone to explosions and is relatively stable when stored for long periods if properly treated. Keep all fuel tanks full to avoid condensation. In addition,

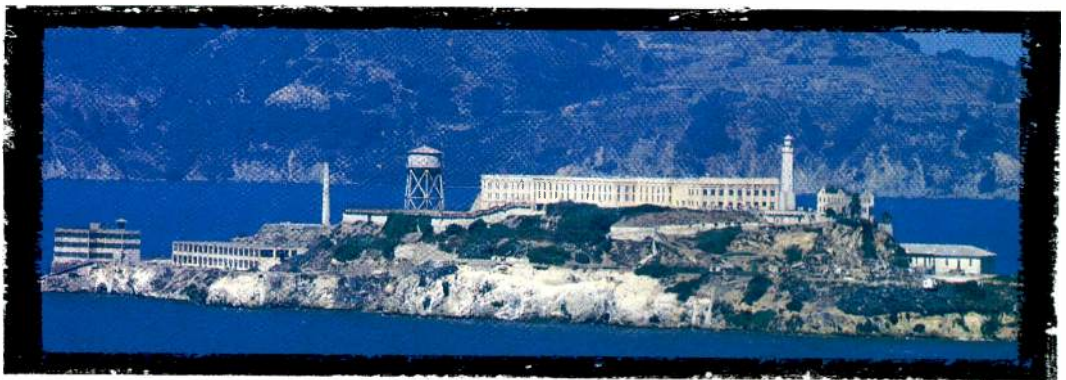
diesel fuel needs to be treated regularly to avoid the buildup of bacteria. Yes, some strange critters live in diesel fuel, and they will quickly plug up the fuel filters if not eliminated. Modern diesel engines are much easier to start than in years past as long as quality battery systems are maintained. It is also advisable to keep diesels reasonably warm in cold climates. Nothing is more useless than a standby power facility that won't start.

### Change-over systems

The change-over panel is the heart of all standby power generators. This contains the logic to determine when switching is needed, the actual switches and, often, some of the monitoring of the generator. The control system should be adjustable to establish the minimum voltage at which the load will remain on the primary power source. This should apply to each phase voltage in multiphase systems. When it is determined that the primary system has failed in part or totally, the generator should start automatically.

Systems are available that will accept the load almost immediately. As unbelievable as it sounds, major systems can switch the load in less than one cycle after failure is sensed. Those systems have engines running all of the time and really do not apply

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to most broadcast usage.

Most broadcasters are content with a system that will accept the load in a few seconds. However, the manner in which the load is switched should be discussed with the transmitter manufacturer. It is not advisable to use a system that can introduce major transients into the power supply for klystrons or similar devices. In many cases, it may be advisable to remove all voltage for a short time and then completely start the system back up. Some transfer panels provide a "park" position to allow everything to stop before power is reapplied.

If your system contains synchronous motors of any type, the above type of switch becomes even more necessary. Severe mechanical transients can damage these motors if power is switched randomly. Fortunately, that doesn't apply to most broadcast facilities.

Once standby power has been applied, the system can be restarted either automatically or by the duty operator. It helps if the staff has remembered to replace those little batteries in the remote-control system. Otherwise, everything will have returned to the "idiot" phase. Remember, there is a little period when nothing has electricity — including the remote control.

Once the system is operating on the standby facility,

take your time in returning to the main power source. Most controllers have a timer that allows this to be done automatically, but manual return may be advisable for most broadcast stations. That way, the program interruption can be controlled or even left until the end of the normal broadcast day. In any case, don't switch back to the mains until they have been normal and stable for at least 30 minutes. Remember, the generator probably needs a good workout anyway.

Following return to the main power source, let the engine run for some time without any load. This allows the system to cool down in a reasonable fashion. If it is shut off immediately after removing the load, a great deal of heat is captured inside the engine with no cooling ability. This can cause some really serious damage to occur on big diesels.

Finally, remember to test the system regularly. The engine should be started and allowed to come up to normal operating temperature at least once a month. Although most standby facilities can be expected to rust away before they have a chance to wear out, the coolant quality, fuel quality and batteries must be checked regularly to ensure the system will work when needed. ■

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

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## SBE and ATSC working toward ATV

**T**he SBE Industry Relations Committee is responsible for maintaining ties with other broadcast organizations and related industries. These organizations range from the National Association of Broadcasters to the Society of Motion Picture and Television Engineers.

The SBE is participating in the Advanced Television Systems Committee (ATSC). ATSC is developing standards for advanced TV systems. This committee is expanding its efforts to coordinate TV standards among different media focusing on digital television, interactive systems and broadband multimedia communications.

### ATSC activities

ATSC's activities are performed by two technology groups and an Implementation Subcommittee. The Technology Group on Distribution develops and recommends national technical standards for distributing TV programs using ATV technology. These technologies may be improvements to current systems or new systems that are compatible or incompatible with current technologies. All forms of distribution are considered, including terrestrial broadcasting, cable systems, direct satellite broadcasting and prerecorded media.

The Technology Group on Production develops and recommends national standards for production of TV programs using ATV technology. The Implementation Subcommittee currently occupies most of the SBE's attention. This subcommittee is investigating and reporting on the requirements for implementing ATV. It is evaluating technical requirements, operational impacts, preferred operating methods, time frames and the costs of bringing ATV to life. Following the evaluation, the subcommittee will identify requirements for standards, recommended practices and rules necessary for a successful ATV system.

### The Implementation Subcommittee

The Implementation Subcommittee is divided into four subgroups. The Production and Post-Production Subgroup is studying origination issues, production switching, recording, post-production and graphics. The Distribution and Program Integration Subgroup is

considering internal distribution, backhaul, ENG, external distribution, commercial integration, program release and server technology. Station reception, distribution, transmission and digital to the home are the concerns of the Station Issues Subgroup. The final subgroup is the Cable, MMDS, DBS, Consumer and Other Subgroup. This group considers alternate distribution technologies and in-home items.

SBE representatives are involved in the Distribution and Program Integration Subgroup and the Station Issues Subgroup. They are providing input on methods, costs, standards development, machine control, interfaces, captioning, data broadcasting, return channels, performance measurement and monitoring.

The subcommittee has prepared the ATV implementation to identify the items and services that are impacted by the implementation of ATV. As this system is refined, details will be added and the scope expanded.

The subcommittee will then highlight missing pieces in the system and identify points where additional standards need to be developed. Manufacturers and vendors will be encouraged to develop the "missing devices." Existing standards bodies will be encouraged to address the interface issues as they are revealed.

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As daily participants in the TV wars, many SBE members are qualified to determine the best way to structure an operating station.

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### Daily participants

As daily participants in the TV wars, many SBE members are qualified to determine the best way to structure an operating station. Much work must be done for the industry to be ready for the future. If you or your employer can pay travel expenses, contact SBE headquarters to volunteer for the subcommittee. If you can't travel, monitor subcommittee activities on the SBE web site and bulletin board. Broadcast engineers know how to make things work and keep them working. By cooperating with other industry segments, we can successfully transition our business to the future. To discuss these activities, call me at (703) 739-5474 or send E-mail to [abutler@pbs.org](mailto:abutler@pbs.org). ■

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*Andy Butler is communications systems engineer for the Public Broadcasting Service, Alexandria, VA.*





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# SEAMLESS DIGITAL VIDEO INTEGRATION IN AN ANALOG WORLD



**D**eveloping and establishing maintenance and test programs for today's multi-format, sophisticated broadcast and post production facilities are becoming tasks of enormous importance. In a world full of transition considerations, implementation nightmares and multi-format conversion compatibility concerns, moving from an analog facility to the digital domain is an engineering challenge that cannot be easily dismissed. Technology changes and obsolescence considerations add to the overall scheme, making

the job of running an effective broadcast and post production facility a true challenge. On top of all this, we are asking our engineering and operations staff to keep working at top speed — to never miss a beat — while they learn the new digital video transmission standards. The differences in testing philosophy between digital and analog systems are vast. Bridging the gap between analog and digital systems, and successfully integrating digital islands within an analog world, has been a costly and cumbersome task until now ...

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- Two serial and one analog (three wire) component inputs for monitoring signal sources in multi-format environments.
- 525 and 625 line compatibility for added flexibility.
- Waveform monitoring (both for the digital and analog inputs in the traditional Y, Cb, Cr or GBR formats simplifies testing operations and bridges the knowledge gap between the analog and digital world.
- Waveform display modes include overlay, parade and timing with full line selection capabilities for detailed signal inspection.

Sweep rates include the traditional 1V, 2V, 1H and 2H for added flexibility.

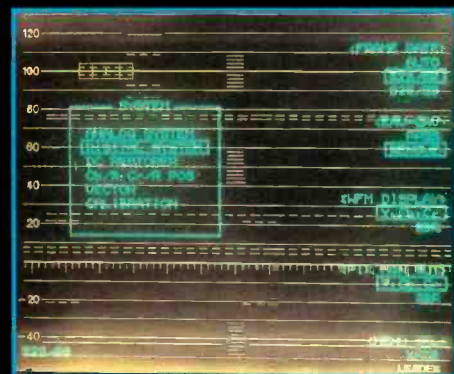
- Component vector display mode facilitates color space testing.
- EDH error code monitoring as well as monitoring of TRS, EAV, SAV, APCRC, FFCRC and ancillary data provide unsurpassed digital video testing abilities.
- User selectable alarms facilitate automated warnings in the event of digital video signal failure.
- A monochrome picture display is available on the CRT for quick program material identification. A three wire component monitor output is also available facilitating a connection to an external monitor. A strobe is available on both pictures when using the unit on line select mode to assist in the identification of the line(s) being tested.
- Detailed digital video signal analysis can be performed using a hex readout of the 4716 data points for a selected line.
- Stereo-audio monitoring with electronic graticule permits audio monitoring and testing.
- A comprehensive set of cursors facilitate easy and error-free waveform readings.



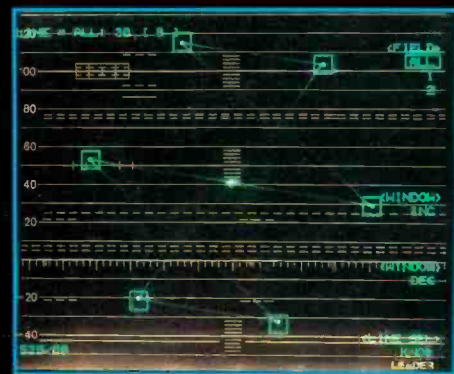
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## Tally Display system

**L**ee Iacocca said it right a few years ago: You either lead, follow or get out of the way. It's a lesson that TV stations all over the country have learned in an era of unprecedented competition for viewers inside and outside the industry.

When A. H. Belo bought KIRO-TV, in Seattle, it took a major leadership position in the market. The station ended its 36-year-old network affiliation with CBS, joining the emerging UPN Network, and moving the station into a major hard-nosed local news format. This bold marketing move, totally changed the station's approach to TV technology.

### Changing needs in source identification

In the network days, 50% of all programming and

promos came from the network. Today, the station produces almost nine hours of live local news and 50% of all promos. To support these demands, a second, all-

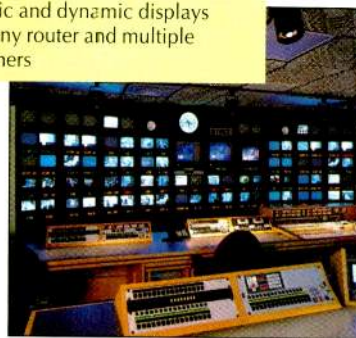
digital control room was added to back up and eventually replace the analog suite.

The news editing staff has also grown significantly.

We've added two mobile units and two editing bays. All this support is needed to produce the 60 to 70 spots a week, which is in addition to the regular news production. To say the least, our facility is

### Performance at a glance

- Intelligent display system
- Tri-color display LEDs
- Available in multiple sizes and configurations
- PC-programmable
- Animation features available
- Available in static and dynamic displays
- Interfaces with any router and multiple production switchers



production-intensive.

With that background, it became obvious that an intelligent display system would be an important element in any rebuild. Directors and TDs now have to cope with identifying source materials on 75 nine-inch monitors mounted in 10 racks in the control room.

Most of those monitors stay active because of the high number of live feeds from field reporters, helicopters, satellite feeds, edited tapes and file tape and materials. We're also always monitoring produced and in-production video from the marketing department.

One key element with the monitors is that their sources change throughout the day. The early morning news, for example, is primarily edited news stories and live feeds from field reporters and helicopters. At 7 a.m., a different morning show format begins, along with a new technical director. The transition between shows must go smoothly and without confusion on anyone's part. This is where the Tally Display system begins to show its value.

*Continued on page 116*

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## MPEG and T-1 for remote weather reporting

In the Sacramento market, many people like to head to Lake Tahoe (100 miles away) for their recreation — the gaming tables, headliner shows, summer water sports and winter skiing. But at certain times of the year, the weather at Lake Tahoe (6,000-foot altitude) can be a lot different than in Sacramento (30-foot altitude). The logical question many people ask when thinking about a trip over the Sierras to Lake Tahoe is, “What’s the weather like up there?”

True, you can always call the Department of Transportation for a recorded message on road conditions, but that doesn’t tell you what the weather is like when you arrive at the lake, since the message could be many hours old. At KCRA-TV, Channel 3 and KQCA, Channel 58 in Sacramento, our management decided that we could offer a service to our viewers by providing real-time video of the lake area together with current

weather data at vari-

ous head-ends via T-1 circuits and uses a multipoint distribution system from FutureTel, our needs were less ambitious. Fortunately, FutureTel also has a point-to-point system called MPEGTHERE, which is more closely suited to our application. In fact, we don’t even use all the capabilities of the system. Although the FutureTel system is designed to handle video and audio synchronization, we don’t use any audio.

### System configuration

Ours is a real-time, straight-through, video-only system using a remote camera together with the MPEG encoder and T-1 interface at a Lake Tahoe site and with the decoder located at our downtown Sacramento studios. An MCI T-1 circuit carries the MPEG-encoded video between the two locations. At the studio, a Stellar decoder converts the signal back into NTSC. We also use a Chyron Infini! to superimpose weather data over the decoded video so our viewers can see what weather

and temperatures are forecast for the next 24 hours.

The Tahoe picture is broadcast several times daily on our two stations, both in the weather segments of our newscasts and in bumper shots going into commercial breaks.

Video quality of the MPEG-encoded and decoded picture is quite satisfactory for the kind of static, wide shots we use most of the time.

### Camera location and remote control

One of the first questions was where to locate the remote camera and the

encoder. We decided on Harvey’s Resort Hotel and Casino in the South Lake Tahoe area, just over the state line in Nevada. (Harvey’s management has been enthusiastic about this project from the beginning.) From the roof of Harvey’s, our camera has an unobstructed view of the lake and much of the surrounding Sierra Nevada mountain area. We can point the camera in almost any

### Performance at a glance

- Use of T-1 offers location independence and line bidirectionality
- Compact
- Minimum cost
- Ease of use
- Simple installation

ous times during the day and evening. Our former DE Jerry Agresti (now with WCPX, Orlando, FL), was responsible for implementing the system.

### A cost-effective solution

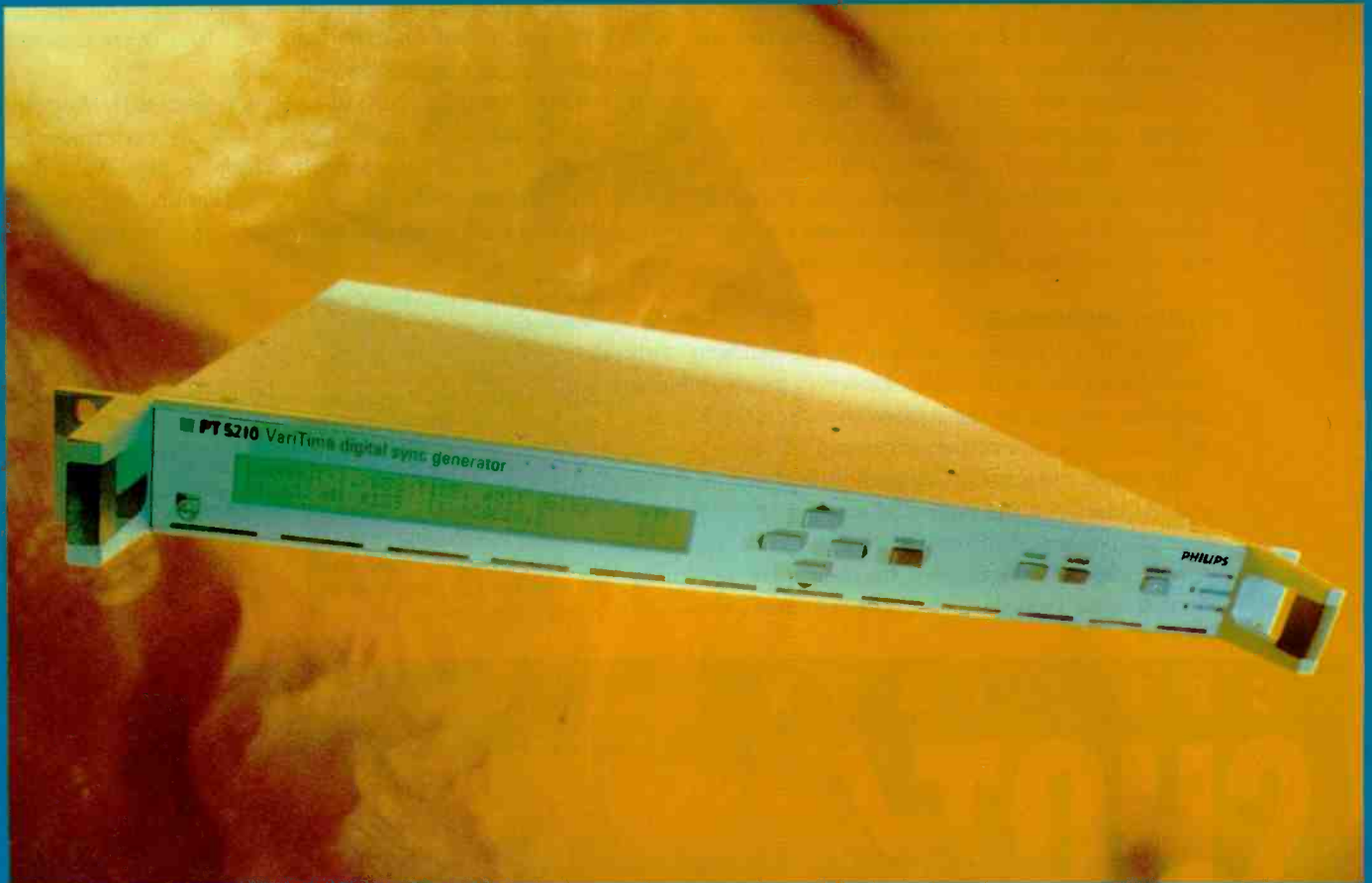
The question then was, “How do we do this without spending a fortune?” The answer wasn’t too hard to find. We knew we could transmit MPEG-encoded video over T-1 phone lines efficiently and provide video of more than adequate quality. As an NBC affiliate, we were also aware that the San Francisco affiliate KRON-TV, was already providing a news feed several times daily over T-1 lines to a number of Bay Area cable systems. (See “TV Station Builds Cable News Network,” *Broadcast Engineering*, April 1995.)

Unlike the KRON system, which feeds five cable





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## field report

direction by using a Troll Technology "ConTroll" system, which uses a dial-up phone line between Sacramento and Lake Tahoe.

The reason we opted for the separate dial-up line was simply a matter of time. Since T-1 lines are bidirectional, we might have used that circuit for camera control, too. However, in our hurry to get the system on-air, we chose — at least for the time being — to use the dial-up. Opening up the T-1 circuit to insert control data and return telemetry is still something to be investigated.

Of course, this was not our first experience with remote, unmanned cameras. We have several similar cameras positioned on towers and buildings in Sacramento and Stockton, 50 miles south. However, these cameras, which are used for traffic and weather reporting, use microwave transmission links.

### System performance

About the only start-up difficulties we had were with the T-1 interface at the studio. However, this was minor and was resolved by the cooperative efforts of Future-Tel's customer service personnel and MCI.

The entire installation requires little space at either end. At Harvey's, the FutureTel encoder and T-1 interface are contained in one PC that runs the encoding software. Besides the camera, the only other equipment needed is the Troll slave unit. The system requires even

less space at the studio. The Stellar decoder in a mounted rack shelf is comparable in size to a consumer tabletop VCR, with a one-rack-unit T-1 interface mounted just above. The master touchscreen ConTroll unit is located in our ENG/SNG control room.

The system requires a minimum of human attention. A telephone technician at Harvey's can be called on to take a look at the system if necessary. Our main concern, based on experience with our other remote cameras, is keeping the lens clean.

Our system has been in operation since early August 1995, and we're quite pleased with its performance. Better yet, audience reaction has been positive. We're the only stations in the Sacramento market that are providing this kind of service and viewers appreciate it. ■

*Martin Main is director of engineering for KCRA-TV, in Sacramento, CA.*

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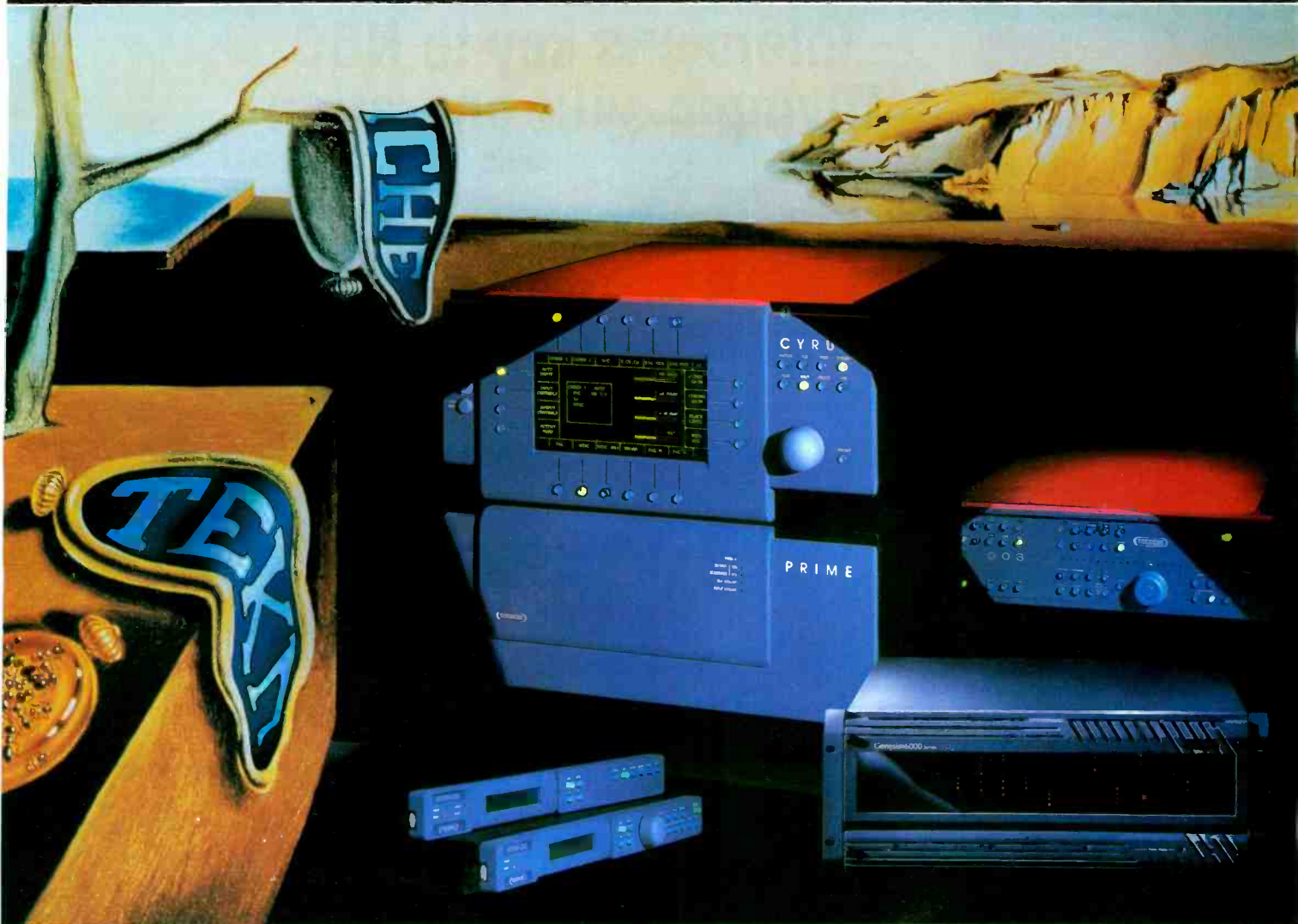
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## Intercoms key to NBC Olympic split operation

The 1996 Olympics in Atlanta have come and gone, and with them one of the most ambitious broadcast operations ever undertaken was judged a success.

NBC, the U.S. broadcast rightsholder for the Olympics, chose to provide approximately 200 hours of coverage by operating its Olympics control facility in two separate locations,

more than 600 miles apart. This was undertaken as a way of making the best use of the existing facilities in New York and making the best long-term use of new facilities. The split operation was made possible by a number of factors. Affordable high-capacity audio/video and data links between Atlanta and New York,

eliminated the typical half-second delay when using satellites, and the advent of a number of control systems permitted remote operation of tape machines, routers and communications systems.

### NBC's operations center

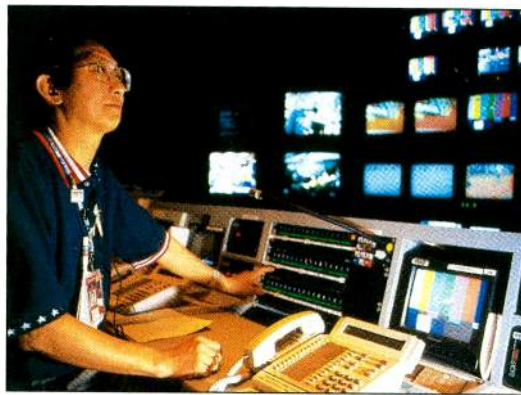
NBC built its Broadcast Operations Center (BOC) in the Georgia World Congress Center near downtown Atlanta to serve as the collection and distribution point for feeds from the sporting venues. The BOC in Atlanta also served as a home for two full-blown studios and control rooms and a number of edit rooms. The bulk of videotape playback of athlete features, commercials and other taped segments was not done in Atlanta. Those functions were done in a production videotape area at 30 Rockefeller Center in New York. Also at 30 Rock were graphics design and compose, as well as videotape delay and compositing for sporting events not broadcast live.

Apart from the technical challenges of routing a large number of program feeds between remote ven-

ues, Atlanta BOC and NBC New York were where the technical and operational challenges of coordinating all the production activities in real time took place. It was as if the production teams were in close proximity to one another.

This seamless operation required a versatile communications system. NBC chose to expand upon its Telex RTS Matrix Intercom System located in New York, by tying it to additional RTS matrices in Atlanta. Using T-1 data lines, more than 60 audio trunks were established between New York and Atlanta. In Atlanta, an RTS 400x400 ADAM Advanced Digital Audio Matrix intercom system was used. This system, one of the largest ADAM intercom systems installed to date, was used as the main communications system by NBC for the Olympics coverage. NBC News also in-

stalled a 64-user ADAM CS Matrix in Atlanta, which was also connected via trunking to the New York matrices. (See Figure 1.)



Willie Yau of Telex demos the RTS KP96 key panel in control room A at NBC's facility in Atlanta.



Willie Yau sets up the CSEDIT editing software for controlling and assigning of the Telex RTS 400x400 ADAM digital matrix intercom system at NBC's BOC.

remote locations. The trunking system handled allocation of the pool of 60 plus trunks and dynamically switched between users as required. At peak times during production up to 60% of the available trunks were in use.

At the various sporting venues in the Atlanta area,

T-1 circuits provided data and audio interconnection between Atlanta and New York. The trunking system allowed users of intercom key panels to not only talk to pre-assigned local key panels, but also to scroll through lists of users locally and in re-

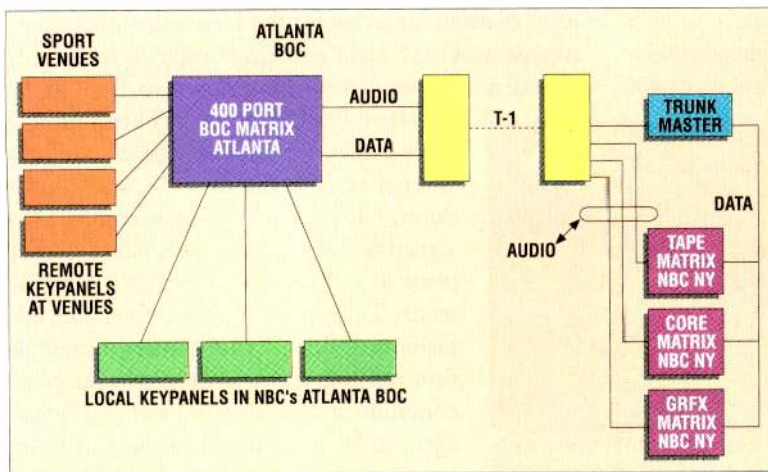


Figure 1. Users at the Atlanta BOC were connected to remote venues in and around Atlanta and trunking allowed connection to NBC in New York.

key panels were connected back to the BOC 400x400 ADAM Matrix via four-wire audio paths and modems. This setup allowed the production staffs at the sporting events full access to a universe of intercom stations in Atlanta and New York. Once connections between the remote venues and the BOC matrix were established, the intercom system automatically provided point-to-point, party-line and IFB communications, completely under the control of each individual key panel. There was no differentiation in the capabilities of the key panels at venues from those at the BOC or in New York. From a communications standpoint, the users were connected to a single intercom system.

The Atlanta matrix was also equipped with 20 RTS TIF-951 Intelligent Digital Hybrids (telephone interfaces). These TIFs could be used by local users in Atlanta to dial out on a telephone line and establish communications to areas where no key panels were located. The TIFs also permitted remote locations to dial in and participate in technical communications.

An example of the usefulness of the TIF was during taping of a segment when Bob Costas of NBC spoke with U.S. and Russian astronauts on-board the MIR space station. A TIF was used to connect the intercom system to NASA in Houston, which then connected to TAS in Moscow and then provided a radio link to the space station. Bob Costas was able to interview the astronauts from the set of the *Prime Time* studio in Atlanta.

For the closing ceremonies, a cut-

away to Sydney, the site of the Summer Games in 2000, was made and again the Australian production staff was in full contact with the NBC production staffs in Atlanta and New York.

With all the capabilities and complexities, there just had to be unforeseen situations that required on-the-fly changes. . . right? Yes, but through a number of test events in the months leading up to the opening ceremonies, most had been anticipated.

### Reliable communications

Trunking use was of concern because the time when you need the

most reliable communications is when things are the busiest.

The trunking system is in almost every way analogous to the long-distance telephone network — it provides a *limited* number of paths between matrices (local central offices). The key to a good system is having enough paths to handle 99.9% of all situations. For NBC's coverage of the Olympics, that 0.1% was judged to not be acceptable, 100% must be achieved. In the world of the telcos, they have what they refer to as "Mother's Day Syndrome" — that's when tens of

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## applied technology

millions of loyal children decide to place long-distance telephone calls simultaneously to their mothers, resulting in "I'm sorry, all circuits are busy, please try again in a half an hour." The thought of a director or executive producer encountering such a situation when trying to call the shots, cue talent or roll tape was the stuff of nightmares.

The RTS trunking system provided a means of continuously observing the trunk utilization, similar to the function of the giant lighted routing maps the telcos use at their long-distance control points. From observations of trunk usage during the test events, one potential problem stood out: if a party-line existed in New York, and 12 user stations in Atlanta wanted to be part of that party-line, 12 trunks were tied up. This situation was solved by establishing "mirrored" party-lines in Atlanta and New York and then interconnected with a single dedicated trunk. As many users as desired could connect in New York, be "full members" of the party-line being mirrored in Atlanta and not tie up a single additional trunk.

A second problem revealed itself once the Games began in Atlanta. In different parts of the country,

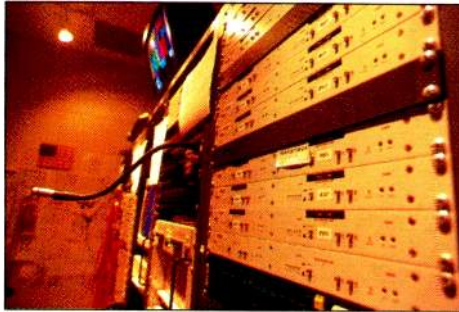
there are different terms for the same phenomenon — "rubber-necking" and "gawking" refer to traffic tie-ups when curious drivers slow down to look at an accident. The Olympics "rubber-neckers" were technical personnel at each end that wanted to hear the director, talent, producer, whoever, at the other end and assigned a listen key on their panel to that trunked source, again tying up a valuable trunk. This problem was resolved the old-fashioned way — with threats, intimidation and bribery. Users judged by the NBC communications staff and technical managers to be non-critical to the particular communications path were asked to either not listen or to listen via one of the

many mirrored party-lines. Vigilant monitoring of the trunking system kept the trunk use under control.

By the end of the Games, the split operation was judged a success; record numbers of American audiences had tuned in. Live venues around Atlanta, live studios in New York and Atlanta, taped items in New York and Atlanta and graphics in

both locations had been seamlessly integrated into 17 days of first-rate programming. ■

*Ralph Strader is product manager, Intercoms, for Telex Communications, Inc., Minneapolis.*



A Telex TIF951 dual-line phone interface with intelligence allowed users to dial in or out from any key panel to reach any phone in the world during the Olympics.



A wall of punchblocks consists of 188 units, allowing the matrix input, output and controlling data cross connecting between the Telex RTS 400x400 ADAM digital matrix intercom system and all the outside venues.

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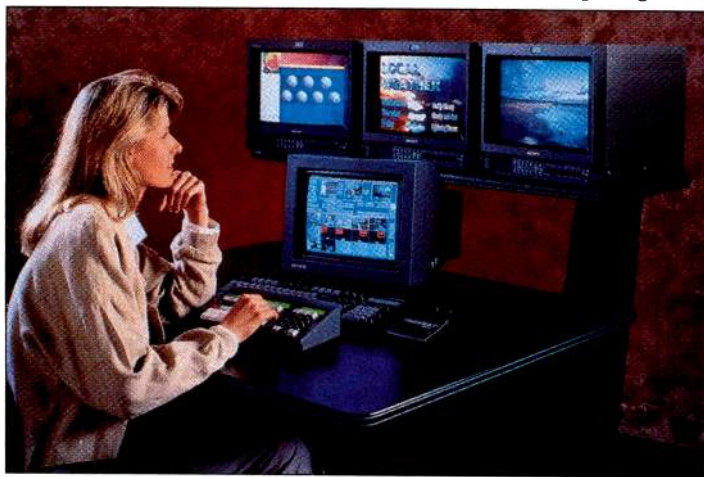
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## PC-based, open architecture, networked storage solutions

**R**ecent advances in desktop computer hardware and software are expanding the power and flexibility of managing stills and clips in a broadcast facility. This article will explore the benefits of the revolution in PC processing power, networking and database management software on the storage and use of graphics in the broadcast environment.

### Black box to hybrid solutions

In the past, broadcast equipment manufacturers developed dedicated, proprietary solutions to meet the industry need to store video stills. Dedicated "black box" systems were effective and served their purpose, but were expensive. Various system components, including



Pinnacle System's FlashFile still-store.

frame buffers, input and output circuitry, user interface, database and networking software were all developed, integrated and supported by the same manufacturer.

Although offering the advantage of an integrated, single-source product, these systems were closed-architecture solutions and suffered from several fundamental limitations. Manufacturers could perhaps excel in one area of the product, but often did not have the resources to offer state-of-the-art technology across different functional areas. Furthermore, only the hardware and software engineers who created the product could access the inner workings to modify its operation. Ultimately, the system would grow obsolete. End users had no way of improving system performance or changing the system's operation to meet individual requirements; they were virtually locked out for the life of the product.

The requirement for fast and easy image access

around different locations within the station evolved as the volume and usage grew. Where in the past, engineers, on-air operators and graphics artists were involved, now producers, directors and others within the station all want faster, easier access.

### New standard of expectation

Today, the computer industry is heavily influencing the development of still-stores and how they are used within the TV station. Low-cost, blazingly fast PC processing power is now readily available for graphics creation and storage applications. Off-the-shelf software programs for database management and networking for cataloging and sharing

stills within a station are readily accessible. Perhaps most important, the Windows operating system, which is at the core of most desktop products, has solidly penetrated the broadcast environment. Windows browse programs that provide desktop access to the library of stills and clips stored on servers have redefined how these systems present information to operators. These developments have accelerated the shift away from proprietary, closed, single-source solutions to hybrid ones where several manufacturers' products can be configured together to better meet application requirements.

### Basic requirements for live, on-air and automated operation

Superior picture quality, fast picture recall, easy building and editing of sequences, as well as library management operations, are still the essential core components of today's still- or clipstore. News, sports and special events, such as election coverage, will always dictate the necessity to provide live on-air control of still and clip playback systems. To serve this time-critical application, special shotboxes have been designed to provide operators with the fastest possible control surface to address time-critical on-air needs.

As in all areas of station operation, the increasing trend toward automation is being driven by economic pressures to reduce overhead and lower operating costs. Manufacturers have responded with collaborative solutions to meet this need by developing applica-



tion software running on the common PC platform. One example, the Newstar station automation system, controls the Pinnacle FlashFile still-store to play out a sequence of stills with preprogrammed transitions to any one of the three output channels. Any automation system with an interface to the FlashFile library system has complete database access to all of FlashFile's images, allowing midstream changes during on-air programming.

To facilitate cooperative development, Pinnacle Systems has published a serial programming interface, which is available to all manufacturers and end users, allowing station customization. Through the serial interface, clip playback control of other devices, such as the Windows-based Tektronix Profile or ASC Virtual Recorder, is provided from either the Pinnacle shotbox or graphical user interface (GUI).

### **Advanced library management**

Software products, such as Windows with its GUI and industry-accepted operational conventions, have changed basic still- and clipstore operation. Manufacturers have chosen to leverage off the heavy research and development investment made by Microsoft and others by developing Windows-based products. Often, these products are positioned around core application programs developed by the manufacturer to optimize unique hardware and software operational requirements. More advanced products offer the ability to custom configure data fields, provide advanced search routines within and between data fields, search across the network and create custom templates for easier storage. When equipment from different manufacturers needs to work together, where large amounts of data are involved or when many different operators will use the system, these features can save time, money and minimize frustration.

Special software programs designed for network applications can provide cost-effective solutions for accessing the central library from a standard PC. One example, the Windows FlashBrowse program from Pinnacle designed for the FlashFile still-store, is a customized software package that runs on a 486 or faster PC. Equipped with a minimum of 8MB of RAM and a network interface card to connect to the FlashFile network, it enables browsing of library images, performing library management activities and the creation of sequences. Another Windows-based option is the Security Administration package, which enables the assignment of different levels of secure access to images, restricting use to authorized personnel. This, coupled with the FlashFile's workspaces, provides a convenient method for organizing images in a sensible, easily customized, accessible manner.

### **Station connectivity and network architectures**

The demand for faster networking and centralized, mass redundant storage has added another layer of

complexity and power to the still-store system requirements. Similarly, performance requirements for intrastation connectivity have increased dramatically. Network speed, reliability and ease of integration have improved due to the development of affordable, off-the-shelf packages from manufacturers like Microsoft, Novell and Artisoft, which offer market-proven solutions.

Depending on the application, peer-to-peer, client/server or peer/server software configurations can be structured to meet the needs of broadcast applications to run on a variety of high-speed data servers from manufacturers like Hewlett-Packard, IBM or Compaq.

For applications where system-to-system transfer of images is limited to a few units, and recall and search speed is not critical, a peer-to-peer network should be sufficient and is the least-expensive solution. In applications where still recall time is critical or searches are performed across the entire database, a centralized client/server configuration is advised. This configuration is inherently more expensive and complex, but delivers the processing power needed. It also enables more advanced back-up routines and network monitoring activities to be performed on one centralized, optimized system.

A hybrid solution, the peer/server configuration offers the best of both solutions. It combines the flexibility of simple peer-to-peer communication with the optimized speed and database performance of a centralized server. This is accomplished by running peer-to-peer software and client/server software simultaneously. The disadvantages are increased complexity and cost.

### **Data security**

Redundant Array of Inexpensive (or Independent) Drives (RAID) can provide a first level of safety for storing on-line data. Redundant mirrored servers that are linked by a fiber-optic interconnect cable running on UPS systems store identical copies of data on both systems and take on-line security to the next, expensive step. Ultimately, off-line optical or tape storage offers the most secure medium at the least possible cost.

The PC revolution is bringing many time-saving advancements to equipment used in the broadcast industry. The volume and economies-of-scale available to PC hardware and software manufacturers are helping to drive costs down and bring increased performance to many products in traditional broadcast applications. The trend does not seem to be subsiding and suggests a shorter broadcast product life cycle than before, as technology marches on. Finally, the convergence of the computing and broadcast industry is being accelerated by manufacturers pursuing the abundance of market opportunity in the desktop marketplace. ■

*George Uibel is an independent consultant.*

# industry briefs

## BUSINESS

**Philips BTS**, Simi Valley, CA, has completed the sale of nine Saturn master control switchers and two Venus routing switchers to HBO for its newly constructed component digital facility in Hauppauge, NY.

Also, Philips BTS and **Warner Brothers**, Los Angeles, have entered into a strategic alliance to develop high-speed, resolution-independent film mastering technologies and processes.

In other news from Philips, PBS affiliate KRMA-TV, and ABC affiliate KMGH-TV, both of Denver, have each purchased three LDK-10P cameras.



**Canon USA**, Lake Success, NY, announced the sale of two DIGI-SUPER 70x and five J55x SUPER lenses to VTE Mobile Television Productions.

**Harris Corporation** announced that its Quincy, IL-based broadcast division has been awarded a contract from WETA, Washington, DC, for a digital TV (HDTV) transmitter. WETA will use the transmitter to become the United States' first digital public broadcasting TV station.

In addition, Cox Broadcasting, Inc., Atlanta, has signed an agreement for Harris Corporation to provide digital transmitters for its 11 owned and operated stations nationwide.

**Hitachi Denshi**, Woodbury, NY, announced the purchase of three SK-2600W 4:3/16:9 switchable and three SK-2600P production portable digital cameras by the Microsoft Corporation for use in its Redmond, WA, studios.



Tom Brokaw, anchor for the NBC Nightly News, sitting in front of the network's new nine-cube display system from **Imtech Corporation**, Denville, NJ.

**Hewlett-Packard**, Santa Clara, CA, and **Turner Entertainment Networks**, Atlanta, announced that an HP broadcast video server will be used to launch Turner Broadcasting System, Inc.'s new Cartoon Network Brazil.

In addition, **Pro-Bel**, Reading, UK, will be providing its MAPP automation software for control of the HP server.

**Panasonic**, Secaucus, NJ, announced that FOX affiliate WXXA-TV, Albany, NY, has made a \$300,000 investment in Panasonic's DVCPRO digital component format to equip its new news department.



**Geneva Aviation**, Everett, WA, has delivered an electronic news-gathering (ENG) helicopter to KTVK TV3 of Phoenix. The

helicopter features ENG equipment that is fully integrated into the airframe, resulting in a clutter-free cabin.

**Sony Electronics**, Park Ridge, NJ, announced plans to work with established newsroom suppliers to ensure that its newsroom video systems will operate within varied customer environments. The move is designed to provide TV stations that are anxious to upgrade their video production and transmission systems with a choice of newsroom computer systems.

Also from Sony, WPIX, New York, became the first station in the United States to purchase Sony's DSM-T1/R1 digital satellite modulator/demodulator. The station will use the equipment in its new SNG truck.

**TC Electronic US**, Westlake Village, CA, became the North American distributor for DK Audio, a European manufacturer of master stereo displays.

**ASC Audio Video Corporation**, Burbank, CA, announced that its VR System has been installed in every major broadcast facility serving the Boise, ID, market, including ABC, CBS, Fox, PBS, UPN and Warner Brothers.

**Miranda Technologies**, Montreal, and **Advanced Audio Visual Systems**, Paris, have reached an agreement for the co-development and worldwide distribution of their respective digital video and audio product lines.

**Dielectric Communications**, Raymond, ME, has been contracted by more than 50 stations to perform HDTV design studies. The studies offer each station alternative solutions for combining current NTSC channels with future HDTV channels based on the latest FCC allotment tables.

In addition, Tribune Broadcasting has signed an agreement for Dielectric to provide antennas, transmission line and RF components for DTV and NTSC.

**Discreet Logic**, Montreal, announced that FOX Tape, Los Angeles, has become the first broadcaster to purchase its FIRE non-compressed, on-line, non-linear digital video editing system.

**RT-SET Ltd.**, Herzlia, Israel, announced that CBS News used its Larus virtual studio system to provide 3-D computer-generated virtual sets for the network's live election-night coverage.



**A.F. Associates, Inc.**, Northvale, NJ, is completing the technical integration portion of the renovation of WNBC-TV's newsroom facilities in the network's Rockefeller

Plaza complex in New York City.

**Channelmatic**, the equipment subsidiary of IndeNet, Inc., Los Angeles, has received orders totaling approximately \$1 million from Prime Cable, Chicago, for its MVP digital ad insertion system.

**NUKO Information Systems** and **Cisco Systems**, both of San Jose, CA, announced the establishment of a joint reference selling and marketing campaign targeting the broadband video market. The alliance features NUKO's digital multichannel MPEG-2 video networking technology with Cisco's LightStream family of products.

**Wegener Corporation**, Duluth, GA, announced it had received an order from Ascent Network Services, Inc., a unit of Ascent Entertainment Group, Inc., to ship digital video transmission products to the Microsoft/NBC Network, MSNBC. The Wegener system will be incorporated at 200 NBC affiliates.

**Quantel**, Darien, CT, announced that it has received an order from **The Post Group**, Toronto, for its Editbox non-linear digital editor.

worldwide sales and marketing for Avid Technology, Inc., Tewksbury, MA.

**Jim Longstreth** has been appointed vice president of sales for Quantel, Inc., Darien, CT.

**Chip Schneider** has been promoted to studio systems product manager, broadcast division, for the Harris Corporation, Quincy, IL.

Also from Harris, **Joe Mack** has been promoted to systems business development manager for the broadcast division.

**Michael Gilbert** has been named vice president of the Advanced Development Center for Sony Electronics Business and Professional Group, Park Ridge, NJ.



**Gary Parks** has joined Clear-Com Intercom Systems, Berkeley, CA, as marketing communications director.

**Thomas F. Ertel** has been appointed vice president of engineering for Artel Video Systems, Inc., Marlborough, MA.

**Edward P. Caleca** has been named senior vice president of broadcast operations and engineering for the Public Broadcasting Service, Alexandria, VA.



**John O. Caezza** has been appointed vice president of engineering for Philips Broadband Networks, Inc., Manlius, NY.

Additionally, **Jurgen Brommelhoff** has been named director of engineering for the Salt Lake City International Competency Center.

**John Whitlock**, president and CEO of The Whitlock Group, Richmond, VA, has been named Entrepreneur of the Year for Virginia.

**John G. Campbell** has been appointed vice president, general manager for The Broadcast Store, Glendale, CA.



**Arthur Densmore** has been hired by KVH Industries to oversee development of the company's mobile satellite antennas for land vehicles. ■

## PEOPLE

**Clifford A. Jenks** has been appointed vice president of

# new products

By Deanna Rood

## D/A signal processing system

### Nova Systems

• **StudioFrame:** front-loading chassis frames for digital and analog signal processors designed to efficiently and effectively combine a wide variety of individual function (or processor) boards into more complex function groups, all in one equipment mainframe; the scaleable nature of the StudioFrame design allows it to be easily reconfigured and/or upgraded as today's video standards and requirements continue to evolve.

Nova Systems, 50 Albany Turnpike, Canton, CT 06019; 860-693-0238; fax 860-693-1497

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## Digital optical disc

### Panasonic

• **LQ-D5500:** a record/erase digital optical video disc recorder/player that provides broadcast-quality, high-density digital recordings; the LQ-D5500 records up to 41.5 minutes of DVCPRO video and two high-quality 48kHz/16-bit digital audio (PCM) channels; with an average access time of 0.5 seconds across the disc, the LQ-D5500 offers a dramatic advantage in editing and production speed.

Panasonic, One Panasonic Way, 2A-2, Secaucus, NJ 07094; 201-392-4319; fax 201-392-6001

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## Software upgrade

### Prism Sound

• **Prism Sound DSA-1 version 2.0:** DSA-1 is a handheld, battery-powered troubleshooting tool for digital audio systems; the software upgrade provides new features including signal generation, channel status editing, printing and uploading of test results, user-definable automatic test sequences, transmission bit-error testing and jitter generation for the generator output; the upgrade is issued on a floppy disk and downloaded into non-volatile FLASH memory in the unit from the serial port of the user's PC.

Prism Media Products, 121 State Hwy. 35, Redbank, NJ 07701; 908-747-7272; fax 908-747-2871

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## Decoders

### Snell & Wilcox

• **Golden Gate range:** a high-performance range of 10-bit multidimensional adaptive composite digital decoders; the Golden Gate range includes the 500 series designed for the all-digital environment, the 2000 series offering analog or digital composite inputs and the Golden Gate 3000, which is a PAL/NTSC decoder that accepts analog and digital composite inputs and produces 4:2:2 SDI output.

Snell & Wilcox, 6 Old Lodge Place, St. Margaret's, Twickenham TW1 1RQ, United Kingdom; +44 (0) 181 607 9455; fax +44 (0) 181 607 9466

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## High-performance decoder

### RSP Technologies

• **Circle Surround 5.2.5 high-performance decoder:** a decoder featuring matrix surround sound technology that decodes five full-bandwidth audio channels from two analog or digital delivery channels; Circle Surround is a patented process that allows unprecedented naturalness, detail and creative control of the surround field; the 5.2.5 technology is fully backward compatible to all manufacturers' existing 4:2:4 systems currently in use.

RSP Technologies, 2870 Technology Dr., Rochester Hills, MI 48309; 810-853-3055; fax 810-853-5937; rocktron@eaglequest.com

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## Programmable router control panels

### Leitch

• **Alphanumeric Breakaway (ABA) panels:** an addition to Leitch's Programmable series of router control panels; the control panels display the currently selected destination and sources connected to that destination on a series of four alphanumeric LED displays; the source and destination names can be eight characters long and are edited and downloaded to the panel using the panel configuration editor Panel MAPPER (included with panels).

Leitch, 920 Corporate Ln., Chesapeake, VA 23320; 800-231-9673; fax 757-548-4088

Circle (253) on Free Info Card



**Lenses**  
**Fujinon** ▲

- **A18X9:** 2/3-inch cameras lenses featuring a focal length range of 9 to 162mm (18 to 324mm with extender deployed), maximum aperture of f1.8 and weighing 2.8 pounds.
- **S18X6.7:** hand-held lenses for 1/2-inch format cameras featuring a focal length range of 6.7 to 121mm (13 to 242mm with extender deployed), a maximum aperture of f1.4 and weighing 2.75 pounds.

Fujinon, 10 High Point Dr., Wayne, NJ 07470; 201-633-5600; fax 201-533-5216  
Circle (280) on Free Info Card



**Motion controller**  
**DNF Industries** ▲

- **ST300-S/SM motion controller:** a flexible universal control system with the ability to control tape-based recording systems using time code or clip-based systems including video servers or video disk recorders using clip IDs; up to 100 cue points can be quickly recalled or stored; a cue point can be marked with the push of a single button and pressing two keys recalls all cue points; also, all cues are retained in memory when the power is turned off.

DNF Industries, 9970 Glenoaks Blvd., Suite D, Sun Valley, CA 91352; 818-252-0198; fax 818-252-0199  
Circle (258) on Free Info Card

**Field analyzer**  
**Boonton Electronics**

- **EXPERT 7831:** a universal video field analyzer that fully characterizes NTSC, PAL, SECAM, QPSK, MAQ and D<sup>2</sup>MAC broadcast signals in the field; it is ideal for measuring the performance of cable, terrestrial broadcast and satellite systems.

Boonton, 25 Eastmans Rd., Parsippany, NJ 07054-0465; 201-386-9696; fax 201-386-9191  
Circle (282) on Free Info Card

**Satellite receiver**  
**Barco** ▼

- **Titan:** a DVB-compliant satellite receiver for broadcast stations, cable TV head-ends and MMDS sites; the unique modularity of the Titan allows the integration of an MPEG-2 decoder or an MPEG-2 transport stream processor into the satellite receiver's housing; full remote control and monitoring of the unit is possible by interfacing it to ROSA, Barco's cable TV management system.



Barco, Th Sevenslaan 106, B-8500 Kortrijk Belgium; +32 56 386 493; fax +32 56 386 293  
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In today's demanding audio and video applications, an inferior connector can become a major source of signal degradation. Reflections caused by line mismatches make it impossible to recover information correctly. ADC's BNC connectors incorporate molded Ultem<sup>®</sup> conductor insulators which assure consistent 75 ohm characteristic impedance for true line matching.

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## new products

### Video switcher

#### ECHOlabs

• **MVS3**: a video switcher that provides up to 12 inputs and comes standard with 1½ M/Es, two keyers, nine panel memories and a 100% trade-in guarantee for an upgrade to a future digital version; the linear keyers offer highly accurate reproduction of fine detail and the flexibility of routing six key inputs or the optional chroma-key to either keyer.

ECHOlabs, 175 Bedford St., Burlington, MA 01803; 617-273-1512;  
fax 617-273-3275

Circle (259) on Free Info Card



### Integrated mixer/recorder

#### Tascam

• **564 Digital Portastudio**: a MiniDisc recorder that combines the operational ease of the Portastudio line with random access capability and a convenient means for data storage and exchange; it provides numerous random access functions including instantaneous locate capability, erase, divide, combine and bounce forward, among other new features; the 564 enables you to record up to five takes of a given track.

Tascam, 7733 Telegraph Rd., Montebello, CA 90640; 800-827-2268 (request document #8520) or 213-726-0303

Circle (263) on Free Info Card

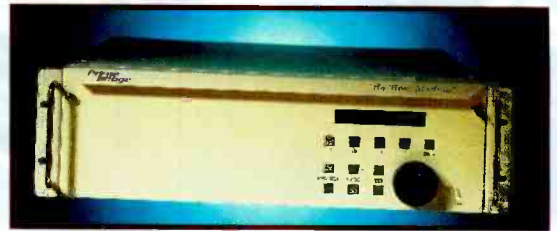
### Routing switcher

#### Videotek

• **RS-12A**: a 12x1 video/stereo audio routing switcher that features 12 video inputs, 12 stereo audio inputs, a serial interface, a GPI port and control panel buttons with re-legendable switch caps; unlike many single-bus routers on the market, the RS-12A series support true vertical interval switching (line 10 NTSC and line 6 PAL) ensuring that any vertical interval data will not be corrupted and the VTRs will have stable sync for servos to operate correctly.

Videotek, 243 Shoemaker Rd., Pottstown, PA 19464; 800-800-5719  
or 610-327-2292; fax 610-327-9295

Circle (260) on Free Info Card



### Device for increasing/decreasing time

#### Prime Image

• **Time Machine**: a solid-state digital electronic device that can increase or decrease time; it can change the length of audio and video passages in such a way that there is minimal to no visual or sound impairment/alternation; this time can be changed in real time as it originally occurs without the need for pre-recording or any other pre-processing; the time changed can be gen-locked to an external source then mixed and switched with normal "non-time changed" media.

Prime Image, 19943 Via Escuela, Saratoga, CA 95070;  
408-867-6519; fax 408-926-7294

Circle (266) on Free Info Card

### Multimeter

#### Fluke

• **867B Graphical MultiMeter (GMM)**: Fluke's most accurate hand-held multimeter to date; it provides exceptional graphical and reporting capabilities presented on the largest and most technologically advanced display screen available in today's market.

Fluke, P.O. Box 9090, Everett, WA  
98206-9090; 206-347-6100;

fax 206-356-5116; fluke-info@tc.fluke.com

Circle (267) on Free Info Card



### Weather graphics software

#### Advantage Television Software

• **TDS 750 Storyteller**: an interactive weather graphics system that incorporates SkyTRAK 3-D and SkyTRAK 3-D DMA; the key difference from other weather providers' 3-D displays is that the Advantage system pre-renders flight paths as full-motion JPEG movies — all paths load, start, stop, reverse or freeze instantaneously allowing the creation of a seamless 3-D environment for the weather presentation.

Advantage Television Software, 980 N. Michigan Ave., Suite 1200,  
Chicago, IL 60611; 312-787-6655; fax 312-787-3964

Circle (273) on Free Info Card

### Support for CSDI standard

#### Philips Broadcast Television Systems

• **Philips BTS** will support the emerging CSDI standard for the transfer of compressed media files from one Media Pool server to another; the CSDI standard supports the transfer of compressed files using the existing serial digital interfaces currently used in many broadcast facilities; instead of sending serial digital video, the system will now transport serial digital data from one device to another, using the full 270Mb/s data rate of the interface; the new CSDI interface will allow for the transfer of compressed files at speeds faster than real time.

Philips BTS, 800-962-4287 or 805-584-4700;  
fax 805-584-4750

Circle (262) on Free Info Card



## ◀ Video editing system for Pinnacle's GeniePlus United Media

- **Duette:** an editing system designed to integrate seamlessly with Pinnacle Systems' GeniePlus 3-D digital video effects system; the all-inclusive package executes simple A/B roll edits, as well as complex edits of multiple layers with graphics control in a single pass; such capabilities are supported via Windows 95, 32-bit software integration; the Duette video editor consists of a single computer card that controls A/B roll editing, the GeniePlus, audio mixer, slow motion, in addition to other features.

United Media, 4771 E. Hunter, Anaheim, CA 92807; 714-777-4510;  
fax 714-777-2434; umi@UnitedMediaInc.com  
Circle (285) on Free Info Card

## Decoder Questech

- **1012:** a composite to serial digital decoder available with a plug-in synchronizer option that provides a separately timed output from the decoder; the 1012 provides a high-quality interface between composite and serial digital component video equipment; it accepts both analog and, optionally, digital (D-2 or D-3 format) input and output signals with excellent subcarrier rejection.

Questech, Eastheath Ave., Wokingham, Berkshire, RG41 2PP England; +44 (0) 1734 787209; +44 (0) 1734 794766  
Circle (281) on Free Info Card



## ◀ Oscilloscope Iwatsu America

- **Model SS-7840:** a four-channel oscilloscope that provides 10 traces, full TV triggering with a clamping function and a built-in five-digit counter to display frequencies to 400MHz; a unique input offset function

is suitable for observing small amplitude signals superimposed over larger ones, with an offset equivalent to  $\pm 500$  div. maximum, applicable to CH-1 or CH-2.

Iwatsu America, 430 Commerce Blvd., Carlstadt, NJ; 201-935-8580;  
fax 201-935-8533; www.iwatsu.com  
Circle (268) on Free Info Card

## Conveyor degaussers Research Technology International (RTI)

- **5300 series:** the unique pulse discharge technology used in these conveyor degaussers provides fast, full erasure of metal or oxide videotape cassettes with minimum labor; as many as 500 cassettes can be erased per hour and unattended erasure can be accomplished with an optional hopper; the tape conveyor system allows continuous operation.


RTI, 4700 Chase, Lincolnwood, IL 60646-1689;  
847-677-3000; fax 847-677-1311 or  
800-784-6733; Pulsar@RTI-US.com  
Circle (257) on Free Info Card

## Internet guide for broadcasters Sypha

- **The Internet for Broadcasters:** a trade annual that contains technology and management articles, case studies and a directory of Internet resources; the articles cover the impact the Internet is likely to have on the broadcast industry and the case studies provide insight into the experiences of broadcasters who are using the Internet; the resources directory lists equipment suppliers, services, information sources, organizations, newsgroups and search facilities of interest to broadcasters; the publication costs \$29.95 (plus postage and handling).

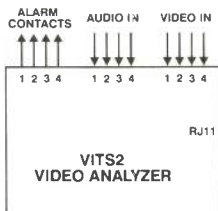
Sypha, 216a Gipsy Rd., London, United Kingdom SE27 9RB; +44 181 761 1042; fax +44 181 244 8758;

100256.377@compuserve.com;  
www.mandy.com/2/sypha.html  
Circle (255) on Free Info Card

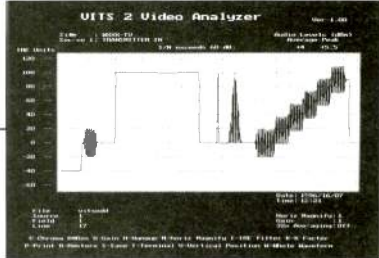


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40 West Wilmot Street, Richmond Hill, Ontario L4B 1H8  
Tel: (905) 764-1584 Fax: (905) 764-7438 E-mail: bvstor@neocom.ca

Circle (69) on Free Info Card



### Video test instrument

#### Tektronix

- **VM700T**: a highly automated video measurement tool that is a turbo-charged version of the VM700A; enhanced features include a powerful central processing unit core and redesign of the main circuit board modules that can triple measurement application speed; a parallel printer port doubles as a firmware upload port to eliminate requirements of a serial printer interface and to simplify future upgrades.

Tektronix, P.O. Box 1530, Pittsfield, MA 01202;

800-426-2200 (press 3, code 566); [www.tek.com/Measurement](http://www.tek.com/Measurement)

Circle (272) on Free Info Card

### Transport multiplexer

#### TV/COM International

- **DVB/MPEG-2-compliant transport multiplexer (TMUX)**: a product that multiplexes up to four multi-channel transport streams into a single transponder stream; the TMUX is especially useful for digital satellite uplinks, cable head-ends and digital broadcast networks requiring video servers, redundancy and/or full transponder utilization.

TV/COM, 16516 Via Esprillo, San Diego, CA 92127; 619-451-1500; 619-451-1505

Circle (271) on Free Info Card



### Miniature serial digital cable

#### Gepco/CommScope

- **7537**: a miniature digital cable introduced under the strategic alliance between Gepco and CommScope; the cable is a 75Ω miniature analog and serial digital video cable with a 25awg (7x.011") stranded bare copper center conductor that provides flexibility without fine strands that cause grounds or shorts.

Gepco, 2225 W. Hubbard, Chicago, IL 60612-1613;  
312-733-9555; fax 312-733-6416

Circle (275) on Free Info Card

### Digital video quality control analyzer

#### AAVS by Sencore

- **DVA320QC**: a fully functional digital video signal analyzer and quality control tester in one comprehensive unit; the DVA320QC can test component and composite serial digital video signals in both 525- and 625-line formats with continuous real-time on-line measurements of all key digital video parameters; it can test serial jitter, EDH errors, gamut levels, signal amplitude, parity bit errors, bit activity reserved code errors, TRS errors and non-recommended value errors; the DVA320QC completely automates your digital video testing and troubleshooting by providing a PC-based unit that allows unattended signal monitoring.

AAVS, 3200 Sencore Dr., Sioux Falls, SD 57107; 605-339-0100; fax 605-339-0317

Circle (251) on Free Info Card

### Portable audio codecs

#### Corporate Computer Systems

- **Olympian**: a portable, easy-to-use ISDN codec/mixer for quality, bidirectional digital stereo audio; the Olympian provides CCS MUSICAM, certified Layer II compatible by the IRT at bit rates up to 384kb/s for full contribution quality audio and Layer III at up to 320kb/s.
- **RoadRunner**: a compact, portable ISDN codec/mixer that can send and receive mono audio over the highest quality phone lines available; if no ISDN is available, the RoadRunner can send mixed analog audio through a regular analog phone line also.

CCS, Ludwigstrabe 45, D-85399 Hallbergmoos, Germany;  
+49 811-55 16-0; fax +49 811 55 16-55; [www.ccs-europe.com](http://www.ccs-europe.com);  
[roadrunner@ccs-europe.com](mailto:roadrunner@ccs-europe.com) & [olympian@ccs-europe.com](mailto:olympian@ccs-europe.com)

Circle (270) on Free Info Card



### RAID storage solution

#### Storage Concepts

- **FibreRAID II**: a fully functional RAID storage solution designed to provide continuous, sustained data rate storage for high-performance applications; based on a new real-time control platform using fourth generation design topologies, the system features redundant pluggable disk modules, redundant pluggable power supply modules, dual fibre channel host connectivity, extensive error logging and RAID functionality control and cableless system chassis design.

Storage Concepts, 2652 McGaw Ave., Irvine, CA 92714; 800-525-9217  
or 714-852-8511; fax 714-852-8930

Circle (284) on Free Info Card



# new products

## Disk-based video recorders

### Philips Broadcast Television Systems Company

• **VDR family:** a disk-based system that replaces conventional studio VTRs for virtually any application; the VDRs offer the convenience of a tape-based system with the advantages of digital recording; available in switchable 525- and 625-line configurations, it provides all interfaces necessary to provide a complete and seamless integration into production or post-production use including edit suites, master control and OB vans.

Philips BTS, 94 W. Cochran St., Simi Valley, CA 93065; 805-584-4700; fax 805-584-4750  
**Circle (264) on Free Info Card**

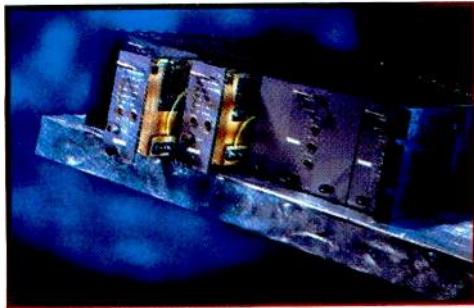


## Modular universal chassis

### Video Products Group

• **VPG6000:** a modular universal chassis that uses a midplane design supporting intermodule connections and connections to I/O panels integrated into the chassis; each functional module can have its own specialized connector arrangement for a flexible system design.

Video Products Group, 1125-B Business Center Circle, Newbury Park, CA 91320; 805-375-2855; fax 805-375-2851  
**Circle (283) on Free Info Card**



## DVCPRO VTRs

### Panasonic

• **600 series:** the AJ-D650 studio editing deck and the AJ-D640 recorder/player have been added to the DVCPRO product line; the AJ-D650 delivers complete editing functions and the AJ-D640 provides a cost-effective solution for high-quality DVCPRO recordings and playback; with analog I/O, digital I/O (optional), and versatile interfacing via RS-422A and RS-232C remote, these two VTRs address applications in non-linear and linear editing.

Panasonic, One Panasonic Way 2A-2, Secaucus, NJ 07094; 800-524-0864  
**Circle (265) on Free Info Card**



## Matrix switchers

### Extron

**CrossPoint series:** a series of switchers capable of switching RGBS analog, composite video and S-video, as well as two channel audio (balanced or unbalanced) signals simultaneously or independently of each other; housed in a rack-mountable 19-inch wide, 3U-high enclosure, the series includes RS-232 capability.

Extron, 1230 S. Lewis St., Anaheim, CA 92805; 800-633-9876 or 714-491-1500; fax 714-491-1517

**Circle (274) on Free Info Card**



## DVD video encoding solution

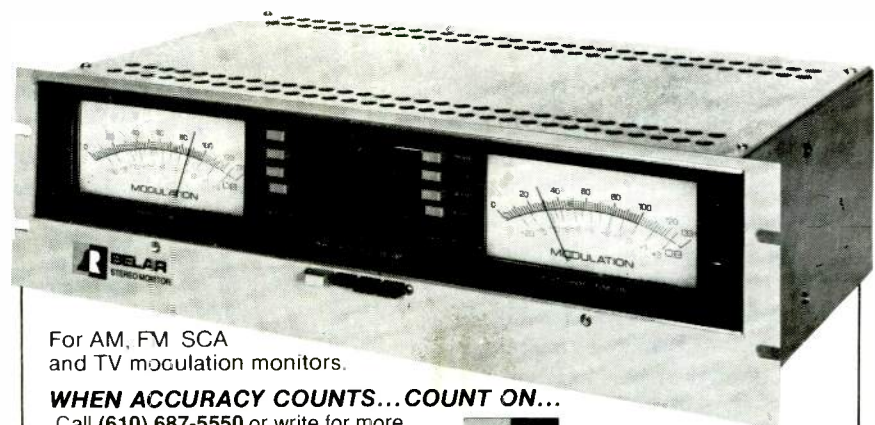
### Minerva Systems

• **Compressionist 250:** a solution for the creation of high-quality digital video disc video assets; the Compressionist 250, based on C-Cube Microsystem's VLSI processors, offers constant bit rate and variable bit rate MPEG-2 encoding technology combined with Minerva's unique video pre-processing and control software tools.

Minerva Systems, 2933 Bunker Hill Lane, Suite 202, Santa Clara, CA 95054; 408-970-1780; 408-982-9877;

www.minervasys.com

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Continued from page 90

## Easy to see, dynamically changeable

The system from Tally Display Corporation specializes in tri-color active displays for use in source identification with monitors. The technology interfaces with routing and production switchers, automation, monitors and other systems requiring clear, precise alphanumeric status readouts. The system allows users to quickly and easily identify source materials and rely on the system to notify the operator of the loss of video or audio signals.

At KIRO-TV, the displays change color depending on the status of the

system allows intelligent monitoring of the local satellite or microwave transmissions coming back to the station. In addition to standard information, such as location, the system's ability to provide streaming information to the control room could provide operators with the reporter's name and location. The system allows displays to be animated if it's important to differentiate one signal source from another.

## Configuration

The system is extremely easy to install and configure. It uses crimp-on RJ connectors in a daisy-chain configuration. Because the system relies on a separate PC, no addi-

**The Tally Display gives our operator the ability to see at a glance what the problem is without having to interrogate the system and take time away from other duties.**

displayed video. Green indicates the source is present for use, yellow indicates preview/preset and red indicates on-line.

Although the main use of the system is label sources on monitors, we are looking at two additional uses. For instance, the system can be used to monitor the remote transmitter, located a mile away on Queen Anne Hill. Instead of a passive alarm system, the system will display alphanumeric warnings based on data supplied by the transmitter. This eliminates the need for an operator to run to a remote-control system and interpret a meter reading. All this could result in increased time off the air. The Tally Display gives our operator the ability to see at a glance what the problem is without having to interrogate the system and take time away from other duties.

The programmable nature of the

tional piece of equipment is tied up for programming. And programming requires little more than listing the source name, typing in the associated switcher/tally channel and setting up colors and animations, if any. Programming is easy and intuitive.

With today's complicated station operation, it is a pleasure to have a system that helps our operators easily track sources and events throughout the control room. The Tally Display system helps us remain a leader in a competitive environment. ■

*John Walters is director of engineering and Paul Polzin is chief engineer, at KIRO-TV, Seattle, WA.*

**FOR MORE  
Information**  
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## STATEMENT OF OWNERSHIP

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## antonbauer

### Logic Series DIGITAL Gold Mount Batteries

The Logic Series DIGITAL batteries are acknowledged to be the most advanced in the rechargeable battery industry. In addition to the comprehensive sensors integral to all Logic Series batteries, each DIGITAL battery has a built-in microprocessor that communicates directly with Anton/Bauer InterActive chargers, creating significant new benchmarks for reliability, performance, and life. They also complete the communications network between battery, charger and camera. With the network in place, DIGITAL batteries deliver the feature most requested by cameramen: a reliable and accurate indication of remaining battery power.

#### DIGITAL PRO PACS

The Digital Pro Pac is the ultimate professional video battery and is 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. The size and weight of the Digital Pro Pac creates perfect shoulder balance with all cameras/camcorders.

- **DIGITAL PRO PAC 14 LOGIC SERIES NICAD BATTERY**  
14.4v 60 Watt Hours, 5 1/8 lbs. Run time: 2 hours @ 27 watts, 3 hrs @ 18 watts
- **DIGITAL PRO PAC 13 LOGIC SERIES NICAD BATTERY**  
13.2v 55 Watt Hours, 4.3/4 lbs. Run time: 2 hours @ 25 watts, 3 hours @ 17 watts

#### GOLD MOUNT BATTERIES

Logic Series Gold Mount batteries are identical to the respective DIGITAL versions with respect to size, weight, capacity, IMPAC case construction, and application. They are similarly equipped with micro-code logic circuits and comprehensive ACS sensors. They do not include DIGITAL microprocessor features such as the integral diagnostic program "Fuel Computer", LCD/LED display and InterActive viewfinder fuel gauge circuit.

- **PRO PAC 14 NICAD BATTERY** (14.4v 60 Watt Hours)
- **PRO PAC 13 NICAD BATTERY** (13.2v 55 Watt Hours)
- **TRIMPAC 14 NICAD BATTERY** (14.4v 40 Watt Hours)
- **TRIMPAC 13 NICAD BATTERY** (13.2v 36 Watt Hours)
- **COMPAC 14 NICAD BATTERY** (14.4v 40 Watt Hours)
- **COMPAC 13 NICAD BATTERY** (13.2v 36 Watt Hours)



## sachtler



#### VIDEO 14/100 FLUID HEAD

- Sachtler Touch and Go System
- Integrated sliding battery plate
- Strengthened dynamic counterbalance in 2 steps
- Frictionless leak proof fluid damping with three levels of drag
- Vibrationless vertical and horizontal brakes
- Built in bubble for horizontal leveling

#### HOT POD TRIPOD SERIES

Especially developed for use in ENG, the Hot Pod tripod is the fastest in the world. The central locking system is activated on all three legs at the same time, while the pneumatic center column easily makes it possible to have the lens at a height of over 7 feet. The elevation force of the center column is factory set and doesn't require any setup. When moving to another location it can be carried by its handle located at the center of gravity.

#### ENG TWO-STAGE TRIPOD SERIES

Sachtler two-stage tripods have an enlarged height range (lower bottom and higher top position) so they are more universal. Legs can be locked in seconds with Sachtler's quick clamping. There are also heavy duty versions for extra stability. The heavy duty aluminum has a 20mm diameter tube vs. 16mm and the heavy duty carbon fiber has a 24mm diameter tube vs. 22mm. All heavy duty two-stage tripods have a folding tripod handle.

#### NEW! Sachtler CADDY Systems

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

#### CAD 01

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

#### CAD 2A

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

## Vinten

### Vision SD 12 and SD 22 Pan and Tilt Heads with Serial Drag

- The Vision SD 12 and SD 22 are the first heads with the "Serial Drag" pan and tilt system. The system consists of a unique, permanently-sealed fluid drag and an advanced lubricated friction drag. Now you can achieve the smoothest pans and tilts regardless of speed, drag setting and ambient temperature.
- Patented spring-assisted counter-balance system permits perfect "hands-off" camera balance over full 180° of tilt.
- Instant drag system breakaway and recovery overcome inertia and friction for excellent "whip pans"
- Consistent drag levels in both pan and tilt axis.
- Flick on, flick off pan and tilt caliper disc brakes.
- Greater control, precision, flexibility and "touch"
- Touch activated, time delayed illuminated level bubble.
- Working conditions from as low as -40° up to +60°C.
- SD 12 weighs 6.6 lbs and supports up to 35 lbs.
- SD 22 weighs 12.7 lbs and supports up to 55 lbs.

### Vision Two Stage ENG and LT Carbon Fibre ENG Tripods

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



#### Vision 12 Systems

All Vision 12 systems include #33643 SD 12 dual fluid and lubricated friction drag pan/tilt head, single telescoping pan bar and clamp with 100mm ball base.

#### SD-12A System

- 3364-3 SD-12 Pan and tilt head
- 3518-3 Single stage ENG tripod with 100mm bowl
- 3363-3 Lightweight calibrated floor spreader.

#### SD-12D System

- 3364-3 SD-12 Pan and tilt head
- 3513-3 Two-stage ENG tripod with 100mm bowl
- 3314-3 Heavy-duty calibrated floor spreader

#### Vision 22 Systems

All Vision 22 systems include #3366-3 SD 22 dual fluid and lubricated friction drag pan and tilt head, single telescoping pan bar and clamp with dual 100mm/150mm ball base

#### SD-22E System

- 3386-3 SD-22 Pan and tilt head
- 3219-52 Second telescoping pan bar and clamp
- 3516-3 Two-stage EFP tripod with 150mm bowl
- 3314-3 Heavy-duty calibrated floor spreader



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#### QuickDial Options for VIDEO • PRO-AUDIO MENU

	QuickDial	QuickDial
Industrial/Broadcast Equipment	72	3D Animation 732
Pro Video Equipment & Accessories	74	Pro Audio Equipment 8
Non-Linear Edit ng & Computer-based Video	731	Used Video Equipment 75



### GY-X2B 3-CCD S-VHS Camcorder



- Newly designed three 1/2" CCD image sensors deliver 750 lines of horizontal resolution and superb signal-to-noise ratio of 62dB
- New micro-lens technology provides exceptional sensitivity of F8.0 at 2000 lux and LOLLUX mode lets you shoot with almost no light! Shoot superb footage with excellent color balance at a mere 1.5 lux
- Variable Scan allows flicker-free shooting of a computer screen
- Quick Record Mode - when turned on the camera is set to the auto iris even if lens is set at manual. Also activated is (ALC) Automatic Level Control and EE Extended Electronic Iris which provides both variable gain and variable shutter. Now you can shoot continuously from dark room to bright outdoors without having to adjust gain, iris or ND filter.

- Full Time Auto White circuit lets you move from incandescent to fluorescent to outdoor lighting without changing white balance or the filter wheel.
- Dual output system allows camera output to be connected directly to an external recorder

## Panasonic Broadcast & Television Systems



### AG-DP800H UPERCAM S-VHS 3-CCD Digital Signal Processing Camcorder



- Three high-density 380,000 pixel CCDs with half-pitch pixel offset achieves over 750 lines of horizontal resolution, a S/N ratio of 60dB and remarkable sensitivity of 18 at 2000 lux. Additionally the Frame Interline Transfer (FIT) CCDs minimize vertical smear, so you maintain impressive picture quality even in very bright illumination.
- Some of the DSP circuits and their functions:
  - CHROMA DETAIL - This function compensates for poor resolution in the high chroma areas of the picture.
  - DARK DETAIL - Determines optimum degree of contour enhancement in dark areas to deliver crisp, natural-looking images.
  - BRIGHT LIGHT CONTROL/PRESSION - Expands the dynamic range of the highlighted areas and prevents halation. The highlight compressor circuit allows a wide dynamic range producing detailed images even against bright backlight or daylight.
  - FLARE CORRECTION CIRCUIT - Compensates for unsteady black caused by light or by a subject's movements.
- Six Scene File modes. There are two user modes for custom digital parameter settings including Horizontal Detail, Vertical Detail, Chroma and Dark Detail, and Color Correct on. The four preset modes are normal, fluorescent, special and sparkling.
- In addition to regular AGC (Automatic Gain Control), Supercam has a Super High Gain Mode. At F1.4 this enables shooting under illumination as low as 2 lux while retaining detail and color balance.
- Synchro Scan function allows flicker-free shooting of computer monitors. Electronic shutter increments can be set variably from 1/61 seconds to 1/253 of a second.
- Built-in interval time code generator lets you record with SMPTE LTC/VITC (Longitudinal/Vertical Interval) time code
- Two hi-fi stereo audio channels with a dynamic range of 80 dB, as well as two linear audio channels with Dolby NR Normal/Hi-Fi recording is selectable. Uses XLR connectors to further ensure high-quality sound.
- Has a 26-pin connector on the back that outputs a composite or component video signal. This enables convenient backup recordings using an additional VCR equipped with a 26 or 14-pin connector
- Phantom power can be supplied to an optional microphone. Power can be switched off to prevent battery drain when not in use.

## SONY COLOR MONITORS

### PVM-1350 13" Presentation Monitor

- Employs a P-22 phosphor fine pitch CRT in deliver stunning horizontal resolution of 450 horizontal lines.
- Beam current feedback circuit eliminates white balance drift for long term stability of color balance.
- Has analog RGB, S-video and two composite video (BNC) inputs as well as 4 audio inputs
- Automatic Chroma/Phase setup mode facilitates the complex, delicate procedure of monitor adjustment. Using broadcast standard color bars as a reference, this function automatically calibrates chroma and phase.
- Chroma/Phase adjustments can also be easily performed with the monochrome Blue Only display.
- Factory set to broadcast standard 6500K color temperature
- On power up, auto degaussing is performed. There is also a manual degauss to demagnetize the screen.
- Sub control mode allows fine adjustments to be made on the knob control for contrast, brightness, chroma and phase.

### PVM-1351Q 13" Production Monitor

- Has all the features of the PVM-1350 PLUS -
- A multistandard monitor, it accepts NTSC, PAL and NTSC video signals. NTSC 4.43 can also be reproduced.
- Equipped with a SMPTE 259M Serial Digital Interface. With optional serial digital interface kit BKM-101C for video and the BKM-102 for audio the PVM-1351Q can accept SMPTE 259M component serial digital signals.
- Equipped with RS-422 serial interface. With optional BKM-103 serial remote control kit, all of the monitor's functions can be remotely controlled.
- Inputs include analog RGB, S-video, component, 2 composite video (BNC) and 4 audio for complete flexibility.
- Aspect ratio is switchable between 4.3 and 16:9 simply by pressing a button.
- Underscan and H/V delay functions
- Color temperature switchable between 6500K/9300K/User preset: 6500K. Is factory preset: 9300K is for a more pleasing picture. User preset is 3200K to 10,000K.



### PVM-1354Q/PVM-1954Q 13" and 19" Production Monitors

- SMPTE C standard phosphor CRT is incorporated in the PVM-1354Q/1954Q. SMPTE C phosphors permit the most critical evaluation of any color subject. Provides over 600 lines of horizontal resolution.
- The PVM-1354Q mounts into a 19-inch EIA standard rack with the optional MB-502B rack mount bracket and SLR-102 slide rail kit same as PVM-1351Q. The PVM-1954Q mounts into a 19-inch EIA rack with the optional SLR-103 slide rail kit.

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## DIGITAL PROCESSING SYSTEMS INC.

### PVR-2500 'Perception'

#### Digital Video Recorder

**The Heart of an Advanced Digital  
 Audio/Video Workstation**

The PVR-2500 offers powerful features for awesome animation, morphing and rotoscoping capabilities. With features like 720 x 480 resolution, 10-bit 2x oversampled video encoding, better than D1 scaling, component and S-Video outputs, multi-processor support and integrated FAST SCSI-2 controller, it empowers your computer to rival the finest professional production studios.

- The PVR-2500 is a full-length PCI card with a FAST SCSI-2 controller which connects to one or up to seven dedicated hard drives. Because the SCSI controller is integrated with the PVR-2500, video data never has to go over the PCI bus during playback. This avoids the bottlenecks found in systems which use the computer's hard drive for video storage.
- Perception gets animations out of your computer fast and easy. Its exclusive multi-format virtual file system ensures complete integration with your Windows NT applications. Any acquired video or computer generated Perception video clips appear simultaneously in many different file formats including TARGA, SGI, BMP and IFF. Perception is compatible with Lightwave 3D, Autodesk 3D Studio Max, Crystal Graphics TOPAS 5.1 PRD, Microsoft Softimage, Elastic Reality and others.
- Runs under Windows NT 3.5 on computers with Pentium, DEC Alpha or MIPS processors. Perception's software utilizes NT's native support for multitasking and multiple processors, allowing use with the most powerful computers.
- Perception performs real-time interpolation of 30 fps video to 24 fps film rates or vice versa. This means that it is also at home on the Hollywood movie set as well.

- Video output section utilizes 10-bit 2x oversampled encoding and provides broadcast quality CCIR-601 (720 x 480) resolution. Dynamic range is in excess of D1 scaling so images are brighter, have more color and greater spatial resolution than ever before. Component, composite and S-Video outputs are provided via the included breakout cables.
- Also control BVU protocol VCRs for video acquisition. VCR-like controls on the Perception's GUI simplifies the task of batch digitizing and recording. In this mode, the PVR-2500 can read SMPTE time code from the source deck.
- Can be used with any Windows NT compatible sound card while synchronization of audio and video is maintained by the PVR software. Captured audio is stored on the computer's system hard drive, not on the dedicated drives. This approach provides maximum flexibility for manipulating audio and video during editing.
- Can be used with third party editing software such as Adobe Premier or iSync Speed Razor MACH III. In fact, a system equipped with the PVR-2500, AD-2500 capture card, a sound card, editing software & one or more SCSI drives becomes a non-linear editor of unparalleled performance - at an unbeatable price.

#### Bundled plug-in for Kinetics 3D Studio MAX

- Every PVR-2500 includes DPS Lockstep software to provide significant control over 3D Studio MAX
- Frame buffer device rendering mode enables unlimited test renders without having to delete files.
  - Easily control PVR parameters like preview sizes and pencil test options from within 3D Studio MAX. Device level support automatically sets screen size, aspect ratio, gamma, and other related PVR adjustments.
  - Video, animations and stills on the PVR SCSI drive show up as PVDs or PSTs within MAX dialog boxes.
  - Image selection, background and video post tools in MAX work like standard video streams.

#### AD-2500 Component Video Capture Card

- Coupled with the AD-2500 live video capture daughter card, the PVR-2500 becomes a broadcast-quality digital disc recorder. It delivers unsurpassed picture quality and storage capacity is limited only by the size/number of attached SCSI hard drives.
- Has component, composite and S-Video inputs for real-time recording. Captured video can also be exported as sequential RGB files for rotoscoping and other compositing applications
  - Incorporates a sophisticated automatic entropy prediction circuit that analyzes the content of incoming video and dynamically calculates the optimum amount of compression on a field-by-field basis—even during real-time recording. You also have complete manual control over compression level/quality settings.

#### FX-2500 Perception Effects Accelerator

- The FX-2500 significantly reduces the time required to render complex non-linear transitions. Although it doesn't deliver real-time transitions, it significantly improves the productivity of non-linear editing systems by dramatically speeding up the rendering time for many effects and transitions.
- A stand-alone PVR-2500 provides real-time cuts between video clips, but other transitions such as dissolves and wipes, substantial delay can occur. A 30 frame dissolve can take minutes to render, even with the fastest PC, because the host CPU processes source frames on a pixel-by-pixel basis. The Perception FX reduces the waiting time to under 10 seconds.



### Uncompressed 10-Bit D1 Video Disk Recorder

Hollywood is a PCI and ISA-based three card set that provides a D1 video recording solution for high-end animation, rotoscoping, and video/graphics compositing. Because such operations can require many passes, Hollywood avoids the use of any video compression which can progressively deteriorate images.

- Hollywood dramatically reduces the cost per minute for uncompressed video recording. Equipped with 4GB hard drives, typical Hollywood recording times range from 7 to 10 minutes. Compare the cost of Hollywood against competitive products which provide mere seconds of capacity.
- Equipped with serial D1 and component analog video (Betacam/MII) inputs as well as composite and S-Video.
- Optional SD-2500 Serial D1 I/O option lets you interface the PVR-2500 directly to Hollywood. The SD-2500 provides one serial D1 input and two outputs plus a composite input.

- Can also function as a digital test signal generator, providing 20 different 10-bit digital test patterns.
- |                                      |         |
|--------------------------------------|---------|
| PVR-2500 Digital Recorder            | 1599.00 |
| AD-2500 Video Capture Card           | 849.00  |
| FX-2500 Effects Accelerator          | 899.00  |
| DAR-2500 Digital A4V Recorder        | 1295.00 |
| Hollywood 10-bit Video Disk Recorder | CALL    |
| SD-2500 Serial I/O Card              | CALL    |



## TRUEVISION

### TARGA 1000/2000

#### Digital Video Capture Boards for Windows, Windows NT and Macintosh PCI

The TARGA 1000 and 2000 are an easy and affordable way to transform your computer into a powerful digital editing system. Along with their high-speed PCI interface, both the TARGA 1000/2000 incorporate all you need to create spectacular multimedia content. They support NTSC and PAL standards and let you capture, edit and playback full-motion, full-resolution digital video with fully synchronized CD-quality audio. Designed for high performance IBM compatibles and Power Macs they deliver incredible processing speed for video and audio effects, tiling and compositing.

TARGA 1000/2000 PCI for Mac is the premier open systems (QT 2.1 Native) video capture/playback and effects acceleration board on the market. They provide a flexible "plug-and-play" solution for video authoring, 3D animation and multimedia applications. Work on animation projects with software like Strata Studio Pro or Specular Infranti-D and video or CD-ROM authoring with Adobe Premiere and After Effects 3.0.



#### Advanced DVR (Digital Video Recording) Technology:

The TARGA 1000/2000 employ advanced DVR technology to deliver superior video performance. Unlike other systems that treat each frame of video as a block of data tied to a specific order of steps such as decompression-resize-compress-write to disk, DVR writes an entire frame of uncompressed video to the huge on-board 20 MB RAM buffer of the TARGA 2000 (8 MB RAM buffer of the 1000). This is a "memory-centric" approach. In which all board functions share access to the video buffer. For example, a DSP (digital signal processing) chip can scan for additional data, such as matching audio samples to video frames to help maintain lip sync. Transitions, filters, effects and/or resizing can also be

applied while the uncompressed frame is in TARGA memory. The final output is then compressed and written to disk. Video data only crosses the bus twice—both times in compressed form. On other systems, the video data path is longer and more complicated. Video crosses the bus twice uncompressed and twice compressed. The DVR architecture can access information in its memory buffer at a speed of 230MB per second. Video runs only at 2 to 7 MB per second, so the TARGA boards have all the time needed to decide what to do with each frame. And because uncompressed data is never sent across the bus, bottlenecks that plague other systems are eliminated.

#### TARGA 1000/2000 Features:

- Record and playback video directly to/from hard drive at full motion, full frame rates (50 fields/sec—PAL, 60 fields/sec—NTSC). Video is stored and played back at the highest resolution for each format (768 x 576 x 24 bit—PAL, 640 x 480 x 24 bit—NTSC). Compression can be adjusted on the fly to optimize for image quality and/or minimum storage space.
- Audio is digitized at 44.1KHz or 48KHz sampling rates, for professional quality stereo sound. Since all audio and video processing is done by on-board DSPs, you are assured of perfectly synchronized sound and images.

- Equipped with 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
  - Optimized to work with Windows NT-based software (Adobe Premiere 4.2, iSync Speed-Razor MACH III)
- Macintosh version only:**
- Video capture plug-in for Adobe Photoshop.
  - Quicktime 2.1 compatible, can be used directly out of the box with many applications.

#### TARGA 2000 Additional Features:

- Accelerated Windows 3.11 and Windows NT 3.51 display drivers offer integrated, true-color (24-bit), non-interlaced desktop up to 1152 x 870 pixels.
- View your desktop and video-in-a-window on your non-interlaced monitor while the processed video is output at NTSC or PAL to a video monitor and/or a VCR.

- Provides a large work area for displaying video, as well as editing application controls. Any part of the display (or even the whole image) can be recorded to tape (video-out-of-a-window)
- Equipped with composite and S-video inputs/outputs. Also available with component input/output (TARGA 2000 PRO)

TARGA 1000 for Windows or Macintosh PCI (specify)	2595.00
TARGA 2000 for Windows or Macintosh PCI (specify)	3995.00
Special! TARGA 2000 for EISA (PC) or Nubus (Macintosh) (specify)	2495.00

## NEW! TARGA 2000 RTX

Truevision's most advanced digital solution, TARGA 2000 RTX features a breakthrough architecture to deliver broadcast quality video and real-time effects processing on the desktop. It provides input and output connections through an advanced breakout box, works in Windows NT or Mac OS environments and can drive an 21-inch RGB monitor at 24-bit color. It also supports full-motion previewing on both RGB and video monitors. The 2000 RTX installs in a single PCI slot, and it plugs directly into the breakout box. The box can be rackmounted or utilized as a stand-alone device on your desktop. It allows easy connection to your input and output cables for composite, component and S-video as well as XLR balanced audio, genlock and alpha channel.

- QuickTime and Video for Windows Native lets it work with a large number of off-the-shelf video applications
- Dual Motion JPEG Codec Architecture processes 2D digital effects in real-time
- Breakout box with component I/O and balanced XLR audio for integration into post-production environments



- Alpha channel output supports downstream luminance and chrominance keying
- Delivers near lossless broadcast quality video to your desktop (up to 9 MB/s per second (300KB per frame))
- CCIR 601 and Square Pixel support

TARGA 2000 RTX boards are only available outside of N.Y. area in complete turnkey systems. See next page.

While other off-the-shelf video authoring applications can be used with the TARGA 2000 RTX, only one takes advantage of its two streams of video and only one performs effects in realtime.....



It empowers your TARGA 2000 RTX to do exactly what it's meant to do.

Working in perfect harmony with the RTX hardware, SPHEREOUS software takes your video productions to new heights. It lets you see your creativity the minute it strikes. In fact, everything SPHEREOUS does is realtime.

- The RTX dual codec provides SPHEREOUS with two simultaneous streams of video. So all the value-adding effects that are spinning and swirling in your mind can come to life—immediately
- Realtime effects include wipes and fades, dissolves and digital video effects. There is also realtime audio panning and mixing, plus the ability to create unlimited custom effects. The sky is the limit.
- The easy-to-use SPHEREOUS interface will have you up and running right away. Many functions are completely intuitive so there is no need for lengthy training courses. Just plug it in and start editing. Readily available on-line help further simplifies the process.
- SPHEREOUS gives the ability to access and exchange media freely—allowing members of a creative team to realize the full potential of the digital convergence.

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## A note about our turnkey systems:

In addition to the systems listed on this page, we can further customize any system to fit particular needs. You can choose faster display cards, bigger hard drives, more memory, larger monitors, better speakers, etc. We also carry a large variety of 2X and 4X CD-ROM writers (HP SureStore 40201, Sony Spressa, FWB Hammer CD-Rs), RAID subsystems (Optima, FWB), portable storage devices (Iomega, Syquest) to name a few. Tell us what you need and our salespeople will custom-design a system for you. And if you happen to be in New York, please come and...

*Visit our expanded Video Store and Digital Video Showroom*

# in:sync SPEED RAZOR MACH 3.5

## Digital Video Editor for Windows NT

The ultimate digital video editing software, Speed-Razor MACH 3.5 allows you to edit full screen, 60 fields per second, CCIR 601 broadcast-quality video. Designed for the DPS PVR-2500 Perception and Truevision's TARGA 1000/2000 video capture cards, Speed-Razor MACH 3.5 is the fastest and most powerful tool for editing and compositing video clips, animations, stills, music and sound effects. Experience straight cut editing in real time and effects which fly on the fastest machines cut there: Alpha, Intel, MIPS-based and PowerPC-based workstations, making this the fastest, most flexible software you've ever seen. Running under Windows NT, it offers three times the speed of Windows 3.1 on the same machine and up to ten times speed when used on Alpha-based systems.

Speed-Razor features infinite video, audio, transition and effects tracks and comes with Razor Blades—transitions and effects to enhance your production. There are preset tumblers, fades and wipes which you can easily customize and save as new presets. In addition, there are special image effects which are unquestionably the highest quality of any system—analogue or digital. Speed-Razor sports anti-aliased 3D DVEs, an infinite channel chroma keyer and an excellent character generator. Use the Included effects or transitions, layer them to create new ones, make your own grayscale bitmaps to use as transitions, or use 3rd party plug-in effects—the flexibility is yours.

There are two user definable resolution modes (thumbnail and final) to facilitate editing. The thumbnail mode allows you to use Speed Razor in the field on a laptop then transfer the project file back at the edit suite and automatically recapture and re-render the entire project at final resolution. RS-422 control and batch capture module allow you to automate video capture via SMPTE time code, so digitizing video and audio is simple and painless. In fact, with the Innovative "Virtual Editing" function you can actually edit your project, complete with effects and transitions—before you've digitized a single frame of video.

### EDITING FEATURES:

- Real-time straight cut editing (this doesn't require a new file to be made and requires less space on the hard drive to edit)
- The only video editor with the ability to cut to the field
- Work in Thumbnail or Final Output resolution mode (you set the resolution for each)

### COMPOSITING:

- Infinite number of layers of video clips, still and animations can be composited together
- Handles any resolution from Betacam (720 X 480) up to Omnimax film (4000 X 4000)
- Video clips can be combined using an alpha channel, key color transparency, still or travelling mattes

### FILE FORMATS:

- Reads and writes ANI files (created by DPS' PAR), PVD files (Perception), DVM files (TARGA 1000 and 2000) and sequences of TARGA files
- Convert files between any of the following formats: ANI, PVD, DVM, AVI, BMP, TGA, FLC, FLI, WAV
- Project-based Library for organizing your work

### AUDIO:

- Handles audio up to DAT (48 kHz) quality
- Infinite number of audio tracks for multi-layer audio mixing

### EFFECTS:

- Blur (circular, gaussian, fast), tint, brightness adjustment, chroma key, crop, displacement, emboss, freeze frame, glass texture, greyscale, invert, lope, matte, pixelate, repeat fields, scale, transparency, strobe, turn red/green/blue
- 3D DVE (translates and/or rotates an image in three dimensions on the X, Y and Z axis)
- Sets a color channel to an assignable value
- Titles (full blown CG using any Windows font in any color with automatic drop shadow)
- Sub-pixel rendering for incredibly smooth motion
- Effects can be applied to infinite sources

### TRANSITIONS:

- Includes over 100 grayscale image transitions, crossfades, luminance fades, fade to/from black, fade to/from white, push, twist, twist in/out tumblers, flip, turn, scale (zoom)
- Transitions can be applied between infinite inputs

in:sync Speed Razor MACH III for DPS PAR-2100 and PVR-2500 .....CALL  
in:sync Speed Razor MACH III for Truevision TARGA 1000 and TARGA 2000 .....CALL

## TARGA 1000/2000 and DPS PVR-2500 Windows NT 3.51 Turnkey Systems:

- Video capture board (specify)
- 220-watt, 6-bay midtower case
- PCI motherboard with 512K pipelined burst cache
- Pentium 166 MHz processor
- 9FX Motion 771 2MB VRAM PCI display card (TARGA 2000 Systems only)
- 9FX Motion 771 4MB VRAM PCI display card (DPS and TARGA 1000 Systems only)
- 32MB of EDO (Extended Data Out) RAM (Premiere systems only)
- 64MB of EDO RAM (Real Impact and Speed Razor systems only)
- Quantum 1.28GB IDE system drive
- Seagate (Barracuda) 4.2GB SCSI-2 FAST/Wide hard drive
- Adaptec AHA-2940UW FAST/Wide SCSI-2 controller card
- MediaTRIX AudioTRIX Pro DSP-equipped 16-bit audio card (for DPS systems only)
- 3.5" floppy drive • Teac CD-58e BX EIDE internal CD-ROM drive
- Aitec-Lansing 300.1 three-piece deluxe speaker system
- Princeton Ultra 17+high resolution 17-inch multiscan monitor
- Focus 2001A keyboard • Microsoft MS mouse • Windows NT 3.51 operating system software.



TARGA 1000/Adobe Premiere 4.2 .....	\$7495	TARGA 1000 PRO/in:sync Speed-Razor MACH 3.5 .....	\$9295
TARGA 1000 PRO/Adobe Premiere 4.2 .....	\$7795	TARGA 2000/in:sync Speed-Razor .....	\$10,695
TARGA 1000/in:sync Speed-Razor MACH 3.5 .....	\$8995	TARGA 2000 PRO/in:sync Speed-Razor .....	\$11,395

\*PVR-2500/AO-2500 w/Adobe Premiere 4.2 .....

\*PVR-2500 System Notes: 1) Does not include Adaptec SCSI-2 controller card (has built-in SCSI-2 port)

2) Includes Seagate Barracuda 4.2GB Narrow hard drive (doesn't accept Wide drives)

<b>Expansions and Upgrades for all Systems:</b>			
Full Tower Case (10-bay) .....	add 100.00	Super Tower Case (12-bay) .....	add 200.00
Pentium Pro motherboard and Pentium Pro 200 MHz processor (256k cache) .....	add 800.00		
9FX Motion 771 4MB VRAM PCI Display Card (for TARGA 2000 systems only) .....	add 200.00		
Seagate Elite 9.1GB Narrow drive (for DPS) .....	add 1000.00	Seagate Elite 9.1GB Wide drive .....	add 1000.00
MAG Innovation MXP-17F 17" multiscan monitor .....	add 225.00	MAG MXP-21F 21-inch multiscan monitor .....	add 1100.00

## DATA TRANSLATION

### BROADWAY MPEG-1 Encoder

Broadway is a low-cost, real-time capture, edit and compression solution that makes adding video to your desktop applications a snap. Broadway seamlessly supplies MPEG-1 digitized video and audio to any Windows presentation, animation or multimedia authoring package. A true plug-and-play solution, you need no prior experience with digital video to install or use. Plus, its all-in-one package so no additional boards, playback cards, monitors or sound cards are required beyond those standard in your multimedia PC.

#### Video Capture:

• Broadway captures full-color, full-motion composite or S-video at 30 fps (frames per second) with synchronized audio. Video can be viewed in real time on your existing monitor and then digitized in real time, compressed to MPEG-1 1 frame only and stored on your hard drive in editable MPEG-1 format. There are no dropped frames and no undesirable artifacts.

#### Compression:

• A robust implementation of the MPEG-1 standard for digital video compression, Broadway includes three levels of encoding—intraframe (I), predictive (P) and bi-directional (B)—to achieve the highest quality video in the smallest possible file size (up to 200-1 compression). Video is compressed into the MPEG-1 standard at about three times real time or 3 minutes for every one minute clip. Systems which use software compression can take thirty to sixty minutes per one minute clip. In addition, Broadway can compress existing uncompressed .avi files from any video source without having to capture it.

#### Video Editing:

• Incorporating hardware acceleration, Broadway allows you to cut, paste, save selection, replace audio, etc. in almost real time. You can also combine several video clips in one sequence and include simple transitions. For complex video editing and sophisticated transitions, Broadway is VFW (Video for Windows) compliant so you can use software like Adobe Premiere or Ulead MediaStudio.

## MEDIA 100 QX

Media 100 qx is a high-performance digital video system that lets users of QuickTime-based applications create professional broadcast-quality video programs. It combines industry-leading image and audio quality with the industry's most popular editing program—Adobe Premiere. The result is broadcast-quality programs indistinguishable from Betacam—at an affordable price. Media 100 qx lowers the cost traditionally associated with digital video systems. Plus it offers an easy software-only upgrade path to the advanced features and real-time functionality of professional Media 100 systems.

#### BROADCAST-QUALITY VIDEO:

Media 100 qx is based on Vincent, the same digital engine used in the professional Media 100. Vincent is a single-card designed specifically for Power Macintosh systems with PCI bus. In fact, by using Vincent, Media 100 qx delivers image and audio quality indistinguishable from what thousands of professional Media 100 users get everyday. True broadcast quality not available with any other QuickTime-based video editing product.

#### OPERATES IN YUV COLOR SPACE:

Vincent is a true video processing card that processes video signals in YUV color space avoiding the quality degradation inherent in RGB conversion. Media 100 qx also supports component video (Media 100 qx Component). This version brings broadcast-quality Y, R-Y, B-Y video input and output to Media 100 qx.

#### FAST RENDERING:

Power of the Vincent board increases your productivity by accelerating the rendering of 20 of the most popular effects.

#### OPEN SYSTEM FOR UNLIMITED OPTIONS:

An open system Media 100 qx is fully compatible with Power Macintosh hardware and off-the-shelf software. Open system design also means that you have a common interface and transparent access to QuickTime applications.

#### SPECIFICATIONS:

- All digital, on-line video processing card with data rates up to 200 KB/frame—equates to 6.0 MB per second
- Full-screen, full-motion video capture and playback at 30 fps (60 fields) NTSC and 25fps (50 fields) PAL
- Composite and S-video input and output. Also available with component input and output (Media 100 qx Component)
- Uses standard high-performance Mac SCSI drives

#### WORK WITH QUICK-TIME APPLICATIONS:

Media 100qx runs seamlessly under QuickTime, providing communication between Media 100 qx and hundreds of QT applications such as Adobe Premiere and After Effects 3.0, Strata StudioPro and Macromedia Director. QT integration lets you "drag and drop" files between multiple applications with no loss in quality.

#### MEDIA 100 COMPATIBILITY:

Provides a software-only upgrade to the real-time editing functionality of the high-end Media 100. Clip media and programs authored on Media 100 qx can be used directly by any Media 100 system with no data loss. Drag and drop files from one system to another.

#### PLATINUM ONE-STOP SUPPORT SERVICE:

The most comprehensive service and support offerings in the industry. Choose from a full range of options including, unlimited toll-free telephone support, exchange loaner program, extended warranty and All-in-One Protection.

- Genlock output for integration with pro systems
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- 20 accelerated wipes and dissolve effects

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- Silex seneOUs Realtime Editing Software (TARGA 2000 RTX systems only)

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For systems with Media 100 qx Component .....	add \$7500		

\*Purchase a Platinum One-Stop Technical Support contract for the Media 100 qx until 10/23/96 and receive a free software upgrade to the new Media 100 lx. A feature set below the full-blown Pro Media 100, the new Media 100 lx offers real-time non-linear editing, real-time editing of 4-track CD-quality audio, real-time audio node adjustment during playback and single-track audio cross dissolves, alpha channel support and FastFX: accelerated dissolves and wipes .....399.00

*Continued from page 22*

a contact microphone, which picked up a range of "high-tech" ambiances. We recorded guns simultaneously up close and from across a canyon, the combination of which makes for a rich and dynamic gun blast. Recording sound effects is not like recording Segovia on a stage; you are not preserving a performance, but rather creating a unique sound with unique emotional resonances.

A final sound track should sound like it was recorded as a single event, but in truth, it is probably made up of hundreds of isolated, individual bits, carefully chosen and combined to make the complete sound we want to hear. Isolated sound effects give sound editors and mixers more flexibility. When recording animals for the *Jurassic Park* films, I usually used a narrow-field mono microphone to separate the vocals from the backgrounds. The cleaner the tiger roar, the better.

### Nature vs. technology

When recording jungle ambiances for this project, I discovered that if I was near the microphone, the nasty bugs I attracted would dominate the recording. So I set the microphone on a tripod and used long cables to get myself and the DAT recorder as far away from the mics as possible — unless, of course, I was *trying* to record the sound of nasty bugs, in which case I could use myself as bait. Other interesting effects were produced by

strange creatures in gurgly swamps, the dripping of perpetually wet vegetation and the rumbles and hissing rocks of an active volcano. I recorded animals whose names I can't pronounce, but will soon be the voices of dinosaurs who no longer exist.

A further advantage of portable DAT is its ability to let the recordist easily write, erase and renumber tape IDs while still in the field. This lets you get a head start on the logging of the sound effects, which continues back in the dark, windowless studio.

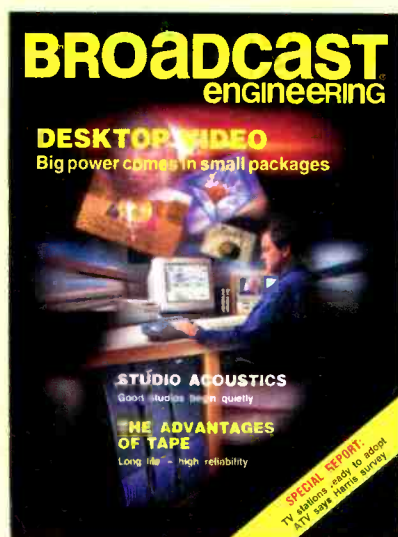
Today, SFX travel from rain forest to computer file. This is what makes SFX work fun — the balance of cutting-edge studio work with messy, unpredictable field work. The creation of ambiances and dinosaur voices for *The Lost World: Jurassic Park* will use the best of both. Yet, success increasingly depends on equipment that can bring the studio into the wild. ■

*Chris Boyes is a sound designer/re-recording mixer with Skywalker Sound, a division of Lucas Digital, San Rafael, CA.*

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- Broadcast Electronics Cart Player Stereo
- Sony EVO-9800 Hi 8 Editing Recorder (2)
- Sony Betamax SL-HF900 (makes a nice boat anchor)
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- Ace (Abekas) T8 SEC/Switcher
- Convergence 204T Editing system (JVC & Sony int)
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## HELP WANTED

**PGA TOUR** Production seeks applicants for a Chief Engineer position to oversee build out of new digital facility and maintain new and existing equipment and systems. Extensive benefit package and perks. A can-do attitude and the ability to work with others is a must. Please send resume and references to Chuck Scoggins, PGA TOUR Productions, 8160 Baymeadows Way west, Suite 300, Jacksonville, FL 32256. No phone calls please. EOE.

**TELEVISION BROADCAST Maintenance Engineer** WPGH-TV The leading independent/Fax Television Network affiliate station in Western Pennsylvania has an immediate opening for an experienced maintenance engineer. The successful candidate will have 5 years prior broadcast maintenance background. This is a hands-on position that will require a thorough knowledge of Beta, MII, 1", CCD, ENG, EFP, 2Ghz, LAN, WAN, TVRO. Strong news background favorable. High power UHF transmitters a plus. SBE Certification and/or FCC General Class License required. Send resume and salary history to: Karl W. Hansen, Chief Engineer, WPGH-TV, 750 Ivory Avenue, Pittsburgh, PA 15214. No phone calls please. EOE/M/F.

**STUDIO MAINTENANCE ENGINEER:** NBC and ABC affiliates in growing Florida market are looking for experienced engineer with computer and digital experience. Experience with BTS router, Pinnacle Flashfile, Avid Digital Airplay, Odetics Airplay, BTS Digital Switcher needed. Must be SBE certified with FCC license. Send resume to: Mike Reilly, 3719 Central Ave., Ft. Myers, FL 33901. EOE.

**ASSISTANT CHIEF ENGINEER** Looking for ACE with hands on experience, qualified in all areas of TV broadcast engineering transmitter and studio maintenance; SBE certified, FCC general license required. Send resume w/salary requirements to Classified Ad Coordinator, Broadcast Engineering, Dept. 780, 9800 Metcalf, Overland Park, KS 66212-2215. EOE.

**TECHNICAL: KSTW-** Seattle's CBS affiliate is seeking a Maintenance Engineer. Degree in electronics or related field required. 3-5 years recent experience servicing broadcast video tape machines, audio equipment and transmitters required. PC literate a must. Qualified applicants send resume to KSTW Human Resources, "Maintenance Engineer position", PO Box 9328, Seattle, WA 98109-0328.

**WANTED CHIEF ENGINEER** Quality orientated, Southeast-based TV group has a rare opening for an experienced television Chief Engineer. Candidate must have a strong, established television engineering and management background. Position requires a thorough knowledge of UHF transmitters, RF systems, ENG microwave systems, and TV studio equipment. Must be well versed in digital and computer systems. SBE certification preferred and strong people skills a must. Employer would consider an exceptionally adept candidate currently in an assistant chief position that is ready to move up. EEO employer encourages applications from females and minorities. Send resume with references to: Personal/Confidential, Classified Ad Coordinator, Broadcast Engineering, Dept. 781, 9800 Metcalf, Overland Park, KS 66212-2215.

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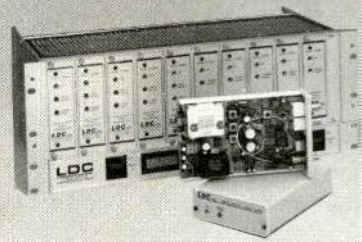
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**MAINTENANCE ENGINEER** National cable company seeks maintenance engineers for evening, overnight and weekend shifts. Candidate will have a thorough understanding of video systems maintenance, post-production/editing, and master control operations. Hands on maintenance experience with Sony Betacam, GVG editors, and switchers, and BTS routers a must. Fax resume to Engineering (212) 941-1821.

**MASTER CONTROL** Operators needed to oversee playback operations for Manhattan based facility. Full-time position with benefits. Prior experience in a Master Control environment necessary. Knowledge of video processing equipment, master control switchers, automation systems and computers required. Fax resume to Network Operations (212) 941-1821.

**CHIEF ENGINEER** WTVY-TV, a Benedek Broadcasting station and CBS affiliate for Dothan and Panama City, has an immediate opening for a Chief Engineer. Candidates should have experience with Harris transmitters, ENG operations, microwave systems, equipment maintenance and computer systems. SBE certification, FCC General Class license, management experience and five years in broadcast engineering is preferred. Send resume to: Human Resource, WTVY-TV, P.O. Box 1089, Dothan, AL 36302. Fax #334-793-3947. EOE.

**TV SYSTEMS ENGINEER** needed to do Customer Service/Installation for TV Automation company in Florida, 1995 Money Magazine's best city to live in. Travel in US and worldwide expected. Fax resume to: Traudi Buchanan 352.375.0859.

**BROADCAST MAINTENANCE TECHNICIAN:** Candidate must have a minimum of five years experience in audio, video, and digital graphics systems maintenance. Must be a self-starter, able to work various hours, and have good interpersonal skills. Send resume to: W\*USA-TV, Attn: Ben Kretchmar, 4100 Wisconsin Ave., N.W., Washington, DC 20016.

**BROADCAST ENGINEER:** Installation, maintenance, repair of UHF TV transmitter, translators, U-Matic tape deck and broadcast equipment. Two years experience required. EOE. Send resumes to: WUBI-TV, Attn.: Beth, PO Box 1080, Baxley, GA 31513-7080 or Fax to (912) 367-5299.

**TECHNICAL: KSTW-** Seattle's CBS affiliate is seeking an ENG/SNG Operator. Degree in electronics or related field required. 3-5 years experience with broadcast television microwave systems, satellite uplink equipment, etc. required. Qualified applicants send resume to KSTW Human Resources, "ENG/SNG position", PO Box 9328, Seattle, WA 98109-0328.

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**CHIEF ENGINEER** KETA, Oklahoma City, is seeking a hands on leader with strong maintenance background. Supervisory and organizational skills will be essential in guiding our technical team in planning and implementing projects. Please send your resume and salary history to the Personnel Department, Oklahoma Educational Television Authority, P.O. Box 14190, Oklahoma City, Oklahoma 73113. AA/EEO.

**TELEVISION MAINTENANCE ENGINEER** Responsible for maintenance, troubleshooting and repair of on-air, studio and post-production equipment. One-inch, Betacam, switcher and audio experience required. Transmitter and/or ENG experience a plus. Must have valid driver's license. No phone calls, please. Send resume to KDVR, Dept. ET, 501 Wazee St., Denver, CO 80204. EOE.

**ASSISTANT CHIEF ENGINEER** - Independent UHF station needs experienced person to maintain transmitter, microwave systems and studio equipment. FCC General License required. Please send resume to KTZZ-TV Personnel Dept., 945 Dexter Ave. North, Seattle, WA 98109. Fax (206) 281-0207. EOE.

**RF MAINTENANCE TECHNICIAN** - Qualified candidates must have at least 5 years experience with VHF television transmitters, EMCEE translators, fixed and ENG microwave, antenna systems and remote control systems. Also requires 3 years experience maintaining satellite equipment. Successful candidate must be willing to maintain transmitter during the off hours of the day and maintain 10 other electronic sites throughout the state of Arizona. Knowledge of air conditioning systems and electrical power and wiring are a must. Also requires knowledge of studio equipment and computers. Contact: Gerry Grunig, Chief Engineer, KSAZ-TV, 511 W. Adams St., Phoenix, AZ 85003 FAX:602-262-0177. (EOE)

**RF TEST ENGINEER** The Advanced Television Technology Center (ATTC) has an immediate opening for a RF engineer skilled in testing of television broadcast systems. Duties will include the operation and maintenance of the RF test bed located at the ATTC. A knowledge of video, audio, and especially RF are required. Experience in trouble shooting RF equipment is required. Contact: Executive Director, Advanced Television Technology Center, 1330 Braddock Place, Suite 200, Alexandria, Virginia 22314 703/739-3850 (phone) 703/739-3230 (fax).

**CHIEF ENGINEER:** Florence/Myrtle Beach TV station has an opening for a Chief Engineer with an eye on the future. RF Background needed, extensive studio maintenance experience a requirement, especially videotape. Contact Vicky Street, WGSE-TV, at (803) 399-6143 or fax resume to (803) 399-7050.

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## Compression standards

**S**ome months ago, I promised to compare the XPEG standards. However, other things came up and that comparison turned out to be the least exciting. Having been castigated by a few readers, it is time to repent. So, to the gentleman who feels forced to read the column even though it is too simple, this is dedicated to you.

All of the XPEG standards are lossy and based on compression of a discrete cosine transform (DCT) of the original signal. The degree of bit-rate reduction differs, as do the methods of applying it.

JPEG is for still images with reduction ratios between 10:1 and 50:1. The algorithm is symmetrical and the time for encoding and decoding are the same. There is no need for motion compensation, and there is no provision for audio in the standard. Software JPEG decoders are speed-marginal, even in the fastest PCs, although plenty of hardware solutions are available.

Motion JPEG uses intraframe compression, where each frame is treated as an individual signal and a series of frames is basically a stream of JPEG signals. The benefit is this construction is easy to edit, making it a good choice for non-linear and similar editors. Also, any individual frame is self-supporting and can be accessed as a stand-alone image. With a fast access system, the compressed images could form a type of still-store.

The major disadvantages of Motion JPEG are with bandwidth and storage. Because stand-alone frames are coded, there is no opportunity to code only the differences between frames, i.e., remove redundancies, so a 640x480 image with 24-bit color at 30fps would require 240Mb/s at 50:1 compression.

### MPEG-1

MPEG-1 was mentioned in the August column as a coding scheme for progressively scanned video. The standard was developed for CD-ROM coding. MPEG-1, with bit-rates of 1.5 to 2.0Mb/s, supports 525- and 625-type signal structures in progressive form with 240/288 lines per frame, sequential-scan frame rates of 29.97 and 25 per second and 352 pixels per line. The coding of high-motion signals does not produce good results. Three different kinds of frame coding are used in the standard: Intrapicture (I), Predicted-picture (P) and Bidirectional picture (B) frames.

I frames are compressed using only the information

within a frame and are reference frames, with at least two I frames guaranteed for every second of video. Because I frames are needed for P and B frames, this limits editing and even random starting points of video.

P frames are derived from previous I and P frames and predict motion in future frames. B frames take the derivation further to I and P frames before and after the current frame. The overall bit-rate reduction ratios achievable are about 6:1 with a bit-rate of 6Mb/s and 200:1 at 1.5Mb/s. Like the better-quality MPEG-2, the compression of MPEG-1 is not symmetrical. The compression side is more complex and expensive.

### ITU standards

Discussions of compressed video should not ignore the ITU standards for video conferencing applications. In the last 18 months, the industry has become standardized with fewer proprietary solutions. The adopted H.261 lossy video compression standard gives reasonable pictures on stationary objects with channels up to Narrow ISDN (64kb/s). H.262 is the standard for Broadband ISDN (128kb/s and higher) and offers double the resolution. But a newer compression standard has been approved for the channels (H.263) and this gives an improvement in quality for the lower bit-rate circuits like plain old telephone service (POTS). The video standard is applied within the approved transport layers, which are H.324 for POTS, H.320 for N-ISDN, H.321 for B-ISDN/ATM and H.322/H.323 for LAN standards.

A significant development in compression has taken place as this column is written; CompCore Multimedia, Inc. (Santa Clara, CA) announced that a software decoding solution for Dolby AC-3 has been developed and has received approval from Dolby Laboratories. The SoundPEG-2 is capable of the complete software-decoding of AC-3, MPEG-2 video and DVD navigation when an Intel processor supporting multimedia extension instructions is used. A combined software/hardware solution is also possible with just about any MPEG-2 video decoding chip. The announcement is important for progress in DVD and possibly ATV, but it is surprising that Dolby did not develop a software solution of its own first, and then license that. ■

*Paul McGoldrick is a freelance writer and consultant based on the West Coast.*

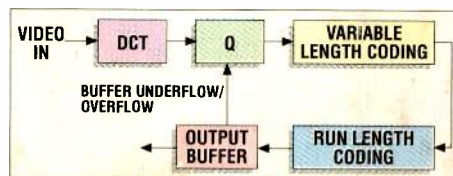


Figure 1. Basic block diagram of DCT-based compression.

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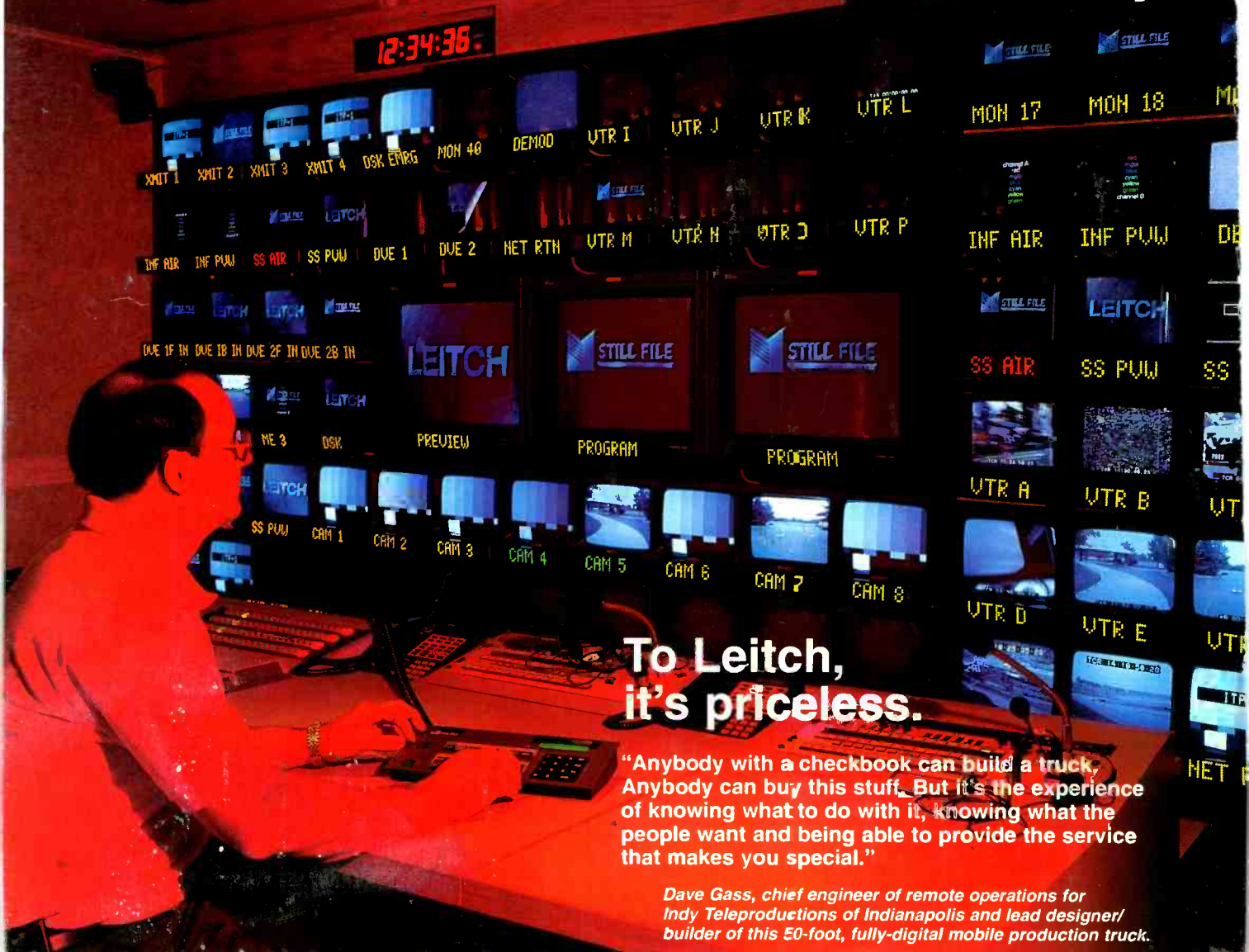
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