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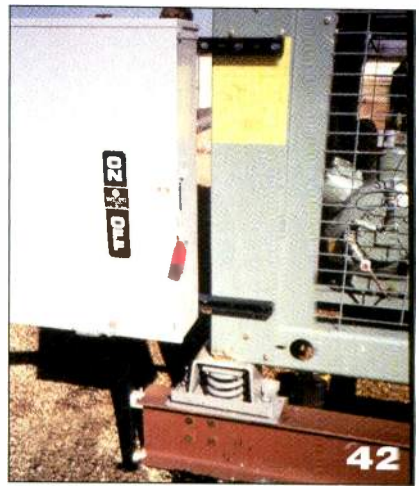

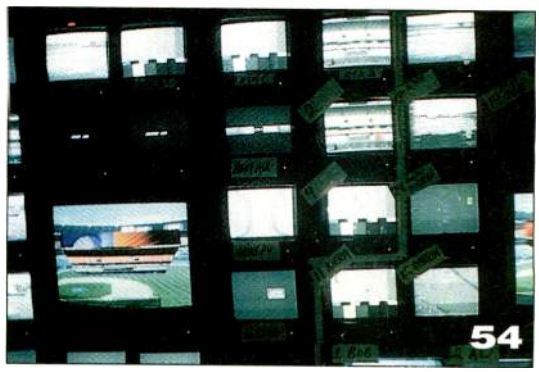

ON THE COVER: Larry Click gets creative using the 50 compositing layers and Dveous FX, a Scitex Digital Video ImMIX StrataSphere digital non-linear editing workstation, located at Flessing & Flessing, Auburn, CA. Photos and compositing by Douglas Schwartz, Sterling Communications, Santa Clara, CA, and Rick Der Photography, San Francisco, CA. Images courtesy of Pinnacle Systems.

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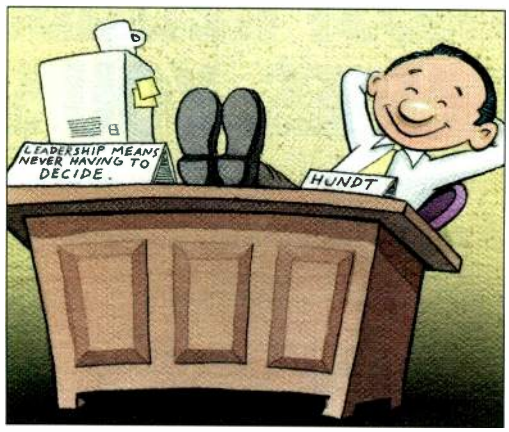
editorial

Marketplace leadership

With time running out, the broadcast, computer and consumer electronics industries reached an agreement on digital TV transmission standards. Perhaps as a Thanksgiving turkey to the American public, the three groups forged an uneasy alliance on Nov. 25 to help get ATV off the ground. Just what FCC chairman Reed Hundt wanted, a decision to not decide — another word for marketplace leadership.

The agreement between the three industries is so tentative that it expires on Dec. 31. If the commission doesn't approve the Grand Alliance standard with the certain exceptions by then, the agreement expires.



The short of it is that the groups collectively recommended that the FCC adopt the Grand Alliance standard as written — with the exception of Section 5, Table 3. This table basically outlines the interlace and progressive formats along with the horizontal and vertical resolution for the 18 different display formats. With that table deleted from the standard, TV stations can transmit just about anything they want to.

Fortunately, TV set manufacturers have stated that they'll produce sets that will decode all 18 formats. This means that the sets will probably decode almost anything the broadcasters or the computer industries decide to transmit. Set manufacturers could, however, decide to produce sets that will decode only one or a few of the possible formats. That would immediately force broadcasters to adopt that format. Or, the computer industry could decide to produce programming with specifications outside the 18 specified Grand Alliance formats. Your brand new TV set would not be able to receive the signal. You can bet that your new computer would, however. We're back in a "marketplace decision" mode, a la the AM stereo fiasco.

By most accounts, the FCC will approve the GA standard with the modification by year's end. Set makers are eager to bring new models to market. The computer industry is more than ready to try to woo consumers to a progressive display and their PC/TV operating system. That leaves the broadcasters looking for direction.

Fortunately, you don't have to know what video format you're going to have to transmit. You just have to decide to stay in business and begin the planning process now. As the attendees were reminded at last month's third annual *Broadcast Engineering* Transition to Digital Conference, the future lies in digital. So begin making plans now to adopt digital solutions in as many places as possible.

The most important step is to start planning for the needed upgrades in the transmission system. No matter what ATV format you'll eventually need, the tower, antenna and transmitter will be the same. Any encoding changes will be relatively inexpensive and easy to implement. For instance, Harris has already announced that its ATV exciter will accommodate any of the proposed transmission formats and that future changes can be accommodated.

Your New Year's resolution should be to:

- Order a tower structural analysis as soon as possible.
- Begin the planning (and budgeting) for a new antenna and transmitter.
- Consider placing bids for the transmission components in 1997.

Because tower, antenna and transmission components may take a year or more to get, you may not want to wait until sets appear in your viewers' living rooms to start this process. These simple actions can help guarantee you a place in the manufacturing process and help ensure timely delivery of the systems you'll need to remain in business.

Brad Dick

Brad Dick, editor

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letters to the editor

Frank talk about Frankenstein TV

Dear editor:

The TV and the PC are not fated to merge into one appliance because, separately, they serve two different functions. Take a look at the way the consumer uses each one: The PC is an active and solitary experience — the user sits two feet away and tactilely manipulates its programs. The television is a passive experience and is often shared with others.

That the television is the focal piece of furniture in America's living rooms should tell you that it's intended for group use --- much like the sofa. The PC sits on a desk facing one chair. Hmm. Would you want to lounge on the couch after a long day at the office and watch your spouse balance the checkbook on Television-Quicken? Would you ever then, frustrated and bored, go sit at a desk and watch "Independence Day" in its entirety on the PC?

I don't see a crossover working, because I hate watching powerless as my husband remote controls through TV shows I hate. If he tried to subject me to his WWW-on-TV choices, I would be forced to wrestle the wireless keyboard away from him and knock him unconscious with it. I don't think that would be good for the equipment.

Michelle Brown
Manager, marketing and communications
Tele-TV Systems

Dear editor:

As a local broadcaster who has been dropped from the local cable system, your editorial (*BE* September 1996) was right on. After six years into a 10-year retransmission agreement, the local cable system chose to accept the expression of approximately 200 of its 90,000 viewers and drop this local broadcaster from its system.

Give us a break! The cable systems seem to believe that they know best what we should watch?

Dick Tedeschi
General manager
RLB-TV

'96 Olympics

To the editor:

Please inform Al Fisher, author of the "'96 Olympics: Gold Medal Technology" (*BE* August 1996), that the International Broadcast Center for the 1996 Atlanta Olympic Games was in the Georgia World Congress Center and not at the Georgia Dome.

And while I am on my soap box, I would really appreciate it if someone would write an article about the inner workings of the TV world at the '96 Olympic Games that had actually been in Atlanta and not read it from ACOG/AOB/Panasonic press releases.

I was there and I saw a lot of great nuts-n-bolts television going on at the individual venues. But all I have read so far is about how great the Panasonic-equipped IBC and NBC worked.

And to date, no one has written a word about the hundreds of hard-working AOB TV free-lancers from all over North America that worked 16-hour days for two to three weeks. It was hard work, but satisfying.

Would I go work Sydney and face the same obstacles and more? You bet, in a heartbeat.

Andrew Parris
Production engineer and free-lance videotape OP/video operator
Taft Broadcasting

Al responds:

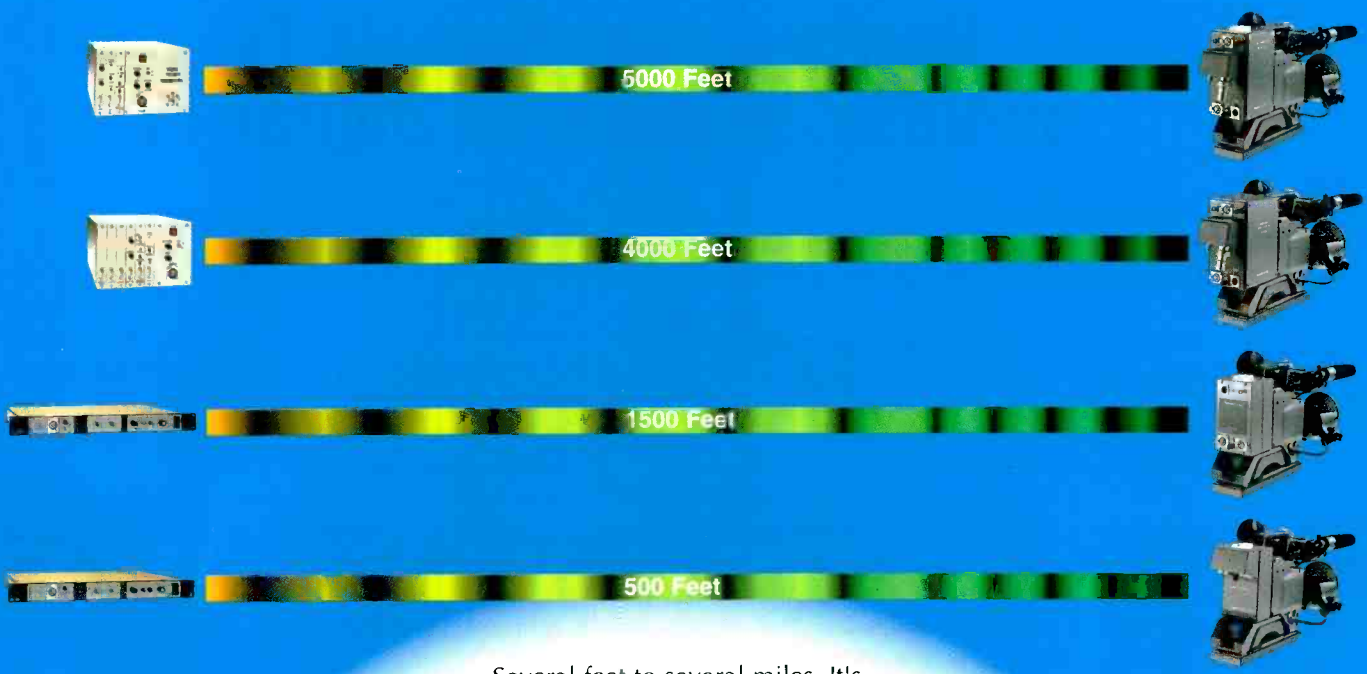
Thanks for your first-hand comments about the Olympics article.

I agree that reporting on an event the size of the Olympic Games is best done at the site. However, publishing deadlines sometimes don't allow that, so we had to work from press releases and from interviews with working people (including free-lancers) and managers of the broadcast organizations.

I hope you have the opportunity to work the 2000 Games in Sydney.

Send your thoughts to the editor at
CompuServe 74672,3124
or fax to 913-967-1905.

Telemetrics Goes The Distance.



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*All distance specifications based on using standard Belden 9232 triax and 8281 coax cable.

By Brad Dick, editor

Harris survey reveals TV stations' mindset on digital TV

In a just-released survey for Harris Broadcast, TV station executives described their thoughts on the conversion process to digital television. Although this survey was completed before the just-announced agreement between the computer, broadcast and TV set manufacturers, the results remain valid.

It's cheaper than you think

One of the most surprising results of the survey was how much station executives overestimated the cost of converting to ATV. Fully 25% of the respondents thought it would cost $8 million or more to convert their stations to ATV transmission. The next largest response category, 20%, thought it would cost about $2 million. See Figure 1.

The real cost of getting just the RF portion of a TV station going is closer to $1.5 million, according to some experts. This means that stations may be overly pessimistic about the cost of continuing to do business in the ATV future.

What is unspoken is the cost to equip a complete camera-to-antenna system. While that would certainly be in the higher cost range, there is no reason for stations to fear facing those costs in the near term. With the FCC expected to approve the recent agreement between the "big three" industries by year's end, stations need only be concerned now about footing the bill for a transmitter, antenna and possibly a tower, to begin ATV transmissions.

The clock is ticking

Not surprisingly, more than 60% of the TV station respondents wanted at least 10 years to complete the conversion to digital TV broadcasts; 75% wanted at least seven years.

Despite the desire for a long conversion time frame, stations said they felt the process would be completed much earlier. The majority, 51%, felt stations would convert to digital transmission within a two- to five-year time frame after the FCC sets the process in motion.

The advantages of ATV

When asked why stations should implement digital television, a resounding 72% said it was to remain competitive. Only 3% saw ATV as having the major benefit of generating additional revenue. Another minuscule 3% saw ATV as a major benefit to their ratings. Some 17% perceived ATV's major benefit as producing a better-quality signal.

These results might be perceived as grudging admittance by TV stations that they have no choice but to implement digital transmission just to remain in business. Clearly, few respondents see immediate financial benefits from building ATV stations.

TV executives miss the mark

One area where TV station executives seem to have missed the mark is in predicting when ATV receivers will be available. The results may reveal more wishful thinking on their part, than what's more likely to happen.

More than one-third, 34%, said that new ATV sets wouldn't be available until five years after the announcement of a standard. Even 17% thought it would be at least six years before sets were available.

More than one-fifth, 21%, said it would take two years for sets to appear on the market. Looking at all responses, station executives predicted that sets wouldn't be available until 4.5 years after the announcement of

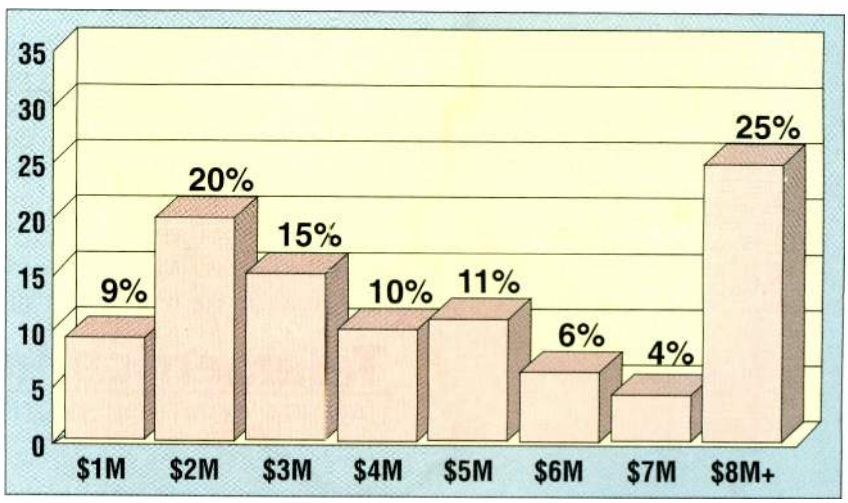

Figure 1. When questioned on the predicted cost to implement ATV, most stations greatly overestimated the actual costs. According to some experts, the RF portion of an ATV system could be built for approximately $1.5 million.

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CBS '60 Minutes' segment; The National Park Service

Vicky Braden
General Manager, Senior Editor

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a standard.

It is here that station managers may have seriously missed the mark. According to Gary Shapiro, president of the Consumer Electronics Manufacturers Association, the first HDTV sets will appear on the market beginning in 1998. That is only one year away. If a station were to implement ATV based on a six-year set arrival time frame, they could find themselves severely lagging behind their broadcast competitors and the PC industry in the fight for viewer's eyeball time.

Stations may be overly pessimistic about the cost of continuing to do business in the ATV future.

Learned lessons

The Harris survey is a benchmark study in the "mindset" of broadcasters. In total, it presents a conflicting picture of not only the costs involved, but the time frame in which stations must be ready to move.

The most positive element is that stations have overestimated the conversion costs. It will not be as expensive to get an ATV signal on the air as many think. With a year to plan, many stations will be able to budget accordingly.

It is worrisome that stations may be underestimating the speed with which TV set makers and the computer industry plan to implement the new digital technology. This could leave some stations dangerously behind the technology curve as their viewers begin purchasing these new sets — and tuning to the alternatives that may be available by then.

With billion-dollar industries like computers and TV set manufacturers ready to run, broadcasters must not wait until the last minute to train for the upcoming race. Installing towers, antennas, purchasing land, and clearing zoning issues all take time — precious time. Several of the larger broadcast groups have already ordered or issued contracts for transmitters and antenna systems. Individual stations may want to take a clue from the big guys and cue up now for the needed hardware. ■

Editor's note: For more information about the results of the survey, contact Harris Broadcast at 217-222-8200.

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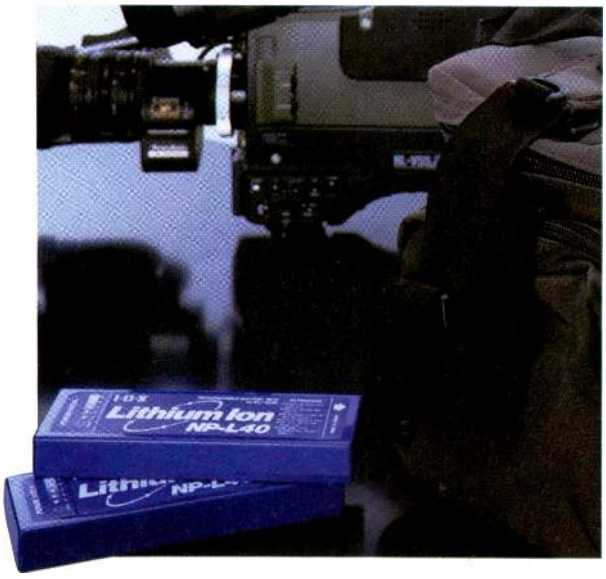

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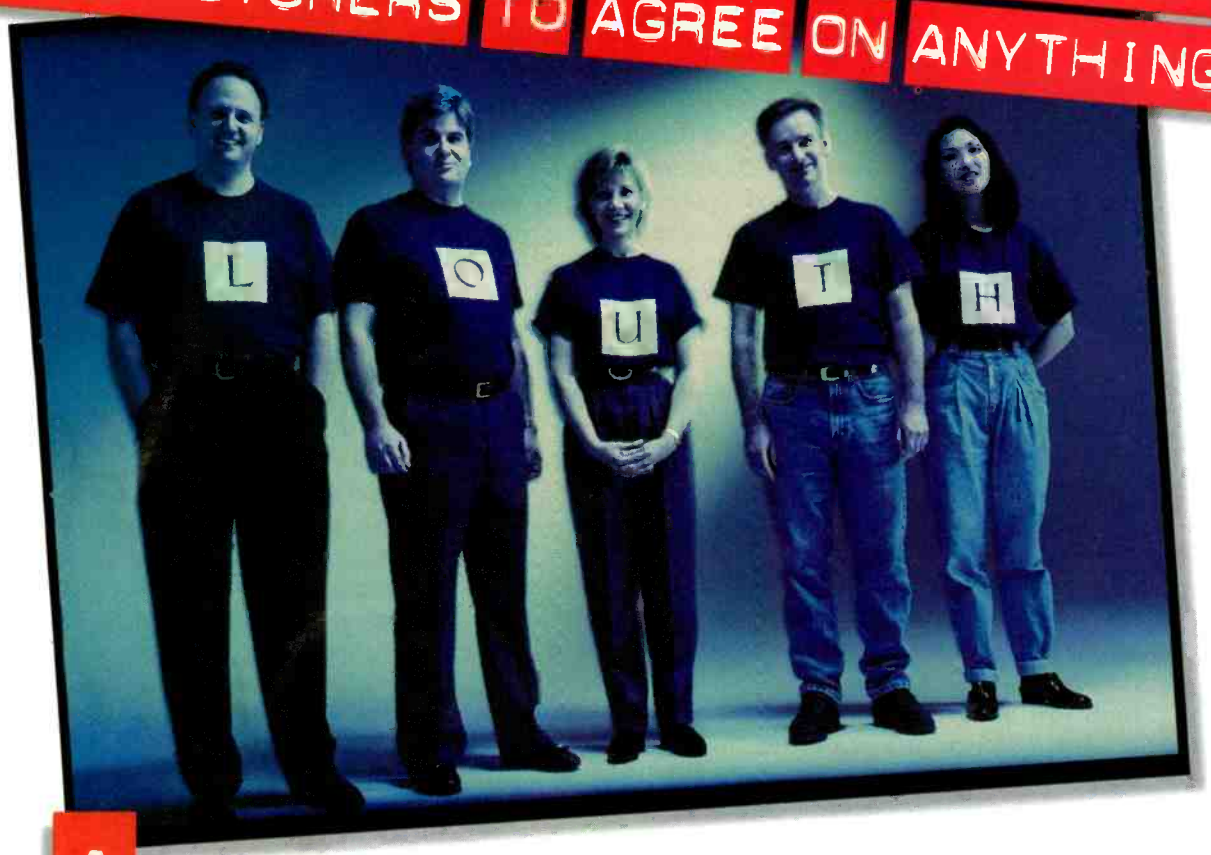
HOW DO YOU GET FIVE DISK SYSTEM MANUFACTURERS TO AGREE ON ANYTHING?



Actually, 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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By Harry C. Martin and Richard J. Estevez

A DTV agreement

A compromise has been struck by the broadcast, computer and set manufacturers on the proposed DTV standard. In a statement by FCC chairman Reed Hundt, the FCC's goal has been to trust the market, not government, to define digital television of the future.

With the three industries coming to an agreement, the groups have recommended that the FCC adopt the voluntary ATSC DTV standard, except for the video format (Section 5 of Table 3), by Dec. 31. The FCC's Report and Order adopting the standard will also allow data broadcasting, which is the transmission of any type of data other than real-time video and audio programming.

TV ownership rules revisited

The FCC has released two rulemaking notices seeking comments on the following TV ownership issues:

• Issue 1. *Local television ownership rule.* The FCC is proposing to allow common ownership of TV stations that are in separate designated market areas (DMAs) and that don't have overlapping Grade A contours.

The FCC is also seeking comments on whether to allow TV cross-ownership waivers under the following conditions: 1) when the combination will be UHF/UHF rather than UHF/VHF; 2) when the station to be purchased is a "failed" or "failing station;" 3) when a licensee is applying for a channel allotment that has remained vacant and unused for some time (e.g., five years); 4) when joint ownership will result in a small audience or advertising market shares or the combination will be located in a larger market with a specified minimum number of independent voices; or 5) when the waiver involves public interest programming enhancements.

• Issue 2. *Radio-television cross-ownership rule.* In accordance with the 1996 Telecom Act, the FCC has concluded that its top 25 market/30 independently owned voice waiver policy should be extended to the top 50 markets. An applicant would be permitted to own more than one FM and/or more than one AM radio station, and one TV station in a top 50 market as long as 30 independently owned voices remained after the transaction. The FCC also is considering whether the waiver policy should be extended to any TV market that satisfies a minimum independent voice test.

• Issue 3. *Local marketing agreements.* Currently, the FCC does not attribute TV LMAs for local and national ownership purposes. Consistent with its treatment of radio LMAs, the FCC has proposed that time brokerage of another TV station in the same market for more than 15% of the brokered station's weekly broadcast hours would count toward the brokering licensee's multiple ownership limits. Nov. 7 was suggested as a grandfathering date for existing LMAs. LMAs entered prior to this date could continue until they expire.

• Issue 4. *UHF discount.* The FCC has deferred further analysis of the UHF "discount" used in counting market share on a national basis, until completion of its biennial review of the broadcast ownership rules in 1998. By then, the FCC will be in a better position to assess such factors as the impact of a digital TV (DTV) table of allotments and the proliferation of cable and other multichannel program suppliers.

• Issue 5. *Satellite stations.* The FCC is considering eliminating the current exemption for satellite stations in calculating audience reach if the satellite and parent stations operate in separate markets.

• Issue 6. *Counting local marketing agreements.* The question of double counting is also raised in the LMA context, since a licensee may reach the same audience twice through a station it's brokering. The FCC is proposing not to count a brokering station's local market twice. This issue is only relevant if the FCC decides to deem TV LMAs attributable.

• Issue 7. *Market definition.* Presently, national audience reach is measured by Arbitron Area of Dominant Influence (ADI) market data. As mentioned above, the FCC has proposed to use DMAs as definitions of local TV markets. Likewise, the FCC feels that DMAs should be used to calculate national audience reach instead of ADIs. ■

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

dateline

TV stations in the following states must file their license renewal applications on or before Feb. 3, 1997: Arkansas, Louisiana and Mississippi. 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.

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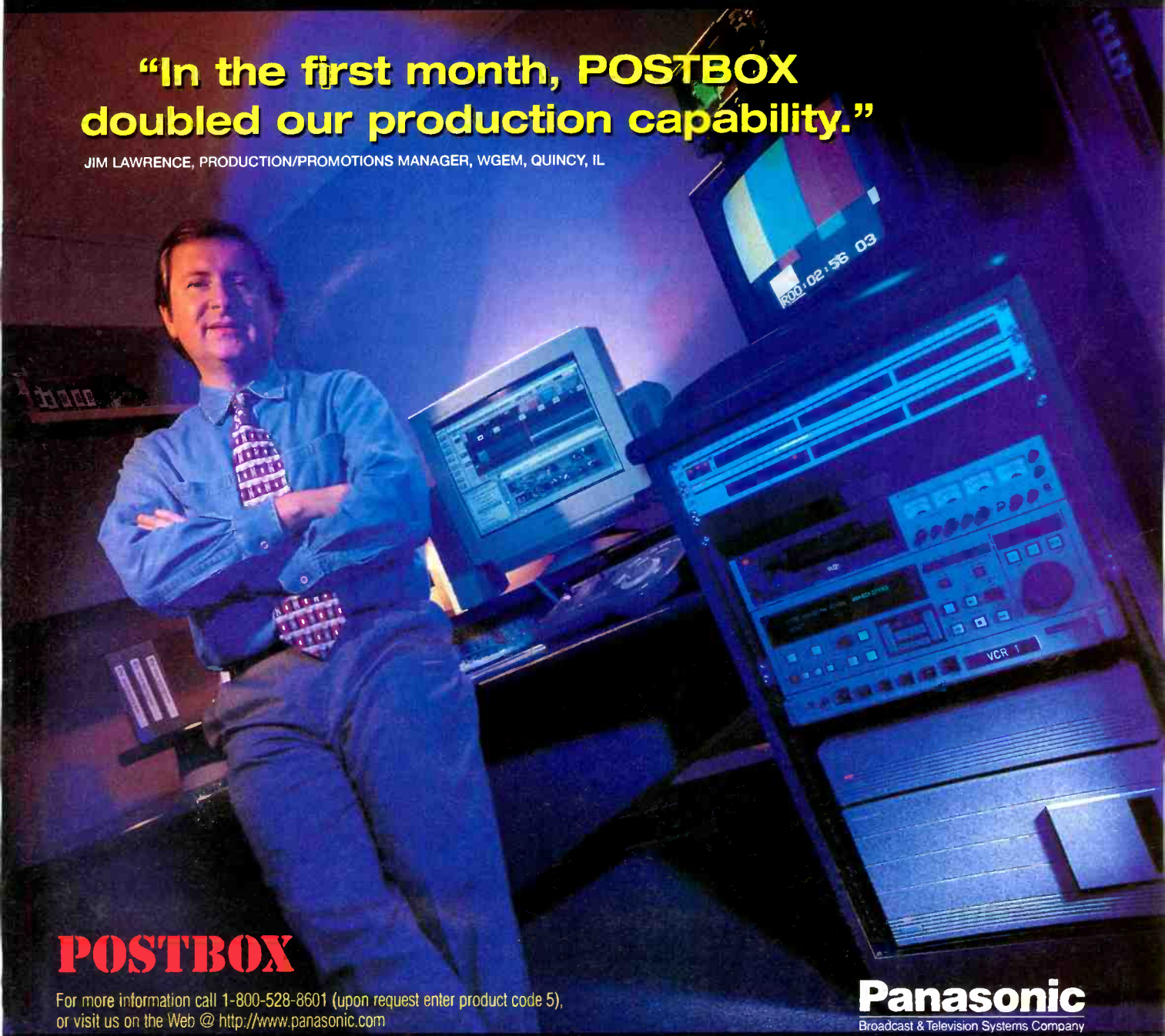
When the Quincy Group decided to convert to nonlinear for their five midwest broadcast stations, they turned to Panasonic's POSTBOX.

"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 overall 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!"



By Richard Duvall

ATM: It doesn't mean automatic teller machine

A hot topic among content developers and service providers involves capitalizing on the world's rapidly advancing communications infrastructure. Thousands of miles of fiber-optic networks are deployed and more are on the way. Correctly choosing a transmission scheme with the flexibility and speed to handle voice, data and real-time video signals today and in the future can provide a competitive advantage. One technology that may help assure a higher quality of service (QoS) is asynchronous transfer mode (ATM) networking.

ATM defined

The ATM transmission protocol was initially described in 1988 by the CCITT, now known as the International Telecommunications Union (ITU-T). It defines ATM as "a switching technology based on unchannelized, high-speed digital links." These links are based on fiber-optic networks, such as synchronous optical network (SONET) and point-to-point trunks arranged in a hierarchy of speeds that offer potential bandwidth well into the gigabits per second range. The SONET physical transmission layer combined with ATM switches forms a network type referred to as Broadband ISDN (B-ISDN), a technology that should not be confused with the older 56kb/s narrowband N-ISDN services. B-ISDN offers an industrial-strength bandwidth and a transmission approach that may allow the delivery of vast amounts of voice, data and video content over long distances in short periods of time with virtually no signal quality degradation.

SERVICE CLASS (Signal type)	BANDWIDTH GUARANTEE	DELAY VARIATION GUARANTEE	THROUGHPUT GUARANTEE	CONGESTION FEEDBACK
Constant bit rate (voice, video, MPEG-2)	YES	YES	YES	NO
Variable bit rate (data, Ethernet)	YES	YES	YES	NO
Unspecified bit rate (E-mail, X.25)	NO	NO	NO	NO
Available bit rate (E-mail)	YES	NO	YES	YES

Table 1. Typical signal-to-service class relationships in the ATM user layer. A direct correlation exists between these classes and quality of service (QoS) levels.

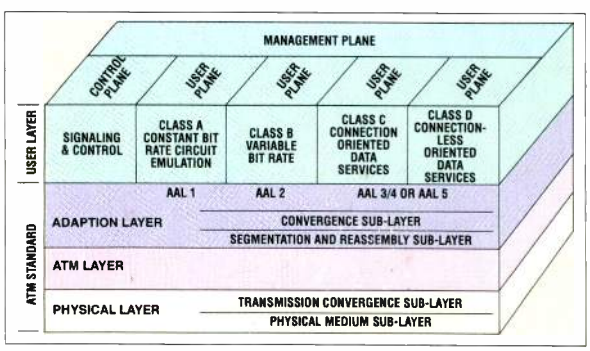


Figure 1. The ATM protocol stack contains information necessary for the communication and transport of information over ATM networks.

Synchronous vs. asynchronous transfer mode networking

A majority of current applications, such as telephony, rely on a synchronous transfer mode (STM) networking protocol. In STM, calls are multiplexed onto a single digital signal 3 (DS-3) or optical carrier 3 (OC-3) transmission path. Each call is assigned a channel with a fixed time slot at a fixed bandwidth, which lasts for the duration of the connection. With this approach, bandwidth is used effectively when voice, data or video signals are being transmitted. However, because the channel is dedicated, you pay for the bandwidth even when no signals are being transmitted.

The asynchronous transfer mode protocol, on the other hand, uses a connection-oriented information transfer. This can be described as an approach where a path from source to destination has been clearly identified prior to any signal transmission.

In ATM, signal traffic from multiple sources is multiplexed onto a DS-3 or a concatenated OC-3c physical network path. But first, the signal is digitally encoded into a number of 53-byte ATM cells. The cells contain a 48-byte payload and five header bytes. The header bytes identify the cell, its destination address and its sequence in an ATM chain if the source exceeds 48 bytes in length. (For more information, see "Digital Basics," *BE* September 1996.)

Because ATM is connection-based and each cell contains route knowledge in its header, the cells can individually seek out the most expeditious route to their destination. By virtue of this architecture, ATM provides bandwidth "on demand." As signal density increases, more cells are used for transmission. As a result, you only pay for bandwidth when you need it.

ATM requires at least a three-layered protocol stack that contains different types of information necessary to communication and transport of information over the B-ISDN network. (See Figure 1.) Depending on

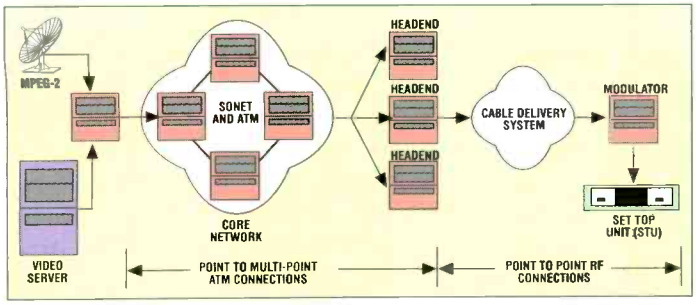


Figure 2. A simplified diagram of how ATM can be integrated with an existing video core network. In this application, ATM is used to transmit a downlinked MPEG-2 program feed and MPEG-2 compressed pay-per-view movie from a video server over the core network to the provider's head-end using a constant bit rate (CBR) service class. From the head-end, the programs are transmitted over a conventional RF delivery system to the customer's set-top unit (STU).

what additional services are needed to support voice, data or video, additional user layers can be added. The physical transport layer is on the bottom layer of the stack. Sublayer functions handle the interface to the physical network (e.g., SONET), along with bit transmission and bit alignment functions that control the actual flow of 1s and 0s over the optical carrier. Functions include complexities like transmission frame generation/recovery, transmission frame adaptation, cell delineation, header error control (HEC) and cell rate decoupling.

The ATM layer is where cells are multiplexed, and virtual path identifiers (VPI) and virtual channel identifiers (VCI) exist. Network switches use the VPI and VCI to determine how the ATM cell should be routed through the network. The ATM adaptation layer (AAL) controls the timing relationship between the source and destination switch, the bit transfer rate of cells between them and the class of service to be used.

Tying back to the concept of ATM's connection-orientation, the user layer is where a service class that supports the requirements of a voice, data or video signal is assigned during encoding. Available service classes include constant bit rate (CBR), variable bit rate (VBR), unspecified bit rate (UBR) and available bit rate (ABR). Table 1 shows typical signal-to-service class relationships. Network performance characteristics of the service class will affect the source signal being transported. Impairments caused by insufficient

ORGANIZATION	ADDRESS
DIGITAL AUDIO-VISUAL INDUSTRY COUNCIL	http://www.davic.org
DIGITAL VIDEO BROADCAST PROJECT	http://www.alphastar_tv.com/dvb.htm
INTERNATIONAL TELECOMMUNICATIONS UNION	http://www/itu.ch
THE ATM FORUM	http://www.atmforum.com

Table 2. World wide web addresses of prominent standards bodies and industry consortia involved in defining the direction of ATM for video transmission.

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

Glossary of ATM terminology

AAL — ATM adaptation layer
ABR — Available bit rate
ADSL — Asymmetrical digital subscriber line
ATM — Asynchronous transfer mode network protocol
ATM cell — A cell 53 bytes in length containing a 48-byte payload and five-byte header
B-ISDN — Broadband integrated services digital network
CBR — Constant bit rate
DS-3 — 45 Mb/s digital carrier physical network path
OC-3 — 155 Mb/s optical carrier physical network path
QoS — Quality of service
SONET — Synchronous optical network
STM — Synchronous transfer mode networking protocol
STU — Set-top unit
UBR — Unspecified bit rate
VBR — Variable bit rate
VCI — Virtual channel identifiers
VPI — Virtual path identifiers

bandwidth, timing delays imposed by network switches, and bit errors induced by errored and lost cells in "bursty" signals like MPEG-2 will occur when an improper service class is selected for a particular signal type.

Integrating ATM into existing distribution systems

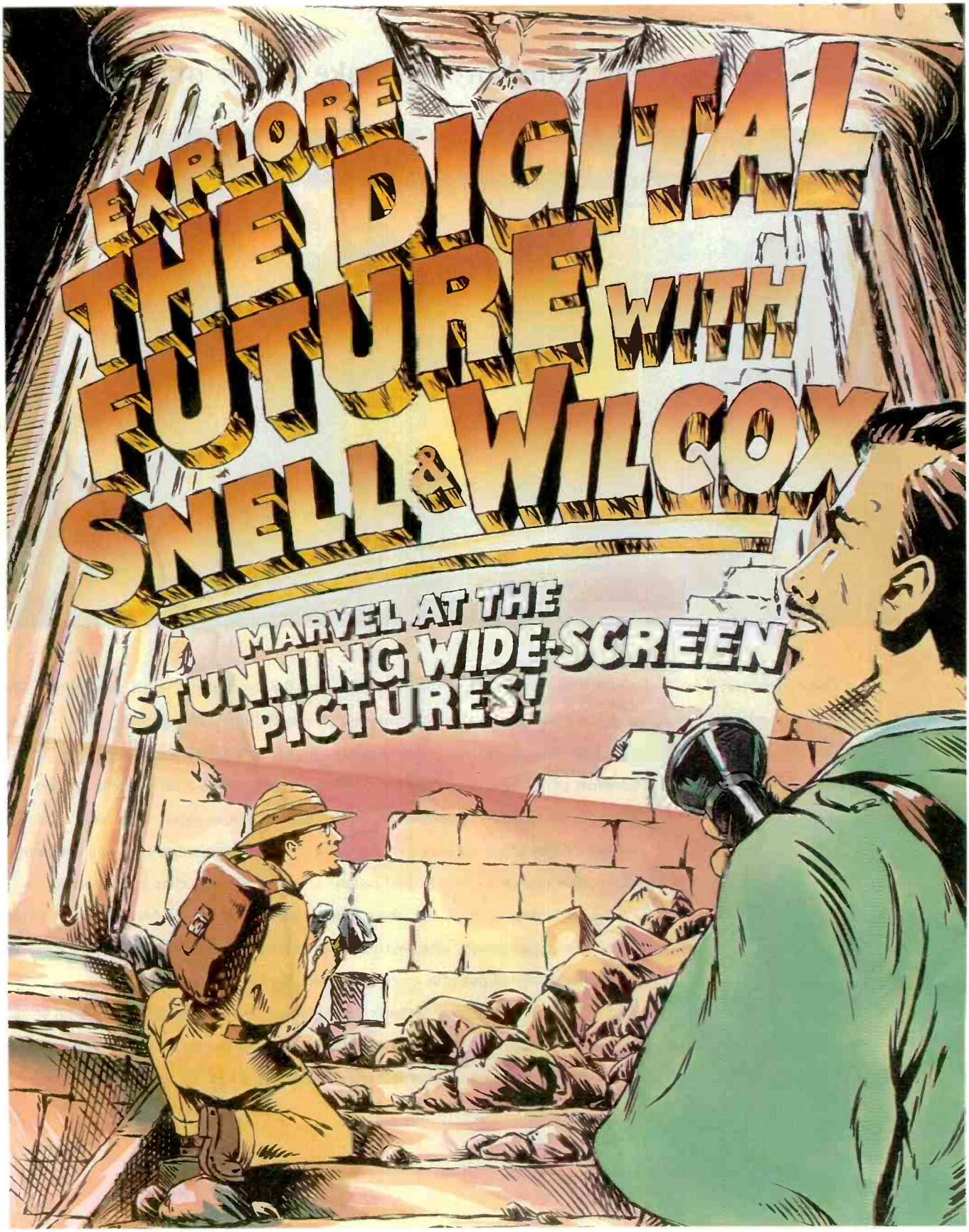
At present, telcos and cable operators are struggling to find ways to increase bandwidth closer to the customer's set-top unit (STU) without going broke. The financial realities of the situation dictate that technologies like ATM can best be used in the core network that links origination points to the head-end. (See Figure 2.)

To more tightly integrate the delivery system and customer STU and provide additional services, technologies like asymmetrical digital subscriber line (ADSL) show promise. ADSL can handle bidirectional signal streams over twisted pair copper wire and coaxial cable. Combined with ATM services on the core network, products like fully controllable video-on-demand and interactive gaming may be possible.

When considering ATM for integration into an existing infrastructure, providers should consider how the technology can be used to enhance the overall QoS. Several issues must be factored into the decision. First, consider the current reliability of the public networks. Growing traffic on the Internet is one example of how switching capacity is being pushed to the limit. Although there is adequate optical fiber available, not all of it is lit. On the fiber that is, brownouts and blackouts do occur, and network providers are racing to add switching equipment to overcome the congestion. Even if you can be assured of adequate capacity, do you want to entrust your signals to a third-party provider whose only perfor-

Continued on page 77

"CLEARLY THE RESULT OF AN EARLY EXPERIMENT IN COMPRESSION..." MUSED WILCOX.



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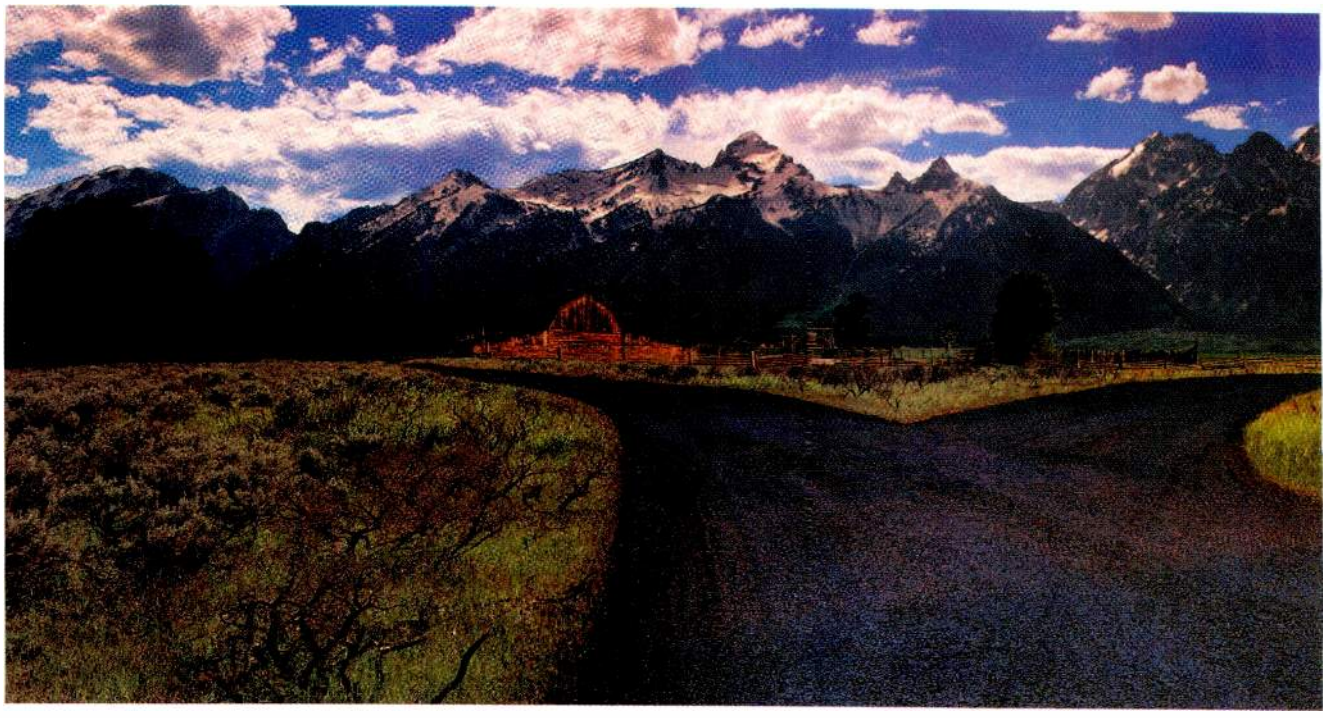

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Plus, with the VideoStore System's open protocol, even third party automation vendors can use any control platform to operate the VideoStore System. In other words, you get the flexibility that you want, that you require, and that is so necessary to integrate the automation software package that's best for your station.

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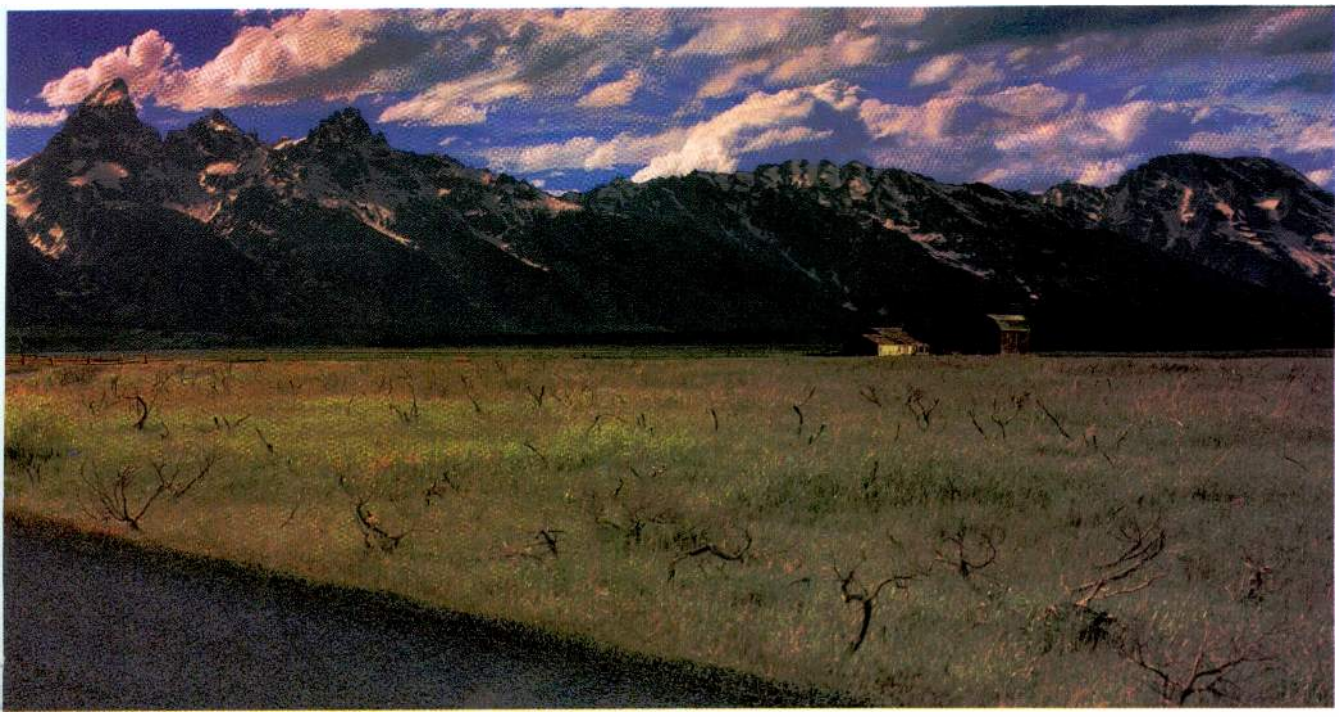

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By Ross Josephson

Goals to a successful new year

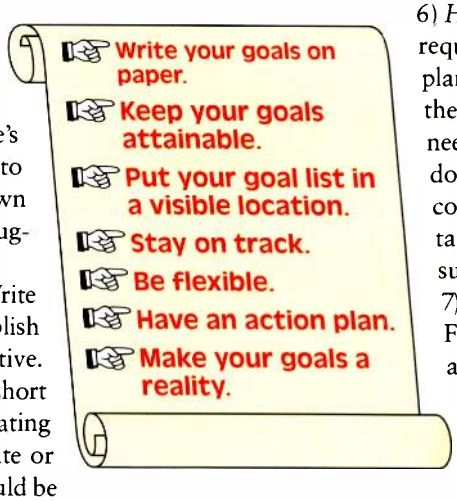
As 1996 comes to an end, it's time to review this past year. For those who have had a good year, a hearty cheer. To those of you less fortunate, as well as for those toasting the current year, a successful 1997 can begin by grabbing a piece of paper and a pen.

We all have had years where good things have happened to us like an important promotion, the birth of your first baby, that end-of-the-year bonus or your child's college graduation. Despite the joys of these good years, we all have had bad ones, as well.

Some years are going to be bad — plain and simple, but setting some goals for the next year can help you decide what you want from your life, in your career and in your personal life.

Goal setting

Goals. We all have them, but the much ballyhooed New Year's resolutions seem to be forgotten almost as quickly as Aunt Maybie's fruitcake. This year, take the time to really think about and *write* down your goals. Following are some suggestions for goal setting.



1) *Write your goals on paper.* Write down what you want to accomplish next year. It's so simple, yet so effective. Jot down key goals. Keep the list short and sweet. One goal might be renovating a broadcast studio by a certain date or hiring a new staff member. Or it could be continuing your education by taking a class or attending a seminar.

Some people may prefer to have separate goal lists, one for personal accomplishments, the other for work-oriented goals. Some people may combine the categories and have no difficulty tackling them together. It doesn't matter how you do it, just write your goals down.

2) *Keep your goals attainable.* Don't set yourself up for failure! Be honest with yourself. By writing down specific goals, you make it all the more likely that those goals will be completed. Being specific makes goal attainment much more probable because in many cases you have quantified the desired result, i.e., I want a 10% salary increase or I want to take my family on a week-long vacation to Alaska.

3) *Put your goal list in a visible location.* There's a magic to viewing your goals over and over again. Place your list of goals in your office and keep a copy in your wallet. Remember, the more times you are reminded of your goals, the more likely you are to accomplish them.

4) *Stay on track.* Regularly review your progress. In today's crazed workplace, it's hard to find time to eat lunch, let alone sticking to a goal list. If you feel yourself veering off course, determine what it is that's causing you to stray, then get back on course. Attaining your goals takes hard work, but those willing to put in that extra effort will reap the rewards.

5) *Be flexible.* If circumstances change and a goal doesn't seem relevant, get rid of it. By the same token, if you have a new-found desire, add it to your list. A flexible list stays current and all the more compelling.

6) *Have an action plan.* For those goals requiring more effort, be sure to have a plan. How long will it take to renovate the studio? What key resources will I need to accomplish my goal and how do I obtain them? Who do I need to convince to assist in my efforts? Detailed planning can help assure overall success.

7) *Last, make your goals a reality.* Follow these steps and believe in your ability to accomplish them. Being positive of your eventual success is half the battle. Visualize the successful completion of your goals.

1997 can be a successful year for you. Take the first step by writing down your goals and putting forth a plan to make each goal a reality. This list is not a cure-all solution that guarantees success. It can, however, set you in the right direction for realizing and attaining your goals.

If it all seems like too much bother, think of the alternative. For those seemingly stuck in a rut, many can trace their predicament to never having identified what they really want out of life and never having set goals.

Take charge of 1997 and make your goals a reality. Take out that pen and paper and start writing. Make your list as sound and complete as possible and then get busy making your plans work for you. ■

Ross Josephson is manager of accounts at Chan & Associates, a marketing consulting service for audio, broadcast and post-production, Fullerton, CA.

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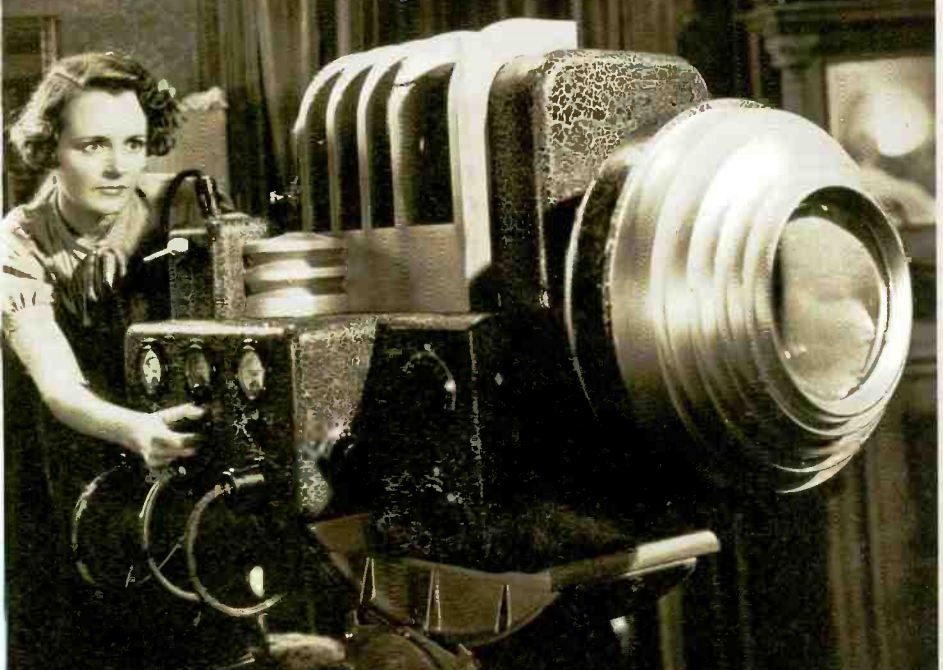

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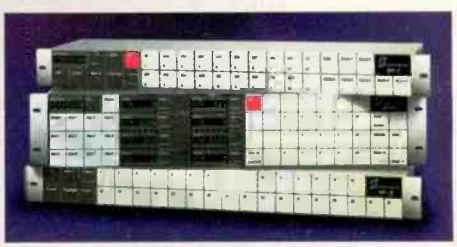

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By Bennett Liles

Choosing batteries for field production

Although new battery chemistries have entered the market or are on the practical horizon, the venerable Nickel-Cadmium (NiCd) is still the benchmark against which all other contenders are measured in the broadcast industry. "Nicads" excel in the parameters most needed by TV field-production crews: short charge time, high number of charge-discharge cycles, good load characteristics even in cold temperatures, good abuse tolerance and low price. Nicads like being discharged quickly under high-current conditions, such as those for which battery belts are used in broadcasting: lights and video cameras.

New, high-capacity Nicads and new charging techniques have combined to promise even better performance. Nicads do better when given a *burp* or *reverse-load* charge. This applies a series of brief discharge pulses to the Nicad while charging it, thereby promoting recombination of gases formed during quick charging. When used regularly, these reverse-load pulses can add as much as 15% to the life of the battery.

	NICKEL CADMIUM	NICKEL METAL HYDRIDE	SEALED LEAD ACID	LITHIUM ION	ZINC AIR
ENERGY DENSITY (Wh/kg)	50	75	30	100	125-220
CHARGE-DISCHARGE CYCLES	1500	500	200-300	150	50
FAST-CHARGE TIME (hrs)	1.5	2-3	8-15	3-6	6-8
SELF-DISCHARGE	HIGH	HIGH	LOW	HIGH	LOW
EXERCISE REQUIRED (days between cycles)	30	90	80	N/A	N/A
COST PER CYCLE ($ US)	0.04	0.16	0.10	0.25	0.12*

* PROJECTED COST IN MASS PRODUCTION

Table 1. Comparison of several key parameters among today's leading rechargeable battery chemistries. (Source: Cadex Electronics and AER Energy Resources.)

A disadvantage of Nicads is the well-known *memory* phenomenon: After being kept on a charger and infrequently or only briefly discharged, Nicads exhibit progressively lower capacity. In modern Nicads, memory effects are most often caused by crystalline formation. When a charge is held by a Nicad for a long time without discharge, spike-shaped nickel and cadmium crystals form in the battery. They can grow large enough to actually puncture the separator (an internal insulator between positive and negative elements), which can cause high self-discharge or even a dangerous internal short circuit. The crystalline formation can be minimized by *exercising* the Nicad monthly. This means discharging it down to 1V/cell and then fully recharging it. If not exercised for several months, Nicads will need *reconditioning*. In this process, the battery is slowly and deeply discharged to <1V/cell and then fully recharged.

Chargers that rely solely on temperature sensing are not friendly to Nicads and tend to "cook" the batteries. More advanced chargers combine temperature sensing with what's called *Negative Delta V* (NDV). This refers to a prescribed sequence of output-voltage levels that are normally achieved as a battery is charged. "Smart" chargers are available that can use these and other parameters to sense a battery's capacity and condition, and can then charge, exercise and automatically recondition (as necessary) several types of batteries simultaneously.

Today's field producers have added cell phones, pagers, two-way radios and even laptop computers to their field kits. Battery-power requirements for these devices differ from cameras and lights, so other battery chemistries may be worthy of exploration. (See Table 1.)

Alternative battery types

The holy grail for all batteries is high *energy density* (high capacity with low weight). In that quest, the Nicad's strongest competition has come from *Nickel Metal-Hydride* (NiMH). These offer fewer charge cycles, lower charge and discharge current, but about 30% more capacity than a standard Nicad. The newer, ultracapacity Nicads equal or surpass the NiMH, but the NiMH requires less exercising than the Nicad. Both types have high self-discharge rates, meaning that they rapidly lose their charge once the charging current is removed (about 10% in the first 24 hours).

For laptop power, new *Zinc-air* batteries promise high energy density, low self-discharge and no memory effect. They may eventually replace all other types in capacity-hungry portable computer applications. After economies of scale take effect in mass production, Zinc-air batteries cost should be comparable to Nicads. Recent experiments have powered vehicles with zinc-air batteries, which are also more environmentally friendly than Nicads. Zinc-air recharge time is longer, however, and fewer recharge cycles are tolerated.

For heavier-duty applications where size, weight and slow charge are not a problem, the *Sealed Lead Acid* (SLA) fits the bill. Sometimes known as *gel cells*, these

Continued on page 78

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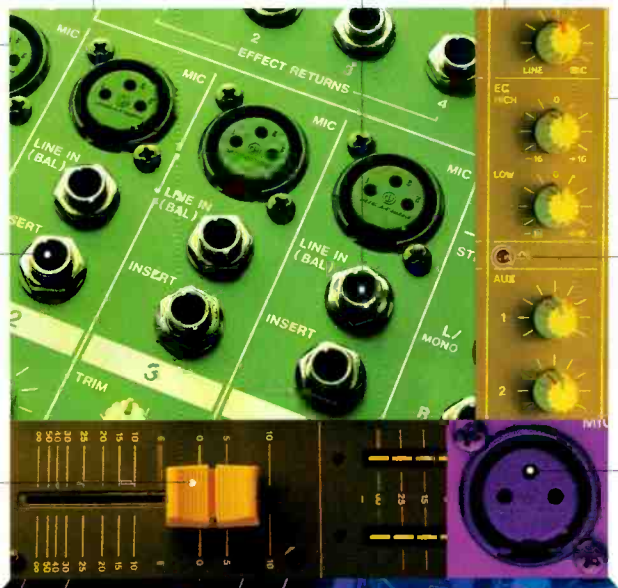

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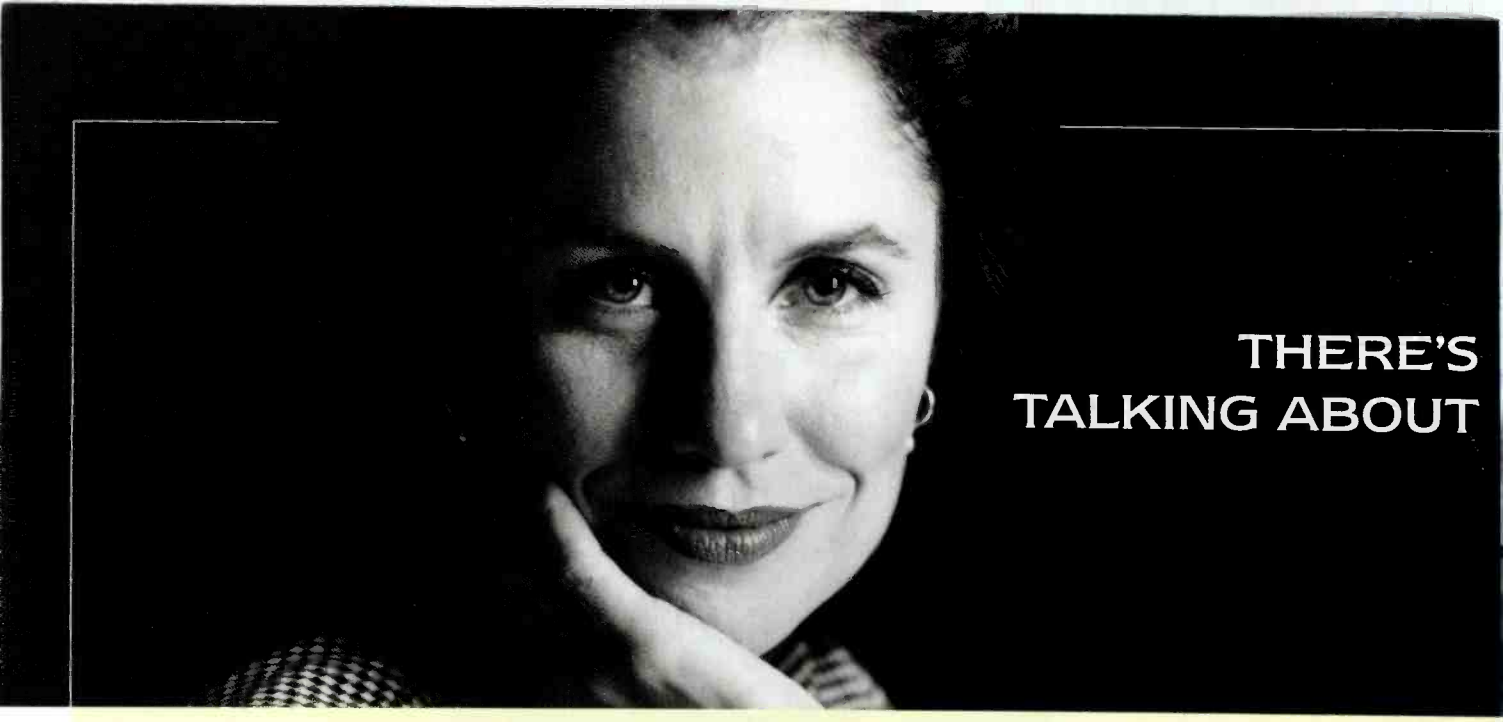

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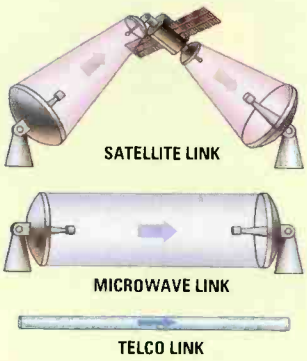

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SONY

digital DREAM
Digital Dream Kids

By Steven Blumenfeld and Mark Dillon

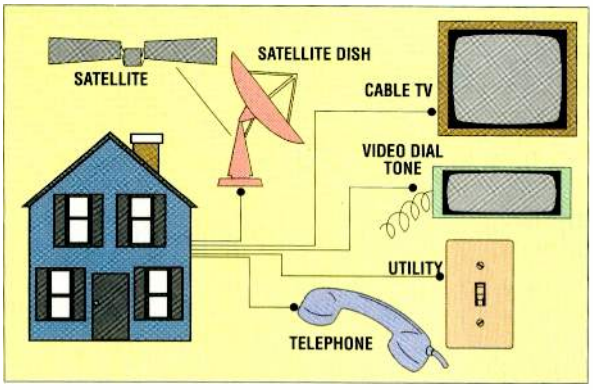
Networking your home, part 2

As described last month, the Residential Gateway will bring all your services into a common device that will distribute the proper signals to the end-user devices.

The network connection

The Residential Gateway will allow the interconnection of various existing and future external networks to various in-home networks and consumer devices. This interconnection is achieved by providing Network Interface Unit (NIU) cards for each external network connected by a bus to Customer Premise Interface (CPI) cards for each in-house network.

An NIU adapter is required for each access network reaching the residence. At least one CPI adapter is required for each type of cable or network that extends within the residence. In many cases, a single adapter may be able to service several in-residence cables, such as multiple telephone extensions.



The Residential Gateway brings a variety of services into the home via a single unit, which then distributes the signals to the proper end-user device.

A weatherproof unit is designed to be mounted at the point of entry to the residence. It has lockable hatches that permit the owner or the subscriber access to different sections of the unit. Internally, there are slots for NIU and CPI adapters. The unit also includes a high-performance, low-cost bus for communication among the adapters, a controlling microprocessor and memory.

The Residential Gateway provides communication among the adapters at some defined rate. Additionally, it will allocate the capacities of the outbound and inbound channels to the various end-user services. The system may also provide a bridging function among the adapters on the residence side, connecting, for example, a home automation network to a PC LAN.

The system contains a microprocessor and memory that support the software services required to operate the basic functions. The system processor and its resources should not be employed for end-user applications, because there is no way to guarantee that these applications will not reduce the available computational resources below the level required for reliable operation of the gateway. End-user applications can be supported by imbedding processors and memory on the adapters.

Typically, each adapter will be servicing multiple datastreams, multiple telephone calls, multiple Internet accesses or multiple video streams. When the Residential Gateway is initially configured, and whenever an adapter is added or removed, each adapter will register with the system manager services that are connected.

The Residential Gateway's control microprocessor collects the data from the adapter and passes it to the system manager program. If there is available capacity, the system manager returns the bus address of a register on the appropriate adapter to the requesting adapter. The requesting adapter can independently pass small bursts or cells of information to the allocated adapter.

The requesting adapter may have received a request to initiate an Internet protocol session. The packet representing this request is fragmented by the LAN adapter into multiple cells, which are then transferred via the bus to the access network adapter. The register address allocated by the system manager will correspond on the access network adapter to a data transport service. There may be multiple requests for this kind of service, and their requests are managed separately using the stream identifier allocated by the requesting adapters. The access network adapter assembles the cells into the format required for transmission over the access network and transmits them.

The future

As consumers see the benefits of technology integrated into consumer products, they will also have to pay for previously subsidized services and bear the costs of bringing information into the home. The Residential Gateway can make the use of these new services easier and cheaper for the consumer. ■

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

Acknowledgment: *This article summarizes "The Residential Gateway Document" created by the following companies: Bellcore, GTE, Hewlett-Packard, IBM, Reliance Comm/Tec, B&C Consulting and Sarnoff Research Center. For a tour of the Residential Gateway, surf the web to: info.gte.com/gtel/sponsored.rg/.*

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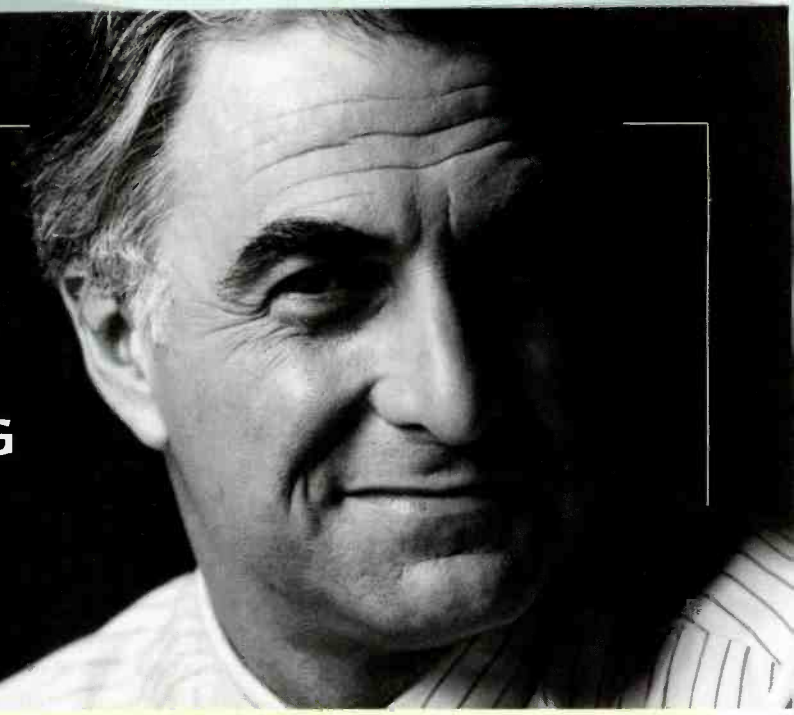

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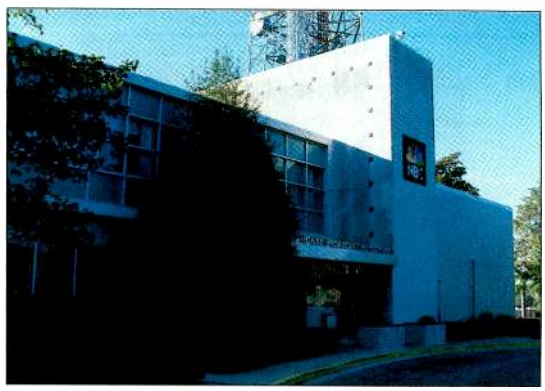
By Louis Libin

Up and running

The Grand Alliance consortium has ceased to exist and we are left with a terrestrial transmission standard that will be an FCC standard. As we enter stage three of the five-part plan, the model or experimental station project will conduct a series of demonstrations of HDTV broadcasting with a fully equipped HDTV studio-transmission facility. The project will also serve as a test ground for electronics manufacturers and their wares.



WRC-TV is the host station for WHD-TV, the HDTV model station located in Washington, DC.

Moving on

In the first part of the plan, the transmitter and studio sites were prepared including the physical space, the HVAC and power requirements. The experimental licenses required preparation, too. In stage two, video was transmitted. The initial transmission was a VTR playback of a pre-compressed bitstream at the transmitter site and the studio site with an in-line STL.

Now in the third stage, post-production capability has been added to the model HDTV station. This is the point where the station is actually a true broadcast facility. Later, the fourth stage will add production capability. And finally, the fifth stage, set for 1999, will add flexibility to the HDTV model station.

On the air

The model station WHD-TV, at WRCTV, the host station in Washington, DC, is now up and running. The knowledge gained regarding equipment performance and user needs will be essential prior to the construction and operation of regular commercial HDTV stations. In the longer term, information from this project will prove invaluable in encouraging manufacturers to develop next-generation equipment with improved performance, simplified operation, reduced cost and enhanced capabilities. The project will involve the collaboration of respective organizations to design, install and operate an experimental high-definition TV terrestrial broadcast station.

The model station will serve as a source of encoded digital TV signals to aid equipment manufacturers in the development of new lines of electronic equipment. Auxiliary data transmission, interactive video services and satellite, optical fiber and microwave feeds will also be evaluated. Some of the potential evaluations will include equipment interface issues, ranging from program organization through studio management, transmission and reception. It is anticipated that information on availability and performance on prototype and commercial HDTV equipment will be better learned.

In addition to providing public demonstrations in the Washington, DC, area for viewing of HDTV, the model station is also offering training for broadcast station technical personnel.

Prior to the availability of prototype or commercial equipment, the Grand Alliance is loaning two sets of Grand Alliance HDTV hardware for use. Much of the equipment and program material is being supplied on a loan or grant basis by manufacturers and broadcasters that are members of the Grand Alliance. In addition, individual manufacturers are providing equipment maintenance and technical assistance.

Pay attention

Keep in mind that the HDTV Broadcast Service is on its way. Most of the new second-channel assignments will be in the UHF band, sometimes high up, in unfamiliar territory. The first issue will be to ensure that your current viewing audience will be able to receive the new signal.

Remember that approximately 1,700 TV stations across the United States will also be planning to build their HDTV facilities. This means there will be serious competition between stations with respect to construction of new broadcast facilities. For now, you should follow the progress of the experimental station closely so you can be ready to prepare for your own HDTV facilities. ■

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

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Desktop video wars

The future of television is on your desktop.

By Jerry Whitaker

THE BOTTOM LINE:
Digital technology has reshaped the way we do business today. From editing to graphics, digital television has changed rapidly in just a few short years. Desktop computers are a vital part of the video center — and represent the bottom line in the desktop video wars. $

It's the invasion of the body snatchers, with computers playing the part of the pods. Don't let your editor go to sleep — he or she may wake up as a video workstation.

From editing to graphics, the area of digital television has changed radically in only a few years. Look at your desk. What was on it 10 years ago? Probably a Selectric typewriter; a bulky, feature-poor telephone; and papers, books and magazines (lots of those). The computer age had just reached the desktop in 1986 with products and features that made sense for business. And your desktop today? The typewriter is gone, replaced by a networked PC; the telephone tells you who is calling before you answer; and — well, OK — the amount of papers, books and magazines hasn't changed much. The point is that technology has reshaped the way we do business. The extent to which it has changed our professional lives is evident only when we step back and consider the "old days."

In the studio

Digital technology tends to come in waves. We have seen several so far:

• *First wave*: The replacement of analog devices and circuits with digital equivalents. This wave, which crested in the mid-1970s, saw the replacement of relays, diodes and other switching mechanisms with smaller, more reliable TTL and CMOS integrated circuits. Other common analog functions, such as timing, were replaced with one-chip digital equivalents. Countless *RC* networks fell victim to the 555 timer chip (which, of course, required *R* and *C* components to function). First wave technologies were widely implemented into video products of all kinds.

• *Second wave*: The beginning of the end of the signal tracer. This wave appeared in force in the early 1980s and was signified by the disappearance of individual signal paths into a bus structure. Signals became data, and data became bursts of state changes on a bus. Early implementations of bus-based technologies suffered from speed limitations and software overhead requirements. Video products generally took a cautious approach to second wave

Photo: Skyview Film & Video's Edit4, a disk-based digital editing suite, represents the kind of technology in today's leading-edge production facility.

implementation, preferring instead dedicated, purpose-built systems to general-purpose computer-based systems. Thus, began the distinction between "video products" and "computer products" or specific-purpose vs. general-purpose systems.

• *Third wave*: The turning point for general-purpose hardware. This wave, which is cresting now, is marked by the elimination of the competitive advantage of specific-purpose (or *closed-platform*) systems vs. general-purpose (or *open-platform*) systems. Although it is still true that a well-designed purpose-built system will almost always outperform a stock computer design, the costs of development are radically different.

• *Fourth wave*: Clear your desk for a supercomputer. Few things in electronics are more predictable than change. Each year brings products that are faster, smarter, better, simpler and cheaper (at least from the standpoint of the feature set). In the realm of desktop workstations, the fourth wave is signified by the utilization of multiple microprocessors for increased speed. With current Pentium-class devices routinely running at or above 200MHz, multiple-processor technology is impressive indeed. It is the fourth wave that will drive the video production center of the year 2000.

NUMA

A number of technologies hold great promise for the desktop of tomorrow. Perhaps the most powerful (and sometimes controversial) is *non-uniform memory access* (NUMA). The idea behind NUMA is to dramatically speed up the microprocessor's ability to read and write data to and from memory. The end

Desktop video wars

result is that massive parallel processing systems are practical. Just this month, for example, Sequent Computer Systems unveiled a computer based on NUMA technology that can contain up to 252 of Intel's fastest Pentium Pro chips. Most current high-end multiple-microprocessor systems use 16 to 30 devices.

The development of NUMA machines — and other technologies that seek the same objectives — are intended primarily to attack the mammoth and rapidly expanding demands of corporate data processing work now handled by mainframe computers. Fortunately for broadcasters, in the realm of computers, data is data. Advancements made for one market are rapidly transferred to another, such as video. The price of these high-end systems is high (the Sequent NUMA machine is initially priced at about $250,000), but those costs will drop in the years to come. While the thought of spending a quarter of a million dollars on a computer is a bit staggering, think about what you paid for your ADO system a decade ago, and the feature set that it offered.

Nowhere is desktop editing more popular than in the newsroom. Systems, such as the Sony DNE-1000 shown above, bring the advantages of desktop power and non-linear versatility to even small-market operations.

Who needs this stuff?

I subscribe to several computer publications, and about once a month I get annoyed as I read an article that tells me how I need to buy the next big thing or I'll be stuck in the technical stone age. I think, "No way. Get with reality. The system I have is just fine, thank you." At the risk of failing to practice what I wish others would preach, let me suggest that mammoth systems such as NUMA will have a place in the video center of the not-too-distant future.

Desktop computers are a valuable element in the video center of today. They are, however, only a stopping point, not the end of the journey. The definition of "desktop computer" is also the point of some disagreement (or at least confusion). Desktop computers have traditionally described general-purpose machines that could be as comfortable running an Excel spreadsheet as editing video. The only difference between machines is the software and add-in cards loaded. "Workstations" have traditionally described more powerful systems that may be optimized for some function, such as graphics throughput. Mainframes, on the other hand, are those big blue boxes that sit in a room by themselves and are lorded over by MIS people (who we may or may not be on speaking terms with).

These divisions are becoming arbitrary. The desktop computers of today are as powerful as the workstations of a few years ago, and the workstations of today are as powerful as the mainframes of a few years ago. And so it goes.

The bottom line is that computers are computers, and in video today we need them. Advances in hardware are always accompanied by advances in software, and by increased expectations on the part of users for more features. The idea of using a massively parallel NUMA computer at a TV station is ridiculous until you start thinking about implementing a virtual set for news operations or establishing a video local area network throughout your facility. Within the last year or so, these technologies have been transformed from blue-sky ideas to practical implementations, due in large part to advances in computing hardware.

We need only look back a few weeks to the election coverage of the big three TV networks. Out in front were ABC and CBS, which both offered virtual reality graphics and sets (to match the virtual candidates). On CBS, correspondents were surrounded by cybersets with bars and graphs of the results shooting out of virtual desks and virtual walls.

First implementations of any new technology always bring with it their share of rough points, and usually a rather steep learning curve. Still, the way of the future is clear: It is virtual, and virtual means high-power computers.

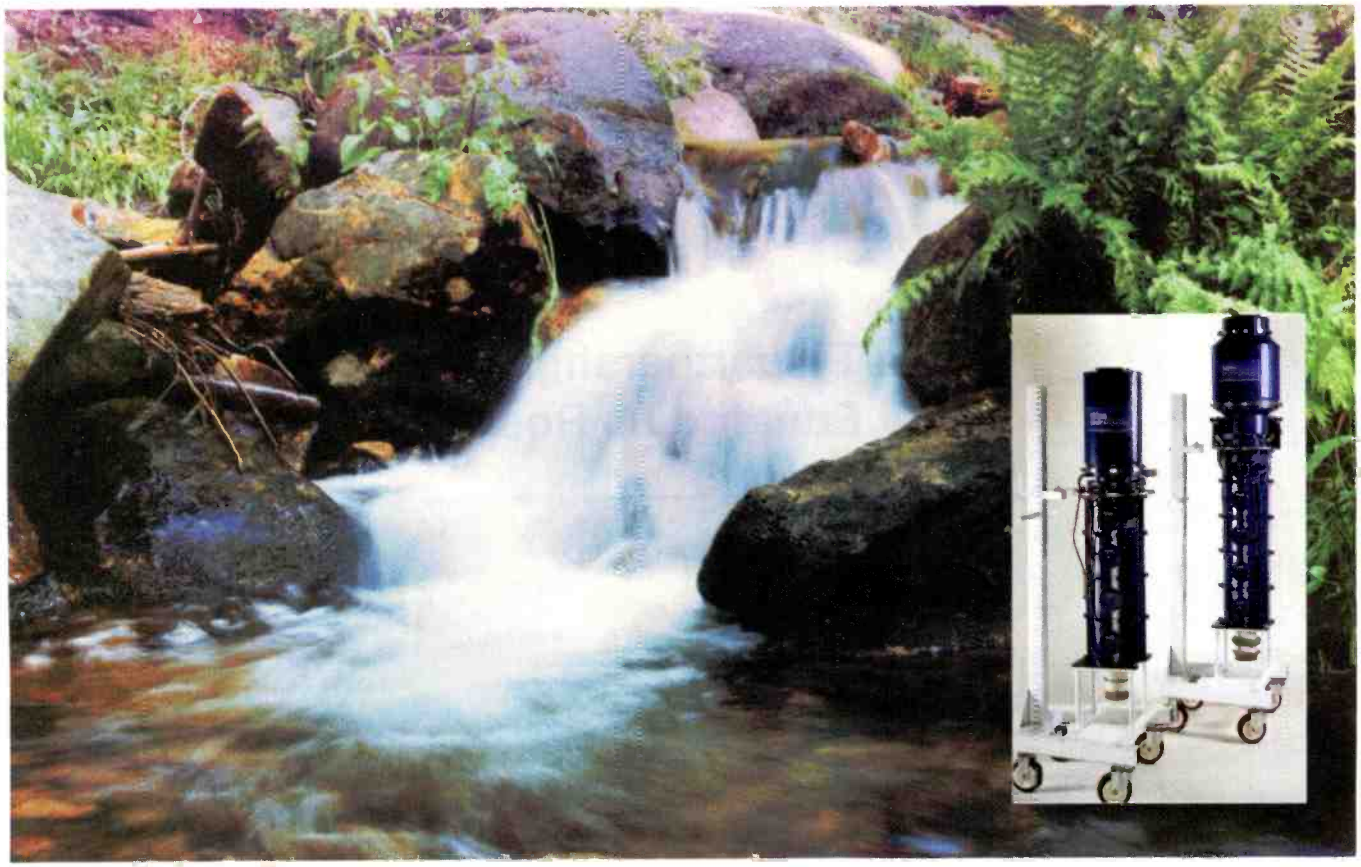
To infinity and beyond!

The remarkable accomplishments of animation on computers have been popping up in theaters. More offerings are on the way, driven by better, more lifelike graphics made possible by smarter software running on faster hardware.

For broadcasters, perhaps the greatest change in video graphics creation, manipulation and storage will come when the digital TV (DTV) standard is finally adopted by the FCC. As DTV stations take to the air, the last analog link in the broadcast chain will be set aside. Developers can then focus on system-wide implementations of digital video that overcome the problems inherent in multiple levels of quantization and bit-rate reduction throughout the facility. Although the DTV standard speaks primarily to the transmission aspects of television, every transmission standard has had a profound impact on the production equipment used to feed the transmitter. DTV is no exception in this regard.

Whatever twists and turns the video industry may take on the road to the next century, it is a foregone conclusion that high-power computers will play a critical role. The desktop video wars of today will surely give way to the workstation video wars, followed by the supercomputer video wars. Regardless of how those wars go, the end-user will emerge the victor. ■

Jerry Whitaker is a consulting editor for Broadcast Engineering *magazine.*



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Cable/broadcast partnerships

Cable/TV partnerships can pay.

By Edmond M. Rosenthal

THE BOTTOM LINE:
Cooperative agreements are becoming the trend for cable and TV stations and can be mutually beneficial to both partners. With DBS encroaching upon cable and TV audiences and stealing revenue, it may be worth considering such an arrangement. Could your TV station benefit from extra presence on the local cable system? Or, could your cable station benefit from local news, weather or sports coverage? A profitable partnership could definitely make it worth your while. $

It's becoming clear that when the resources are there, cable operators would rather do it themselves — but, nevertheless, broadcast-cable programming partnerships are making their mark across the country.

Focusing mostly on news and informational programming, many of these arrangements are a product of the Cable Act of 1992, which opened negotiations for retransmission consent. Rather than paying to carry stations in their markets, many cable operators have opted to provide TV stations with additional channels for local programming.

These channels have yet to prove themselves as major revenue producers for the stations, but there has been progress in advertising sales as measured audiences have become significant enough to show up in the Nielsen rating books. For the broadcaster, one of the benefits has been using these channels to promote the station's news franchise in the area. For the cable operator, these channels are an inexpensive means of providing local service.

But for a major cable operator like Time Warner, this isn't the road map to the future. John Newton, senior vice president of Time Warner Cable Programming, asserts, "It may not serve our purpose to simply extend the brand of an existing broadcaster." Time Warner is more interested in developing local news services, such as New York 1, in Manhattan.

Photo: Behind the scenes at one of the news sets at Channel 4 in Kansas City.

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Cable/ broadcast partnerships

Is MMDS the answer?

As broadcasters look toward more programming and data services, cable isn't the only answer, nor is the hoped-for allocation of digital spectrum by the FCC. Another prospect is MMDS. Andrew Craig, vice president and general counsel of the Wireless Cable Association International, points out that MMDS has the spectrum that broadcasters are seeking for entry into the multichannel marketplace.

Craig says it isn't practical for broadcasters to enter this marketplace alone with advanced TV frequency allotments. Providing pay services, for example, would be expensive and isn't something for which broadcasters are well-equipped. He holds that broadcasters won't receive enough spectrum for viable multichannel services. A better route is a relationship with wireless cable operators or acquisition.

Echoing this proposition is Marcia De Sonne, director of technology assessment for the NAB. She points out that broadcasters have had no restrictions on ownership of MMDS systems since the 1996 Telecom Bill. She also sees agreements with wireless cable operators as an opportunity for broadcasters to extend their coverage beyond the signals.

"Wireless cable is the closest brethren to broadcasting," De Sonne says, "because it's over-the-air and omnidirectional. Wireless cable will be using the same MPEG-2 compression scheme as broadcasters."

Working relationships: BayTV

Meanwhile, relationships with cable operators are in place, and as these channels become entrenched in their markets, they may be on an irreversible path.

While many of the TV-cable relationships in operation are characterized by low overhead and use of existing assets, BayTV, an undertaking of KRON-TV, San Francisco, launched July 1, 1994, with a major investment.

As part of its six-year retransmission consent agreement with cable interests dominated by Tele-Communications Inc. (TCI) and Viacom Cable, KRON committed to a 24-hour channel with nine hours of live, original programming including local news updates, talk shows and coverage of local events.

For BayTV, KRON Video Enterprises co-produces New Media News, a daily half-hour on computers and technology with Jones Computer Network. BayTV fills the rest of its 24 hours with time-shifted programming.

Amy McCombs, president of parent company Chronicle Broadcasting, declines to reveal start-up costs, which are incorporated into the KRON infrastructure. Trade estimates of the cost of a launch of this magnitude, though, run as high as $25 million. While BayTV capitalizes on existing staff and facilities, staff dedicated to BayTV — mostly in newsgathering, sales and traffic — is about 60. Engineering and maintenance work is absorbed by the KRON staff.

Director Howard Ezell in the WSFA Channel 12 control room in Montgomery, AL.

The channel reaches nearly 1.3 million subscribers and with TCI acquiring Viacom's cable operations, TCI will control 85% to 90% of these homes.

"We're transmitted by a combination of everything from T1 lines to fiber to microwave," McCombs notes. TCI has an aggressive program of putting in fiber and eliminating head-ends, so she looks forward to more dependability. Programming is sent complete with commercials from KRON.

The venture is only partly a child of the Cable Act of 1992. "Retransmission consent certainly made it a lot easier," McCombs concedes, "but before that, we had already begun discussions with TCI and Viacom, and they saw the value of this. The Cable Act gave them a reason to finalize an agreement with us where they were able to add value to their cable operations."

An important aspect in cable carriage is not being relegated to cable's never-never land—channels that can't be received on cable-ready sets without converters or that are available only as a tiered package for an additional charge.

Working relationships: Pittsburgh Cable News Channel

Started more than two years ago and operating in the black in its second year is Pittsburgh Cable News Channel (PCNC), a venture of NBC affiliate WPXI-TV with cable operators including TCI, Adelphia Communications, Time Warner Cable, Armstrong Group, Comcast Cable and Cox Cable.

The 24-hour PCNC revolves around exclusive and time-shifted newscasts and talk shows. A "week in review" program originates from the station's Washington bureau. The 10 p.m. newscast is the only one available at that time in the market.

Unlike BayTV, WPXI, according to retransmission consent negotiations, charges cable operators a per-subscriber fee and shares in ad revenues. This arrangement came about "after lengthy and trying negotiations," WPXI general manager John Howell admits. Evan Pattak, community affairs manager for TCI of Pennsylvania, adds "The concept for PCNC had been discussed for a number of years before retransmission consent came along, but that's what provided the impetus."

With some 800,000 cable subscribers in the Pittsburgh market, PCNC is accessible to about 521,300. The remainder either lack the channel capacity or the fiber connection to carry it. Much of the 75-mile fiber-optic loop carrying PCNC to the systems has been built by TCI, reports Fred Hamm, director of engineering for TCI of Pennsylvania. His operation has reduced head-ends from 19 to 10 via fiber and expects to eliminate more.

Like the Bay Area, the Pittsburgh area has an advertising interconnect among cable operators. The operators have Seachange digital commercial insertion equipment, with commercials downloaded into a processor at each head-end.

Pattak labels PCNC a significant asset, stating, "It does for local news what

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Cable/ broadcast partnerships

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Working relationships: TCI

Meanwhile, an arrangement between WSFA, Montgomery, AL, and TCI, occurred prior to the 1992 Cable Act. According to Carl Stephens, WSFA operations manager, and Jack Gilbert, TCI area manager, the subsequent retransmission consent negotiations were handled by the parent companies, with the broadcaster wanting cash and settling for TCI bearing the expense of a fiber-optic link to the station.

A variety of programming from WSFA appears on TCI's local origination channel, withboth parties sharing ad revenues. The best revenues stem from a package of Southeastern Conference basketball games that the station acquires from Jefferson Pilot Communications. WSFA runs only the Auburn and University of Alabama games, pre-empting its regular programming on Wednesday nights for the games. The remaining seven or eight games go to TCI.

TCI also carries barter-syndicated programming and does some programming on the local origination channel.

Working relationships: American Cablevision

The approach of WDAF-TV, Kansas City, MO, six years ago was to produce five to eight five-minute news inserts per day for American Cablevision to insert into its transmission of *Headline News*. Ed Piette, general manager of the Fox affiliate, says this arrangement was incorporated into retransmission consent negotiations. The cable system, jointly owned by Time Warner and TCI with the former as managing partner, pays cash for the service and has the advertising time exclusively.

Based on all the news gathered for its own newscasts, WDAF pretapes the inserts. According to Jeff Johnston, vice president of marketing for American Cablevision, the cable operator has a dish at WDAF to receive *Headline News*, and cue tones in the national feed start the tape at WDAF. The station puts cue tones into its inserts, which start up the Starnet commercial insertion equipment.

American also built a short fiber-optic extension to receive the programming from the station. This gives the system connectivity to the Kansas City Teleport, which it uses to uplink sports programming and teleconferences outside the market.

Working relationships: TNi

While some broadcasters work with cable through voluntary partnerships and others as part of a retransmission consent agreement, WBIR-TV, Knoxville, TN, does both. Its TNi channel launched in May 1994 with Scripps Howard's cable operation as a financial partner. Added as part of retransmission consent agreements were Intermedia, Inc. head-ends in West Knoxville and the Maryville/Alcoa area, as well as a Marcus Communications system in Morristown, TN.

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The station learned many lessons about programming since its start. It programs 18 hours a day and carries Bloomberg Financial Service overnight on TNi.

"We initially programmed it with news, information programming and local sports where we could get them," David Cowen, director of program operation notes. "This programming included rebroadcast of our local news and a half-hour a day of original reporting. We also did weather updates each day that were more extensive than what we do on our regular newscast." Three half-hour programs were produced once a week and repeated throughout the week, twice a day at the most.

Now owned by Gannett Company, Inc., WBIR initially was owned by Multimedia and did additional runs of Multimedia talk shows. The broadcast day was filled out with barter-syndicated products not carried by the station, that were generally intended for weekend use by TV stations.

Since then, the station has learned that local sports is the most marketable product to audiences and advertisers. In May 1995, TNi shifted to a sports emphasis.

"Sports, including call-in talk programming, is now 45% of our programming and growing," Cowen states. "We still have syndicated programming, especially outdoor programming, and we still have weather, but we discontinued news when we went to sports."

BayTV morning hosts Terry McGovern and Margarite Jackson at KRON Channel 4 in San Francisco.

Production for TNi, Cowen notes, uses the in-place production staff. "There are definitely costs associated with it, but we've never broken them out." He says ad sales, at times, have allowed the station to break even on its known costs, "but like any cable channel after three years of existence, it's not where we want it to be." Audiences are now sufficient to show up in the Nielsen measurements, he says.

The Scripps-Howard cable operation has fiber distribution to the node, and the programming is distributed to its head-end via fiber. Scripps-Howard hands the programming off to Intermedia via fiber. A microwave relay from the station's transmitter site covers the Marcus system.

All programs are played back on S-VHS from the control area, with the control automated by an Odetics PC-based system using cue tones. Commercial playback is via an ASC Virtual Recorder hard-disk system at the station, with all the spots on 3GB SCSI drives. ■

Edmond Rosenthal is a technical free-lance writer based in Freehold, NJ.

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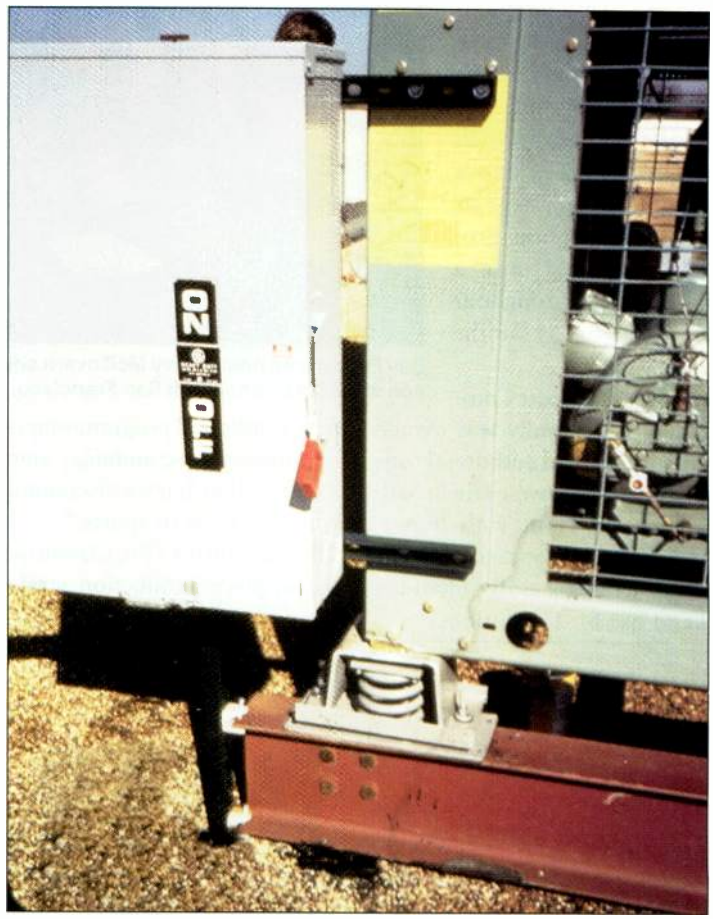
Controlling HVAC noise

It's important to recognize acoustical pitfalls before they swallow you up.

By Richard Schrag



THE BOTTOM LINE: Noise and vibration in HVAC systems are among the most typical shortcomings in technical facilities. Armed with a little common sense, you can avoid some of the most widespread acoustical problems encountered in broadcast and production studios. $

When people who work in existing broadcast and production facilities are surveyed about workplace comfort, their most prevalent complaints involve the heating, ventilating and air-conditioning (HVAC) systems. The problems they cite most frequently, aside from temperature control, have to do with excessive noise and vibration.

How can this happen so often? First, the requirements for an HVAC system in a technical facility are quite different from those in typical office spaces. Technical spaces have extensive heat loads and other unique characteristics associated with a high concentration of electronic equipment or production lighting. As a result, adequate cooling, airflow, humidity control and filtration are vital issues. Second, a majority of these technical spaces have acoustical requirements that are much more stringent than those for run-of-the-mill buildings. Combine these two features and it's no surprise that without a great deal of care, the results are often disastrous.

It would be nice if there were qualified engineers and acoustical consultants involved in the design of every construction project (we all have our little fantasies), so that a TV facility's management and staff would not have to

Photo: The spring isolation of a rooftop HVAC unit is defeated by transmission of vibration through the stanchion that supports its electrical disconnect.

The packing blanket (labeled "trash") stuffed into gap around conduit will do little to attenuate noise passing through this oversized penetration.

understand the ways in which noise and vibration problems can arise from a poor HVAC design. Unfortunately, the reality is that architectural acoustics is one aspect of broadcast and production that is commonly misunderstood, misrepresented or misapplied — by broadcasters and by many design professionals.

This article discusses some problems with HVAC system noise and vibration that are commonly encountered in broadcast and production facilities. Sometimes just knowing the potential pitfalls is enough to avoid falling headlong into them.

Estimating heat loads

When designing an HVAC system, the first step is to accurately identify the heat loads generated by the occupants, equipment, lighting and surrounding environment. Although this isn't really an acoustical issue, it's an area that suffers from the "garbage in, garbage out" syndrome. If a project's mechanical and electrical engineers are given bad information about equipment loads by the broadcaster's engineers, consultants or systems integrators, the HVAC systems they design may never be able to provide an appropriate environment for equipment or operators. When HVAC systems don't work right, it can often be traced to a mismatch between capacity and actual load.

Unfortunately, it's difficult to obtain accurate information about the power requirements of broadcast equipment, much less the heat dissipation. Manufacturers sometimes list peak power consumption, sometimes power consumption at idle and sometimes just the fuse rating or recommended circuiting requirements. Invariably, if they exist at all, the manufacturer's specs represent some sort of worst case, which for many equipment items (audio amplifi-

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Controlling HVAC noise

ers or any machine with a tape transport motor, for example) bears little resemblance to their actual power consumption over time.

For someone trying to tabulate power consumption of dozens or hundreds of equipment items, it's tempting to guess high when the data you're collecting is ambiguous or undefined. This isn't much of a problem for the electrical systems, where the downside of excess capacity is only the cost of oversized circuits or transformers. For HVAC systems, however, it's sometimes worse to have too much capacity than to have too little.

Besides the increased noise and vibration that comes with oversized equipment, some HVAC system types — particularly less-expensive varieties — don't respond well to conditions outside their design range. If oversized, many systems will *short-cycle*, rapidly dropping the temperature in an occupied space over the span of a few minutes, then shutting off for a longer period while the humidity climbs and the air stagnates.

Compounding the problem is the diversity of room types that exist in a typical TV facility. Production control rooms and edit suites may have technical equipment that operates 24 hours a day, 365 days a year, but they undergo fairly drastic swings in their lighting loads and number of occupants over the course of a typical day. Technical operations centers or tape rooms, on the other hand, will have relatively constant equipment loads with few occupants. Furthermore, neither of these types of rooms are subject to the seasonal changes in HVAC system operation that are typical in the office areas. Technical spaces often require cooling year-round.

Studios and stages are yet another category. They are subject to enormous heat loads from production lighting instruments when they're in operation, but have little heat-generating equipment the rest of the time. In addition, the changing requirements of newer fluorescent-type production lighting and the next generation of cameras may combine for an order-of-magnitude difference in heat loads compared to today's totals.

TIP: Do your homework. When you're asked to estimate power consumption for your technical electronic equipment, the time spent getting accurate information can mean the difference between a successful facility and one that just never works right.

HVAC equipment location

There is no substitute for keeping equipment that generates noise and vibration as far away as practical from acoustically sensitive spaces. If an air handler is too close to a studio, obtaining adequate sound attenuation through the duct system can quickly become a losing battle. And the risk of excessive noise or vibration via every other potential path is greatly magnified.

Perhaps due to their superficial resemblance to warehouse space, TV studios may appear to inexperienced mechanical engineers to be perfect candidates for rooftop units located directly overhead. This is almost always a big mistake, because exposing a studio to noise and vibration by poking a hole in its roof and placing rotating machinery there makes it virtually impossible to achieve industry-standard background noise levels.

Standard building mechanical systems are almost always inadequate to handle the specialized needs of technical facilities. In evaluating an existing building to house technical spaces, it is essential to consider the existing mechanical systems, as well as the space needed for supplementary systems.

TIP: Think ahead. Whether in a new facility or a renovation, knowing where HVAC equipment will be located relative to the acoustically sensitive spaces can keep you from having to face intractable problems later on.

Duct silencers

You would think that any device called a *sound attenuator*, *silencer* or *sound trap* would be invariably beneficial to HVAC noise control. Sound attenuators are an effective means of reducing broadband noise as it travels down a duct system, and have the advantage of predictable performance. Like any other tool, however, these products work properly only when they're used correctly.

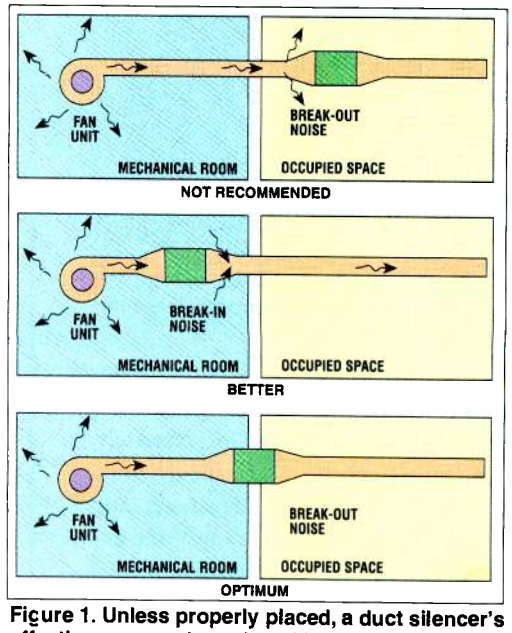

Figure 1. Unless properly placed, a duct silencer's effectiveness can be reduced by mechanical noise that is emitted upstream of the silencer or recoupled into duct work downstream.

Duct silencers operate by restricting the airflow through a system of baffles, exposing as much of the air stream as possible to sound-absorptive filler materials and/or resonant cavities. As a result, they have "self-noise" characteristics, meaning that they generate noise themselves due to turbulence in the airflow through their internal baffles. Silencers should be located far enough upstream of any acoustically sensitive space to ensure that the noise they generate is adequately attenuated before it reaches the occupied room.

Another frequent misuse of sound attenuators involves their placement in the duct system. If a silencer is located within a mechanical room, noise may enter the system through the sheet metal duct after the silencer. If a silencer is located away from the mechanical room walls, noise may escape the system through the sheet metal duct before it is attenuated by the silencer. Ideally, a sound attenuator should be located within or immediately adjacent to the mechanical room's walls. (See Figure 1.)

TIP: If you're using sound attenuators, make sure they're located where they will perform the job that's intended.

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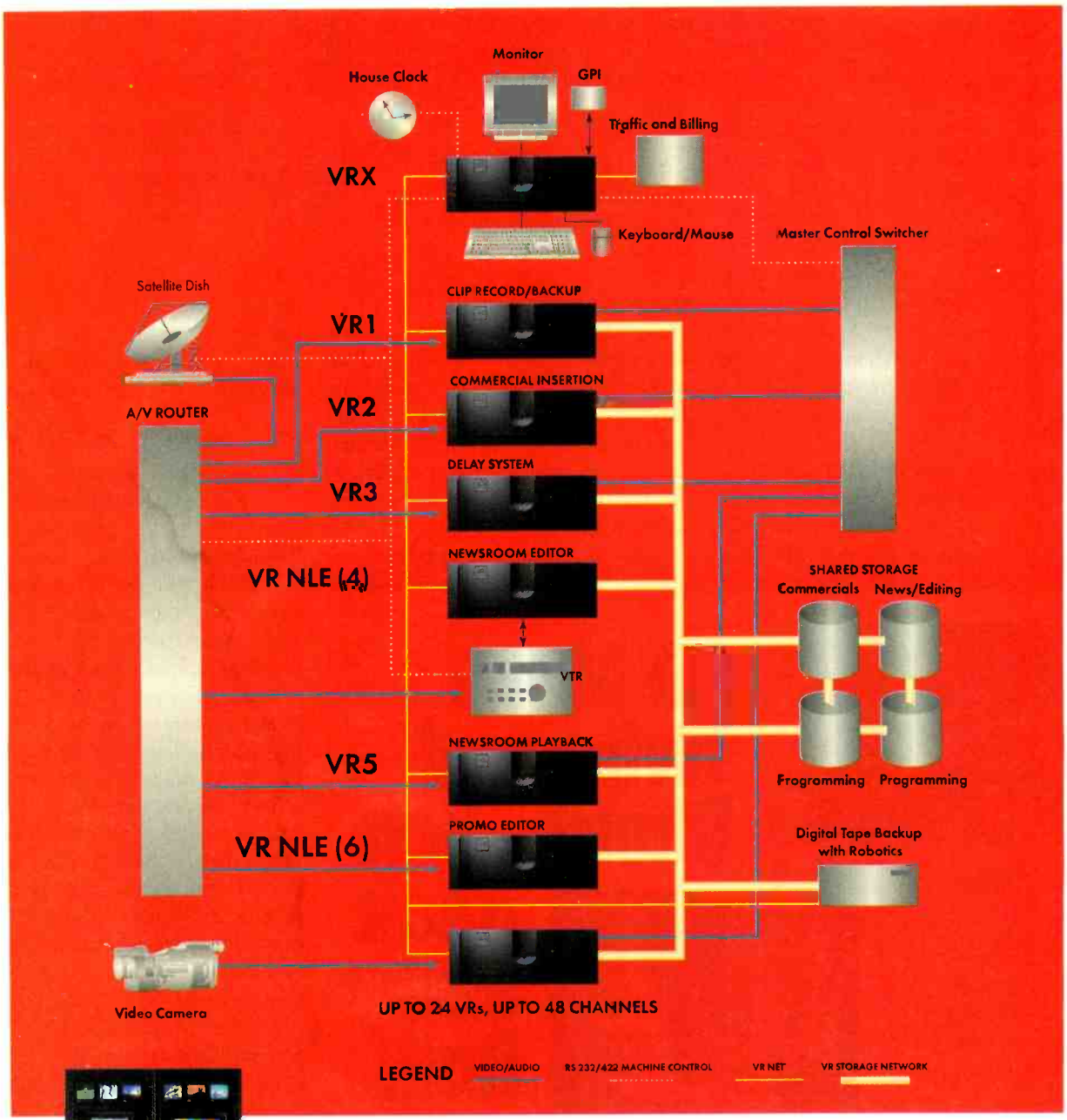

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Controlling HVAC noise

Duct-borne noise

The duct work that connects a fan or air handler to a room is a contained system that will also connect the equipment noise and vibration to the room unless adequate precautions are taken to attenuate the noise before it gets there. Without internal sound-absorptive duct liner or prefabricated sound attenuators, noise travels effectively down the duct system right along with the conditioned air.

Acoustical *crosstalk* is a similar problem that occurs when two spaces are connected by a common duct system with inadequate internal sound attenuation. Noise from one space enters the duct through the supply-air diffusers or return-air grilles and travels through the duct to a similar opening in another room.

Although noise control issues through the supply air duct system are routinely considered in HVAC design, inexperienced mechanical engineers and contractors often forget that the *return*-air path is an equally important contributor to noise problems. In fact, because return-air systems sometimes employ common plenums above corridor ceilings, there may be less duct work in the return-air path to attenuate the noise, and the transfer of return air from one space to another may be a significant breach of the sound isolation between them.

TIP: Make sure all duct systems are laid out to prevent crosstalk and to attenuate fan noise.

Velocity noise

As conditioned air travels from a fan to an occupied room, it is subjected to acceleration, deceleration, changes in direction, division and a variety of surfaces and obstacles. Each of these effects disturbs the uniformity of the airflow and causes turbulence, which in turn creates noise.

It is essential to limit the velocity of the airflow through all duct work systems in order to keep it from generating excessive noise. This is particularly true at the final branch ducts and the neck of the supply diffusers and return grilles, where this regenerated noise is exposed directly into the occupied spaces.

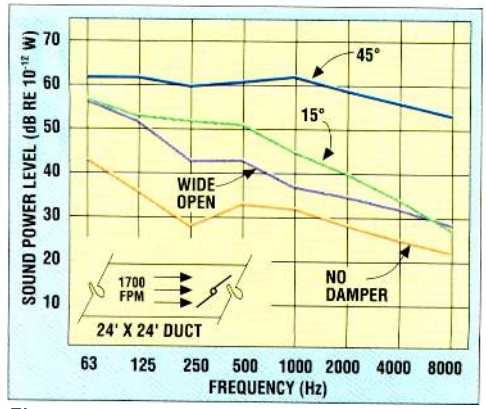

Figure 2. Volume dampers can regenerate noise due to the air stream turbulence they create, even when they're wide open.

TIP: Keep airflow velocities low throughout the duct systems serving acoustically sensitive spaces.

Volume dampers

An important feature in the proper design of a duct work system is the ability to control the amount of air that flows through each segment of the duct, to ensure that the volume of air supplied to each space is tailored to its conditioning needs and that each supply diffuser in a given room is balanced with the others. To accomplish this, volume dampers are needed to limit the amount of air that is allowed down the duct path. Unfortunately, dampers accomplish their volume control by pinching down the air stream, increasing the pressure and consequently the noise wherever they occur. (See Figure 2.)

For office spaces, ceiling supply diffusers routinely are installed with *face dampers*, which are volume control dampers located right at the inlet to the diffuser. The airflow noise created by face dampers is essentially exposed directly into the room. In acoustically sensitive spaces, even if face dampers are left wide open they can generate audible noise.

TIP: Don't use face dampers at the diffusers to adjust the air volume. Adjust the volume upstream using opposed-blade-type dampers.

Continued on page 75

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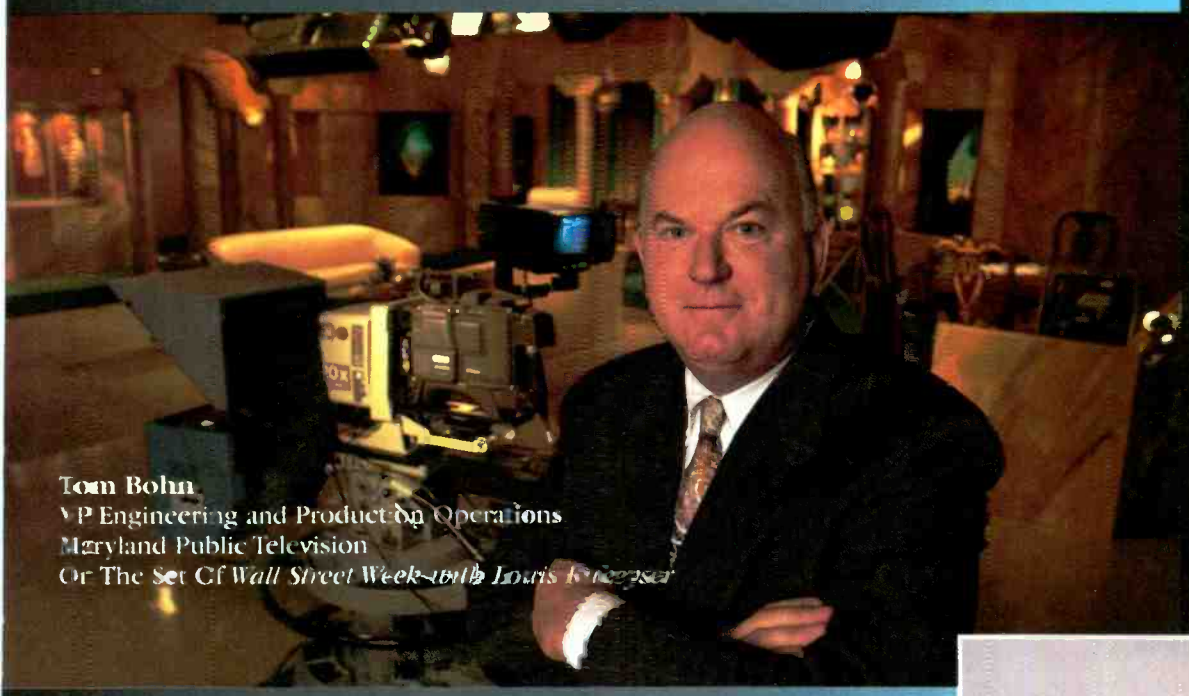

Tom Bohn
VP Engineering and Production Operations
Maryland Public Television
On The Set Of *Wall Street Week with Louis Rukeyser*

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Tom Bohn feels the change from 4:3 analog to 16:9 digital technology "will be a revolution every bit as big as black-and-white to color. And since we don't know what the standards will ultimately be, we must start to future-proof now."

As he invests in new technology, Bohn looks for upgradeability on each piece of equipment. That's one reason he purchased eight Hitachi digital cameras. The SK-2000 Series has four built-in upgrade paths, from the single LSI processor, and A/D converter, to the newest CCD block technology.

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The web is coming to your TV, part 2

Major names in the TV and computer industry line up to take consumers on-line.

By Marjorie Costello

Photo: With the Destination PC/TV, you can play a game of Monopoly, browse the web or watch television.

Joining the Internet boxes and web-browsing televisions discussed in the last Broadcast 2000 are PC/TVs, Internet appliances and other new technologies designed to display web pages on a TV screen. Companies that are offering products today or planning them for the near future include Gateway, NetTV, Thomson/RCA, Compaq, Microsoft, Netscape and IBM.

Gateway gets Destination to retail

This past May, computer direct marketer Gateway 2000 started selling its PC/TV, the Destination. It includes all the functions associated with a PC, such as web browsing and word processing, as well as the ability to watch TV channels. The Destination uses a 31-inch data-grade tube, connected to a CPU, designed to look like a black A/V component. The TV tuner resides on a PCI card inside the computer, along with the Pentium processor, hard- and floppy-disk drives, CD-ROM drive, modem and other components. Control is provided with a wireless keyboard and Gateway's Field Mouse remote control.

Destination, although it features an electronic programming guide (EPG) from Harman Interactive, does not offer the ability to move seamlessly from a TV show listing — or program — to a related web site.

NetTV'S PC/TV

Another PC/TV that provides web browsing and TV viewing is available from NetTV of San Rafael, CA. The company introduced its Home Theater Computer WorldVision models this past spring. The company actually shipped models before Gateway — back in April — but only to a few stores. Similar in concept to Destination, WorldVision prices start like Gateway's at less than $3,000, but for a system that offers a smaller 29-inch monitor. However, the NetTV monitor features a 125-channel, cable-ready tuner.

The processor and other components are built into WorldVision's ComputerDeck, a sleekly designed black case resembling a VCR. Control is provided with a wireless keyboard. The company is also offering 33- and 37-inch screen sizes. Because NetTV is a relatively small company, its models are still in limited distribution — mainly on the West Coast. And because of Gateway's considerable financial resources, Destination also received most of the media coverage.

Thomson getting ready with TV/PC

Starting last fall, Thomson/RCA has been demonstrating its Genius Theatre (GT), which the company prefers to call a TV/PC. GT takes a more integrated entertainment approach than Destination. In prototypes that we have seen, Thomson's Genius Theatre II featured a master unit control center that permits the integration and operation of a number of devices, including a big-screen monitor, from one remote control. A

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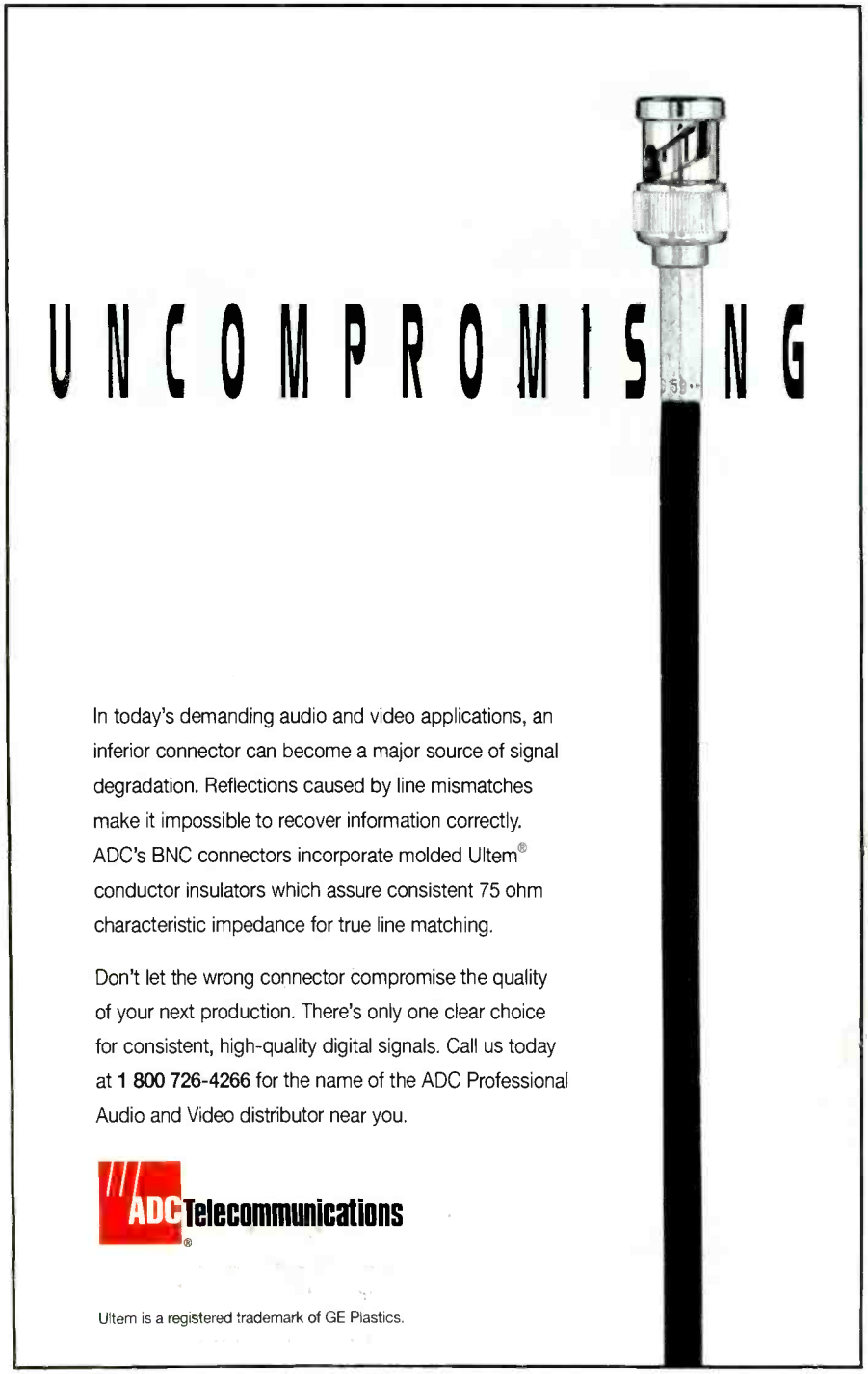
wireless keyboard for simplifying Internet access has also been shown.

Although Genius Theatre is connected to a mini tower CPU, Thomson does not currently plan to use the system for other computer applications, such as word processing. Instead, the focus is on web browsing and playback from devices, such as a CD-ROM and eventually DVD.

Of particular importance to Thomson's TV/PC plans is the integration of the StarSight electronic programming guide, which will pave the way to move seamlessly from a TV show to a related web site. For instance, RCA showed how — when watching television — an automated link could move a viewer from a TV show to a related Internet site.

The company is working on a special version of StarSight that will make it easy to jump from a broadcast web to a web site. StarSight is slated to provide easy access to any of the playback boxes, and in some cases, coordinate their operation. In fact, RCA even calls the EPG the killer app of the 21st century, when entertainment — as opposed to information — management will be king.



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Thomson and Compaq plan TV/PC

At its Genius Theatre presentations, Thomson openly admitted it did not want to be in the PC business. So, it did not come as a great surprise when the company announced this past May that it had formed a joint venture with Compaq Computer. The Thomson/Compaq alliance will develop a new generation of home entertainment products, with the first convergence product a TV/PC.

We anticipate that a prototype of the Thomson/Compaq TV/PC will be shown at the upcoming 1997 Winter CES.

Microsoft sets its sites on StarSight

Microsoft, which has made the Internet the core of its corporate strategy, has announced plans to move the PC into the living room. To make it easier to integrate TV watching with web browsing, the software giant formed an alliance with a name known in CE circles and to these pages: StarSight.

The two companies have been reluctant to specify what they are planning through their cross-licensing agreement and long-term collaboration, which led the software giant to pay $20 million to StarSight. Based upon StarSight's expertise and what Microsoft has announced, it is not too difficult to come up with some educated guesses as to what the two may have in the works.

Microsoft moves: SIPC, BPC and MSNBC

This past April, Microsoft chairman Bill Gates unveiled the Simply Interactive PC (SIPC) framework of hardware technologies for Windows-based PCs. According to Gates, the SIPC technologies will make the PC platform the center of entertainment, communications and productivity for both the home and office, providing the ease of use and convenience of a consumer appliance. SIPC is designed so that web browsing integrates more easily and effectively with other add-ons (such as telephony and cable cards) and software applications.

Microsoft has also promoted its concept for the broadcast PC (BPC), which downloads, manipulates and displays programming and data from a variety of signals. This past summer, Microsoft and NBC launched MSNBC on the

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Internet. The web presence provides news and information that complements the programming transmitted on the new cable network, MSNBC Cable, launched simultaneously with the on-line operation. Microsoft, current Department of Justice investigations notwithstanding, is toiling into the night to overtake Netscape's lead in web-browsing software.

And, as we reported in Part 1, Microsoft formed a strategic relationship with WebTV this past fall to develop technologies and standards for delivering high-quality Internet browsing for display on televisions.

It is likely that a StarSight version of Windows may be in the works for the BPC, SIPC and any other PC/TV-related products now under wraps in Redmond. Another possibility is a StarSight plug-in for Microsoft's Internet Explorer browser that could simplify navigating to web sites. And, Microsoft could use its special version of StarSight to navigate viewers from MSNBC Cable to MSNBC on the Internet. Microsoft's deal with StarSight does not affect the customized version of the EPG that Thomson is developing for its products. Both Thomson and Microsoft are StarSight licensees, and besides, Thomson owns a stake in StarSight.

It is clear from Microsoft's announcements and collaborations — including the one with WebTV — that the software giant wants to be a major force behind the web, whether displayed on a TV or PC screen.

Netscape ready to navigate TVs

Netscape, while seeking legal relief from the government for what it claims is Microsoft's anti-competitive practices in pushing web-browsing software, is not resting on its laurels. The company is also moving forward on the technology front as it plans to integrate the PC and the TV.

This past summer Netscape established a new company to bring its Navigator web-browsing software and technology to consumer electronics devices and other non-PC systems. Netscape has established Navio Communications, an independent Internet software company, in which Netscape has a major equity position. Navio will work with CE and computer names to develop a wide variety of leading products. Companies mentioned were Sony, Nintendo, NEC, Sega, IBM and Oracle.

Navio is planning to find ways to develop versions of the Netscape Navigator for televisions, telephones, set-top boxes, game players and the new breed of network computers and information appliances designed for homes and businesses.

Network computer news

Netscape, along with IBM, Sun Microsystems, Apple and Oracle, are the major backers of the Network Computer (NC). NC refers to a set of technical standards — announced this past May — for developing simple, relatively inexpensive devices for cruising the Internet. In some cases, NC devices will be designed to connect to TV sets. In fact, Thomson (RCA) said that it would sell a set-top web-browsing box, based on Oracle's Network Computer (NC) design next spring.

IBM plans to use the Aptiva S line of media consoles to offer a home theater system that includes a PC/TV.

The first official NC product was announced by IBM this summer and features a customized version of Netscape, designed by Navio. Called the IBM Network Station, the product is smaller than an algebra textbook and weighs in at 2.5 pounds. It is designed to sit upright next to a computer monitor. Featuring varying amounts of memory, the device also includes a network adapter card, keyboard and mouse, an optional monitor — but there is no disk storage.

The Network Station, in addition to providing web access, can also link to a company's central server computers, so employees can use other applications and store their work. It is geared toward business customers at $700 and uses a computer monitor for display.

IBM's PC/TV plans

IBM is also working on a PC/TV, and news of a collaboration with a major consumer electronics name is expected in the future. This past September, Big Blue introduced its new Aptiva S line, with a split-system that separates the floppy and CD-ROM drives, along with the power controls, from the CPU. With these components now packaged in a newly introduced media console, which resides beneath the monitor, the CPU can be moved up to six feet away from the work area.

IBM plans to use the media console in its collaboration with one or more consumer electronics companies to offer a home theater system that includes a PC/TV. The media console will also be leveraged by IBM to create the networked home of the future, which includes console access stations throughout the house, linked to a central server.

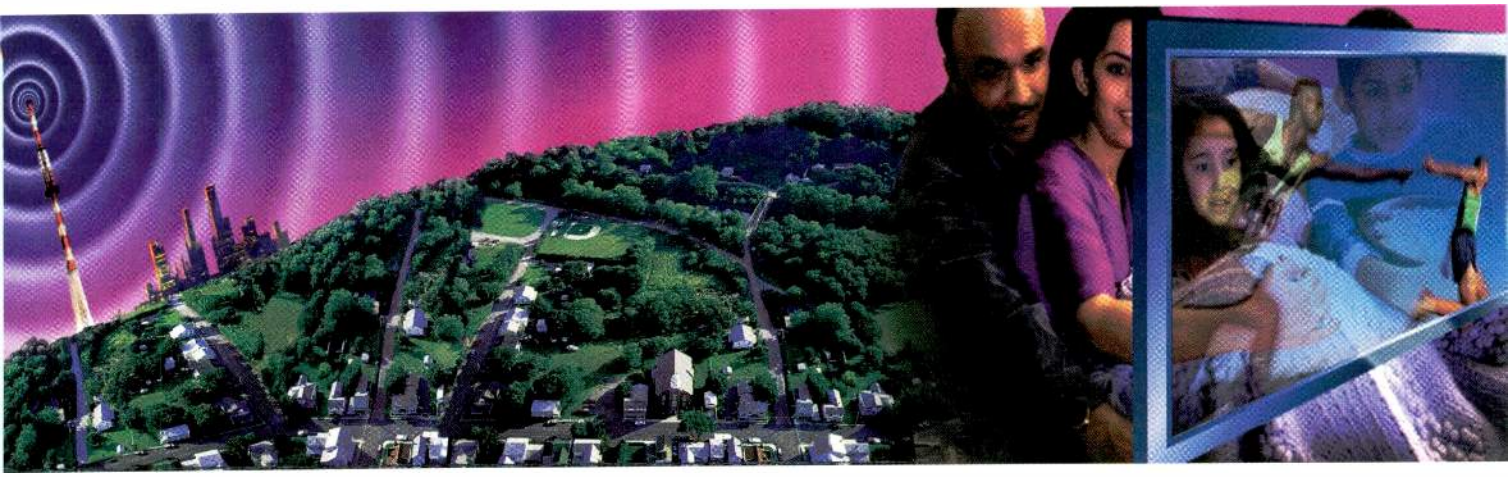
In a demonstration provided by IBM, a big-screen television was linked to a mini tower incorporating a TV card, modem and other software, such as a web browser. The system also included familiar audio and video devices, such as a home theater sound system, VCR and DSS. The Aptiva media console incorporated a DVD-ROM drive.

IBM also demonstrated an on-screen graphical user interface it designed for integrating and controlling the system.

IBM demonstrated a special remote control, dubbed a "media wand," that operates with the interface and responds to hand movements — as well as button pressing — for controlling a range of devices and functions. Web browsing is one of the capabilities we expect from a PC/TV from IBM and its as-yet-unnamed TV-set partner. ■

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.*

The first in a series of DTV updates from Comark



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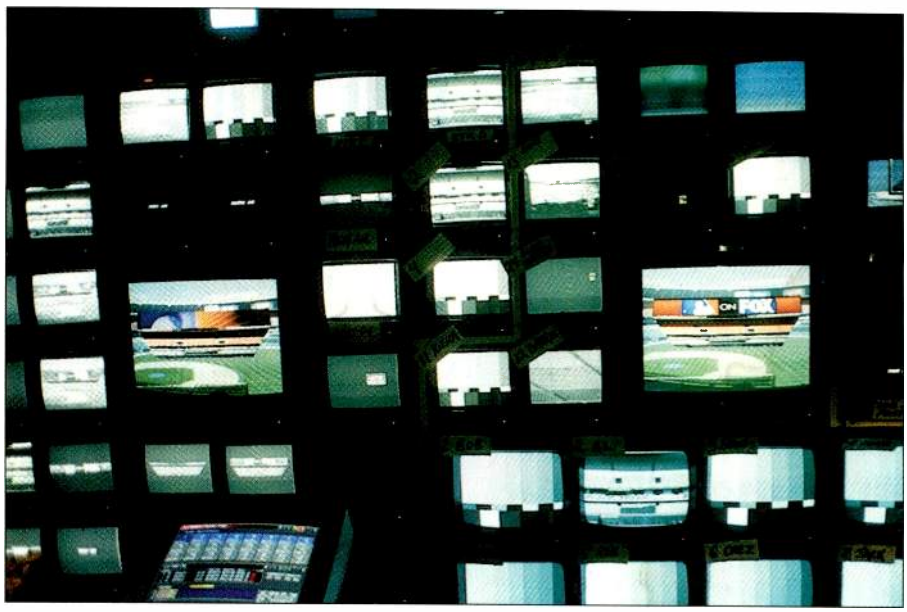
Fox Sports, Sony hit home run with World Series coverage



Fox rises to the challenge with a squeaky clean feed.

By Tom Cook, senior managing editor

ong before the New York Yankees beat the Atlanta Braves to win the 1996 World Series, the senior vice president of operations and engineering for Fox Sports, Jerry Gepner, knew he faced a dilemma. Holding the TV broadcast rights for the World Series, Fox Sports had an obligation to provide not only the domestic coverage, but also the international feed — a *clean* international feed.

It wasn't too long ago that sports broadcasting companies would put up a key for the score and another key with the network's logo, and they would just send a clean feed out upstream of that logo for the international feed. Thus, when you saw the World Series in Japan, you didn't know that ABC, for example, was broadcasting it in the United States because you never saw any of its monikers on the screen.

Photo: Two 20-inch color monitors display the results of Sony's Squeeky Clean digital solution for Fox Sports' broadcast of the 1996 World Series. The monitor on the right shows the Fox Sports and Major League Baseball logos, which appeared on the slab of each DVE replay. On the left, the bar contains generic artwork, which would be filled during the game with a different logo for the international audience.

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Fox Sports, Sony hit home run with World Series coverage

The clean feed challenge

Well, if you watched any Major League Baseball on Fox this past season and saw the Fox Box (a continuous graphic in the upper left corner with inning, scoring and base running data) or witnessed the swoosh of some statistics flying onto the screen, you knew that providing a clean feed to the rest of the world was not going to be an easy task.

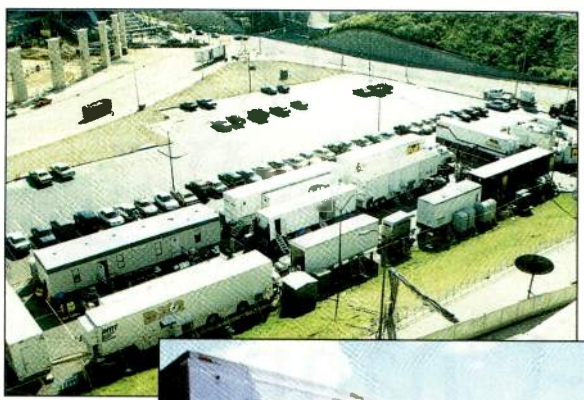
"The problem was the way they do that show, there was no way Fox could meet its obligation of a clean feed," said Steve DiFranco, director of production and post-production marketing for Sony's Broadcast and Professional Products Division, San Jose, CA.

Gepner agreed: "As domestic U.S. production gets more and more complex visually, and as more and more graphical branding of a product takes place, then the obligation to service the international market with that clean feed becomes more difficult from an engineering standpoint. Many of us are including an identifying graphic somewhere in the DVE replay (Major League Baseball's and Fox's logos on the 3-D slab), and although you don't want to compromise the ability of your executive production people to brand your product, you need to provide as branded-free a feed as possible for the world's broadcasters."

With less than five months until the World Series, Fox enlisted the help of Sony, which was partly responsible for the construction and equipment supply of at least five of today's digital mobile production units.

That's when the creative juices started flowing. Gepner, said DiFranco, came up with the idea of tying two switchers together, in this case Sony's DVS-7000. "He (Gepner) wanted one switcher to do domestic distribution with all of the logos everywhere and have the other switcher do the international feed without all of the graphics," DiFranco said. "Except he didn't want to hire two TDs (technical directors) or two directors or have to run the show twice."

Tom Belford and Glenn Hill, senior sustaining engineers for Sony, came up with the ideal solution, called Squeeky Clean. An option with the DVS-7000 is that one of the three M/Es could be controlled by another control panel. So, thought Hill, if two control panels can run one set of electronics, why not have one control panel run two sets of electronics?



Top photo: NMT's DX-2, a 53-foot digital mobile production trailer, parked in the lower left corner of the truck compound outside Atlanta's Fulton County Stadium and provided original feeds. Bottom photo: LIN Productions' LIN-1, which has nearly identical equipment to the DX-2 and also contains 38 feet of expandable space, parked on the top row in the middle and worked in tandem to provide the world's first all-digital transmission from two trucks.

"Why don't we park two trucks next to each other, tie them together with a communications line, and as the TD is switching the show in one truck, the other switcher will literally mimic in real time the switch?" Hill asked himself. "We'd send the same camera feeds to both switchers and send the Fox graphics to the main switcher, but the still-store in the other truck would just have a generic Major League Baseball icon."

DiFranco admitted being apprehensive when approaching Gepner with the solution. "When we told Gepner about how this would work, I expected him to hit the ceiling when I said he'd have to rent two trucks," DiFranco said. However, DiFranco's worries turned out to be unwarranted.

"We were going to use two trucks anyway," Gepner said. "Because of the number of cameras and tape machines you use, it doesn't make sense to use one truck and then build all that other stuff up outboard. It's much more cost-effective to bring in a second mobile unit."

Fox, which doesn't own any mobile facilities, called on National Mobile Television (NMT), Cincinnati, and its DX-2 digital unit to be the main truck, and LIN Productions, Arlington, TX, to provide LIN-1 as the truck for the international feed. The Squeeky Clean system originated only from Atlanta. (Fox rented CBS' MU1 and NMT's A16 for analog production in New York.)

"Frankly, I was shocked when Steve DiFranco called and said, 'By the way, you know, it works,'" Gepner admitted. "I was floored, absolutely flabbergasted. I said, 'You mean you went and did it?' And he said, 'Yeah, it was a good idea.' It's very gratifying to have those kinds of relationships."

No turning back now

DiFranco knew there was no turning back, but he also did not want to go to the World Series and give this a try for the first time. Never before had two digital trucks been linked for a broadcast. "I wanted to make sure that nobody questioned the use of Digital Betacams, Sony cameras, switchers or digital video effects in a live production," he said. "And I wanted to prove to the country that we had the kind of support systems that everybody felt Grass Valley was always able to provide."

So Gepner called chief engineer Mark Brooks at NMT and arranged for DX-2, which had just completed a September weekend series between the Los Angeles Dodgers and San Diego Padres, to

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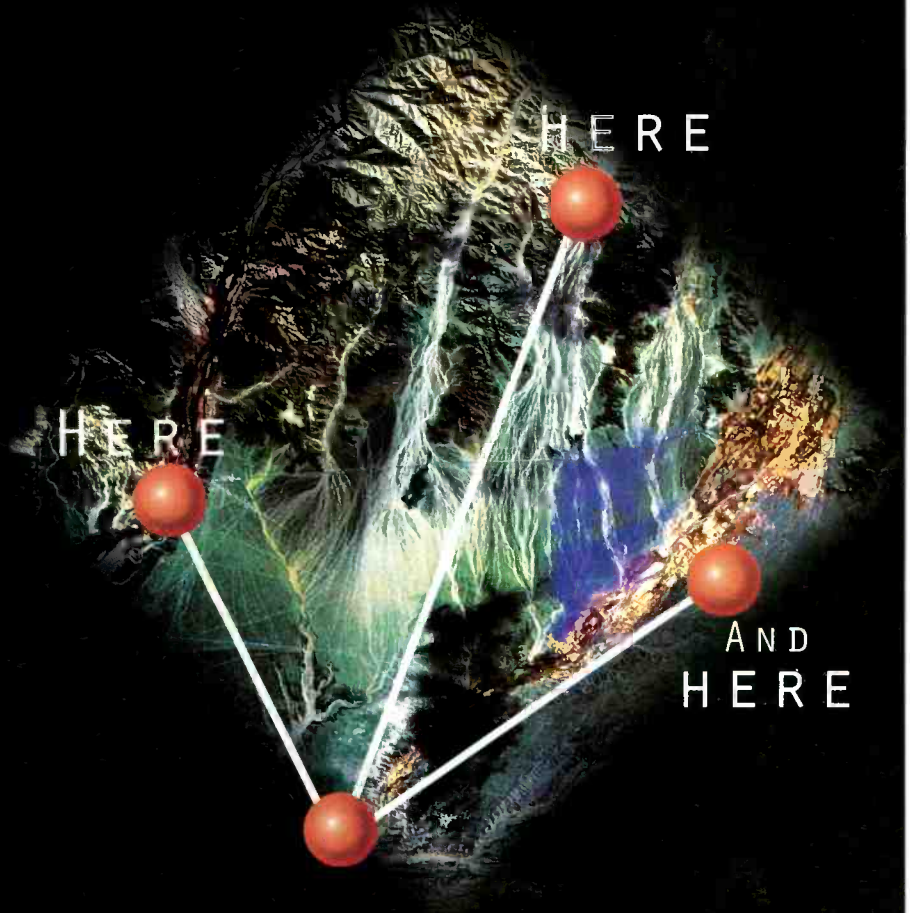

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Fox Sports, Sony hit home run with World Series coverage

be parked in Sony's San Jose barn and put through the paces of producing an entire baseball game. A second DVS-7000 posed as LIN-1's switcher. Eight hours later, after numerous tests and purposeful power failures, etc., DiFranco and Fox Sports' Jerry Steinberg, director of field operations, were comfortable with the setup.

"Here's a way that the programmer, Fox, worked with a company, Sony, to help two of their customers, NMT and LIN, solve a problem for Fox, where Fox called us first," said DiFranco. "And that relationship is what's changed in our industry. Twelve years ago, it would have been a network working with its internal engineers, and the manufacturer would have had nothing to do with it.

"Today, the programmer calls the manufacturer to come up with a solution for the manufacturer's customers, and I think that relationship is an indication of what's going to happen in this business. I spend as much time talking to programmers now about what they want these trucks to do as I do with the truck owners. I think it will be a completely different arena in the way we interact with each other."

Sony's DVS-7000 switcher in LIN Productions' digital mobile unit essentially looked the same during setup as it did for the three World Series games in Atlanta. The switcher was linked with the DVS-7000 in NMT's DX-2 truck to mimic every switch for the international feed, so there was no need for a technical director at this unit during the game.

Gepner, whose Fox Sports Division is still the new kid on the block for network sports programming, approached the 1996 baseball finale with a sense of excitement, seeing this as the crowning achievement in digital sports broadcasting. "We were very excited about the possibility of an all-digital compound," he said, "and being able to share very conveniently facilities between two large digital production plants without some of the normal angst you go through when you tie together multiple analog environments. This is where emerging video technology. . . and digital technology. . . will take us." ■

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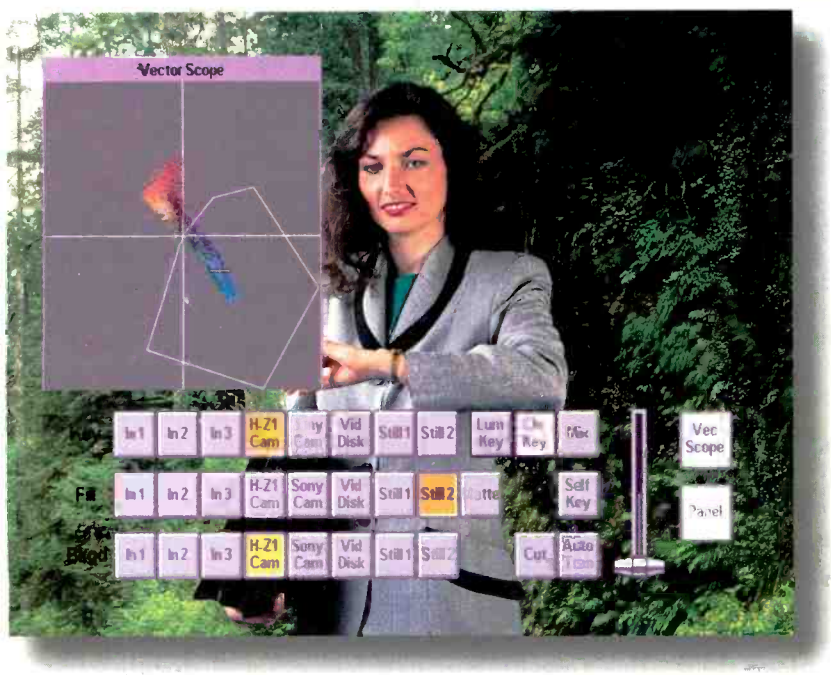

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By Don Markley

Doing maintenance at combined VHF/UHF sites

The advent of ATV (or one of its other aliases) will introduce many station engineers to the world of UHF TV transmitters. This has been discussed earlier to some extent in *Broadcast Engineering*, but without really going fully into new maintenance requirements.

One of the required major changes will be having to deal with new volumes of hot air and/or water with the possibility of also dealing with steam. Because no one really knows what the final configuration of the ATV transmitters will be (we don't even know what the scan rate will be), it's highly possible that some vapor-cooled devices will be inflicted upon engineers who are used to dealing only with docile blowers. In addition, for those who already have such systems, this is a good time of the year to be taking another look at those systems.

The cooling system

While some UHF equipment, even at fairly high power, is totally air-cooled, the majority of the higher-power devices use some combination of air and liquid in their cooling system. With a few exceptions, the final heat removal is by air. If the air is not cooling the device directly, it is used in a heat exchanger to cool a liquid, which is then used to cool the device. Some systems are even more exotic where distilled water is used to cool the amplifier with a heat exchanger used to transfer the heat to another liquid containing an antifreeze, which is in turn cooled by air in a heat exchanger.

While most experienced station engineers are familiar with blowers, filters and their associated problems, dealing with all of those non-potable liquids is where the problem arises. It can be assumed that all summer long the cooling systems have been simply doing their thing. However, as winter sets in, new demands are placed on the system — namely, don't freeze. Just as winter follows fall, the next few months will see some stations go down because no one has serviced the cooling systems.

Just as winter follows fall, the next few months will see some stations go down because no one has serviced the cooling systems.

The inspection check list

A simple check of all fluid levels is always in order. This should be accompanied by an inspection of all belts, motors, gear boxes and other blower and pump drives. When the staff is worrying about neat digital boxes and how to get them wired into the video system, there is a tendency to ignore the more mundane things like flow rates, filter conditions and the freezing point of cooling solutions. The result is often a frozen heat exchanger with more holes in it than a politician's promises. The problem is that the cooling systems are so dependable that no one really thinks about them until it's too late.

For the newcomer, much can be done with the cooling system to protect it from harm. Where pure water is directly cooled by outside air, controlled louver systems need to regulate the temperature of the cooling air. To explain this better, let's first look at the system when nothing is running. Without the transmitter making steam/hot water/hot air, the heat exchanger will be subjected to whatever temperature of air is in the surrounding room or in the duct work.

Heat exchangers can be inside the transmitter building with duct work for air input and output, directly located outside or in an air-handling room of their own. For vapor-cooled transmitters using distilled water and heat exchangers, which transition directly to air, something must be done to keep the system from freezing during down time. In fact, these systems will freeze up while operating if the airflow is not properly controlled. For indoor systems, louvers must be installed on the intake and exhaust of the heat exchanger. Then, a heat source must be provided to keep the air around the heat exchanger above freezing. This is usually either in the form of a small space heater or heating rods placed near the core of the exchanger.

The louvers must be adjusted automatically to permit outside air to flow when the transmitter starts heating up the water. This may be done by a system that will partially open/close louvers to maintain the air temper-

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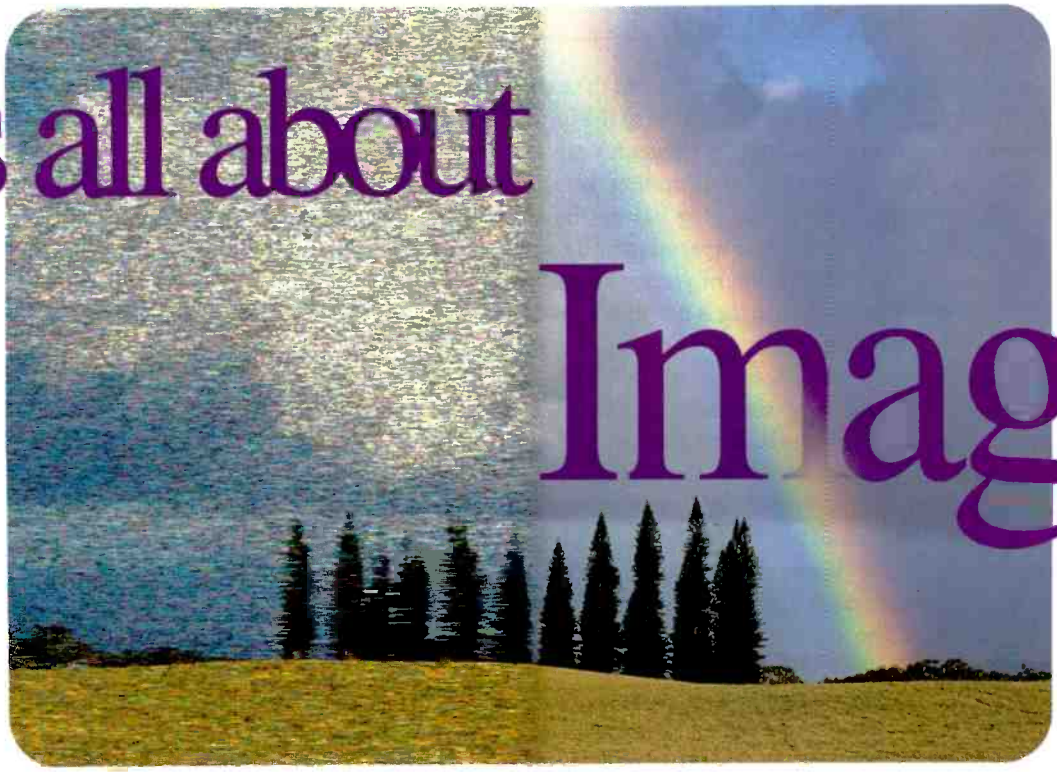

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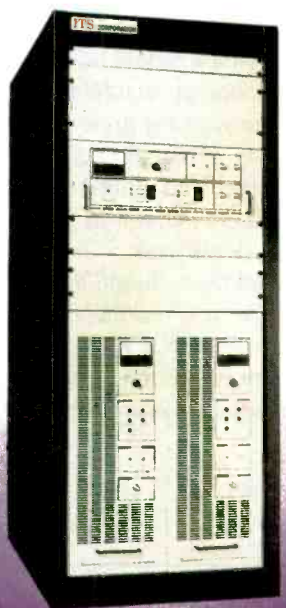

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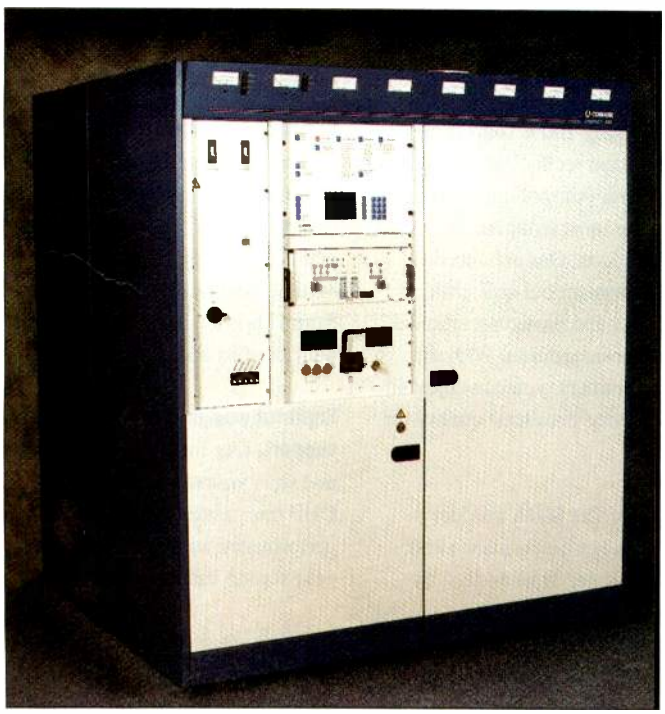
ature at a reasonable level. That is, some of the exhaust air will be recirculated to the input to keep the input air temperature within an acceptable range. It's advisable to call on your heating/air-conditioning service to check these systems out thoroughly before the really bad weather arrives. The louver operation and controllers are critical to the operation of your system. When everything is frozen solid with ice is not the proper time for preventive maintenance.

As a word to the wise, some protection should be provided for the louvers themselves. Your heating contractor can construct protective hoods to cover the intake and exhaust louvers. Without such protection, ice can build up on the louvers during a storm, which will prevent them from opening when air is needed. Even worse, if the louvers are frozen in the open condition and the transmitter shuts down, outside air is free to enter the heat exchanger room with dire results.

Water/vapor cooled systems create a whole new set of worries for the transmitter crew. Remember, if the power at the transmitter site goes down during a winter storm, you must have standby protection available.



The Comark Compact IOX transmitter in use at the WDHD-TV transmitter in Washington, DC.

This can be in the form of a standby generator, which will at least operate your electric heating systems or non-electric heaters to keep the heat exchanger and transmitter warm. If the power stays down long enough for the building to get below freezing, you can kiss a few things good-bye starting with heat exchangers, klystrons, pipes, pumps and, perhaps, your warm indoor job.

There is some good news here. The pure water systems are primarily found in existing equipment using regular klystrons or MSDC klystrons with vapor phase cooling. Most of the new equipment use IOT devices, which aren't vapor-cooled. For these systems, the collector is cooled with water and ethylene glycol at ground potential. All other parts of the IOT are air-cooled.

Carefully inspect all belts, motors, gear boxes and other blower and pump drives.

The other primary problem is the liquid itself. Many systems use an ethylene glycol solution as the primary cooling medium. This is for liquid-cooled, not vapor-cooled, transmitters. Ethylene glycol in a vapor-cooled klystron would deposit new and interesting compounds as it's boiled away. In addition, it's not non-conductive and cannot be directly applied where voltages are present, as is the case in an MSDC klystron. For the liquid-cooled systems, ethylene glycol is readily available and inexpensive.

Checking the chemicals

The chemicals used most are Dowtherm (Dow Chemical) and UCARTHERM (Union Carbide). The first requirements are to check that the mix is good to the coldest temperature anticipated and that it remains clean. The ethylene glycol is usually mixed with distilled water to avoid introducing other chemicals into the system. In addition, most systems have filters in the liquid that should be checked periodically. A testing kit is available for the mixed liquid, which should be used regularly. The problem is that the corrosion inhibitors break down after time, which can start the growth of unwanted deposits in the klystrons. When this occurs, the system should be drained, flushed and refilled with new coolant just like you do with the radiator in your car. You do check that regularly, don't you?

The cooling system is simple and there should be no problem with it's maintenance. The only real difficulty is remembering to check it periodically. It is the old squeaking wheel syndrome where the cooling system rarely squeaks. Unfortunately, when it does squeak, it's more like a roar. ■

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

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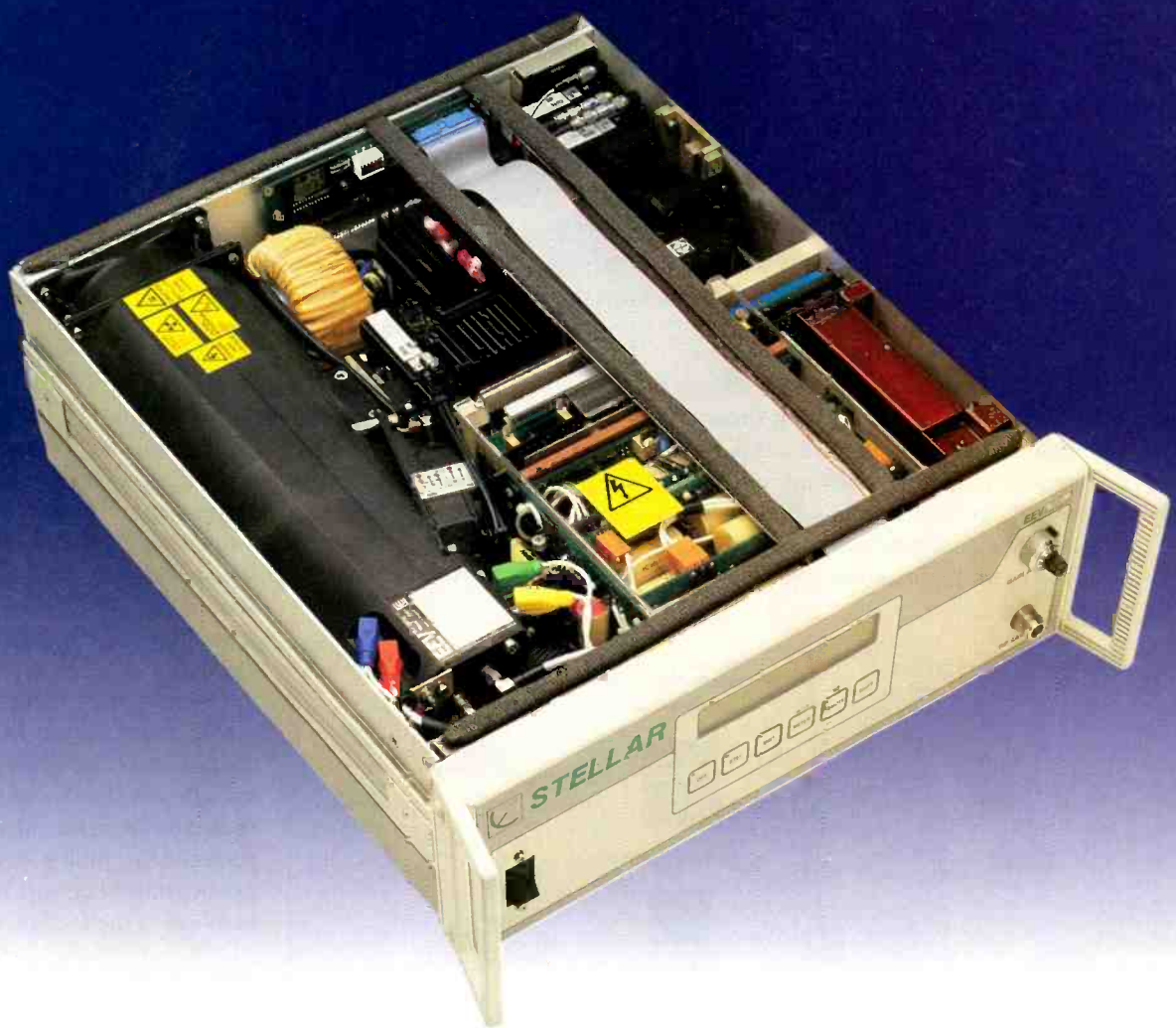

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By Charlie Bernstein

CSDI: Compressed serial digital interface

The ability to transfer compressed files in a broadcast facility from one video server to another or from acquisition equipment to video storage devices is a growing demand in the broadcast industry. A number of different approaches to this requirement have been proposed by various vendors. Philips Broadcast Television Systems (Philips BTS) has endorsed the emerging SMPTE standard of compressed serial digital interface (CSDI) to transfer compressed files from one device to another.

Application-specific servers

An important issue facing broadcasters as they migrate to more centralized disk-based servers is the problem of supporting multiple applications in a facility, all intermixed in a single box. Video servers may be used for commercial playout, programming, dubbing and news applications. Material may be developed on a news server that later airs as a promo on a spot playout server or replayed during the newscast on the on-air server. Stations want to be sure that the activities in their news room and edit suites don't affect the operation of their commercial playout channels.

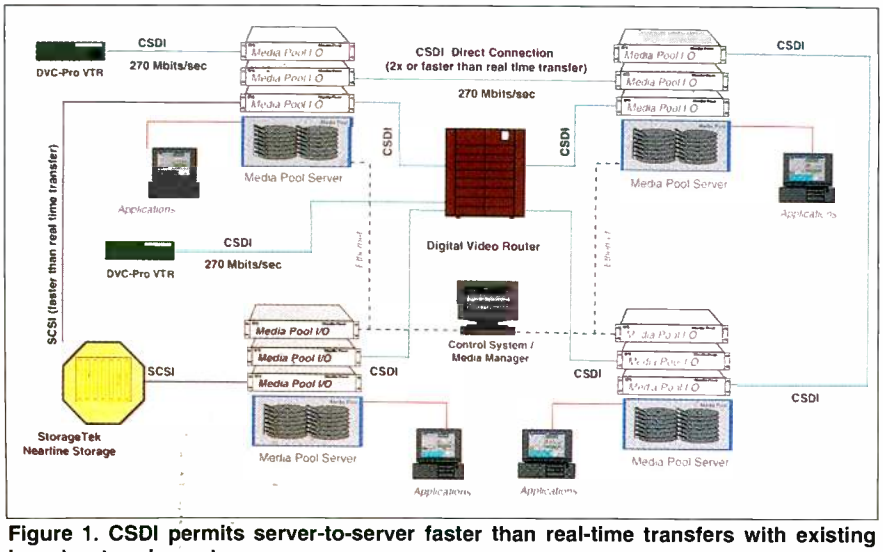

Figure 1. CSDI permits server-to-server faster than real-time transfers with existing broadcast equipment.

Real-world solutions

How will networked servers address these requirements? In order to obtain maximum benefit of server-to-server transfers, the ability to transfer a compressed file is imperative. Decompressing and recompressing files can already be done with existing serial digital interface (SDI) technology. The advantage to sending compressed files is threefold. First, there is no additional generational loss of the video signal. Second, because the signal is compressed, it can be sent faster than real time from one server to another. Third, associated file database information can also be transferred, eliminating the need to recreate the information manually on the destination server.

CSDI: A new solution for server-to-server communication

CSDI is an emerging standard for sending compressed files from one device to another. The standard allows the use of existing digital broadcast infrastructure to send data, as opposed to video, between devices. Data (compressed video files) are synchronized to a standard digital video signal and sent. The data is effectively synchronized to video scan lines. The data being sent includes compressed video, all audio tracks and timecode tracks. Compressed files can be sent via direct connections or routed through a serial digital video router. Also, multiple connections can be established with other devices in use at the facility.

CSDI vs. SDI

How does the video server send compressed files over the same infrastructure used for video? Consider that with a regular video server, when video is written to disk, it is compressed to save bandwidth and storage space. On output, the video is sent through a video decoder, brought back to full bandwidth and sent out over the SDI to a digital video router where it goes to monitors, other devices or to air. With CSDI, the same compressed file is read from disk, but instead of going through the compression engine and decoded, it is sent directly to the serial digital interface as a compressed file, not as video. The data signal, which runs at up to 270Mb/s, can be sent to the same router and distributed to other devices that support SDI.

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Intraserver compressed transmission

Server-to-server (intraserver) compressed file transfer is a new technology for broadcasters. The technology offers many advantages. These include compressed file transfer, faster than real-time transfer, point-to-point transfers, point-to-multipoint transfers and media management.

In addition, a CSDI-based solution also provides additional features that may not be included in other implementations, including forward error detection or correction, automation control, support for acquisition equipment, faster than real-time file transfer and support for existing broadcast equipment.

Support for acquisition equipment

The CSDI standard not only includes support for video servers, but also supports acquisition and tape-based devices. DVCPRO cameras and VTRs may support CSDI providing up to four times transfer from field cameras (pre-recorded tape) directly to VTRs or to servers. Videotapes can be loaded onto the VTR and transferred into the server in the same manner as files are sent between servers.

FEATURES/BENEFITS	CSDI	FIBRE CHANNEL ARBITRATED LOOP
COMPRESSION FILES	SUPPORTED	SUPPORTED
FASTER THAN REAL-TIME TRANSFER	YES	YES
BROADCAST INDUSTRY STANDARD	PROPOSED SMPTE STANDARD	COMPUTER STANDARD
USES STANDARD BROADCAST EQUIPMENT	YES	NO
SCALABLE BANDWIDTH	MULTIPLE CSDI CONNECTIONS SUPPORTED BANDWIDTH SCALABLE BASED ON NEEDS	ARBITRATED LOOP LIMITS BANDWIDTH WITH MANY DEVICES CONNECTED
USES EXISTING INFRASTRUCTURE	YES	NC
ADDITIONAL COMPUTER TECHNOLOGY	NO	YES
POINT-TO-POINT	YES	YES
MULTICAST	YES	NO
ROUTABLE	VIA SERIAL DIGITAL VIDEO ROUTER	VIA ADDRESS ON ARBITRATED LOOP
SUPPORTS OTHER DEVICES	ACQUISITION, VTRs	NO

Table 1. Feature comparison between CSDI and Fibre Channel topologies.

Scalable bandwidth

One of the requirements of interconnecting servers is having the required bandwidth to transfer files over the connection. Today's solutions provide suitable bandwidth for at least a single compressed stream and sometimes it provides suitable bandwidth for multiple streams. Currently, there are two main approaches to interconnect servers, arbitrated loop technology (Fibre Channel Arbitrated Loop) and matrix switched technology (CSDI).

With a loop technology, each loop has a maximum bandwidth it can support. As more servers or nodes are added to the loop, more congestion may be created. With CSDI, scalability is provided by adding new crosspoints between servers, just as they are done today with video. A serial digital video switcher can take a single input and route it to multiple outputs or multiple source destination connections can be made as additional bandwidth is required.

Standards-based solutions

CSDI has been proposed for standardization by SMPTE. The proposal will support standard file formats, a specified bit rate and synchronization. Today, there is one file format being proposed. It is possible that, in the future, CSDI will support multiple file formats for different applications. For instance, DVCPRO could be supported for acquisition and news applications and Motion JPEG supported for spot playout and programming. Additionally, MPEG-2 may be supported for distribution servers. Because the transfer is, in most cases, faster than real time, the file format should be irrelevant. As long as the data can be synchronized to the data rate of the connection, it should be possible to send the data over that connection.

CSDI vs. Fibre Channel

CSDI offers most or all of the advantages of a computer networking technology, such as Fibre Channel. It also provides some additional advantages. CSDI offers increased scalability over Fibre Channel. A single Fibre Channel Arbitrated Loop can support about 75MB/s to 80MB/s. Each CSDI connection can support about 34MB/s. Although Fibre Channel has more initial bandwidth, multiple CSDI connections can be made to support more data transfer.

CSDI also uses existing familiar broadcast equipment, and uses the existing professional video paradigm: serial digital routers, coax cable and standard video connections. With CSDI there is no new equipment to buy. Existing systems are already compatible and expansion can be easily supported. No new computer technology needs to be learned or installed. CSDI also fits in well with today's automation systems.

The future

Today's broadcast and post facilities increasingly require the use of multiple applications, large servers and dispersed site operations. All of these needs can benefit from a fast, easy-to-implement intraserver file scheme. The new CSDI standard provides these advantages in a server-to-server interconnect topology at faster than real-time rates. And just as important, its implementation can be accomplished using existing broadcast equipment. ■

Charlie Bernstein is senior product manager, storage and retrieval products, Philips Broadcast Television Systems Company, Simi Valley, CA.

new products

By Deanna Rood

Digital camera
Hitachi Denshi America Ltd.

• Z-2000A digital camera: a three-chip CCD color camera that features a new data transfer system for quick transfer of camera set-up information between cameras; an instructional 42-minute videotape is available that demonstrates the features of the Z-2000A, as well as the proper set-up of menu-selected items, such as special gamma, six-vector color corrector and flesh-tone detail control.

Hitachi, 150 Crossways Park Dr., Woodbury, NY 11797; 516-921-7200; fax 516-496-3718
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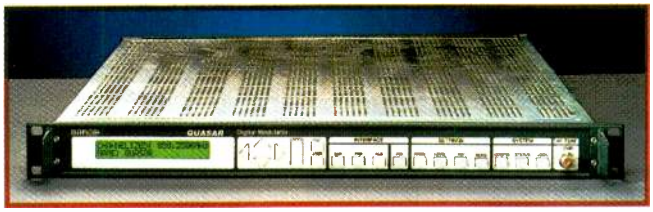

DVB-compliant QAM TV modulator
Barco

• Quasar: a DVB-compliant QAM modulator for transmission of digital signals; n-QAM capability, combined with a selection of different bit rates and channel bandwidths, makes the unit fit to operate in virtually every CATV or MMDS system; in addition, full remote control and monitoring of all settings are possible through Barco's ROSA 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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MPEG video analysis
Snell & Wilcox

• MVA100: an MPEG-2 video analyzer designed to complement the MSA100 transport stream analyzer by concentrating on the way in which pictures have been encoded; the MVA100 can verify the performance of any MPEG-2 encoder or decoder; it can also solve encoder/decoder compatibility issues and optimize the design of encoders as it monitors transmissions in the field; the integral high-quality decoder is designed to support every encoding mode in MPEG-2 MP@ML and will always produce a picture from a compliant video stream.

Snell & Wilcox, 1289 Hammerwood Ave., Sunnyvale, CA 94089; 408-260-1000; fax 408-260-2800; snellcal@aol.com
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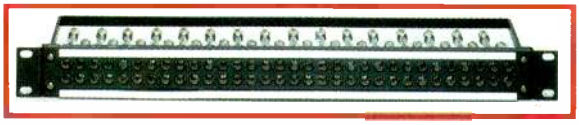
Video panel
ADC Telecommunications



• CJMID staggered video panel: a CJMID staggered midsize jack video panel, especially designed for use in broadcasting trucks and other high-density digital video applications where true 75Ω impedance is required; the panel features 2x32 video circuits in a standard EIA width panel (1.75"x19"); in order to accommodate the large number of circuits, ADC designed midsize coax jacks — the CJ3011 and CJ4011 short- and long-body midsize single video jacks are staggered alternately on the panel and feature closed-entry BNC contacts for maximum center conductor force over sustained periods.

ADC, 4900 W. 78th St., Minneapolis, MN 55435; 800-366-3891 (ext. 3475); www.adc.com
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DVCPRO VTRs
Panasonic

• 600 series: the series is made up of the AJ-D650 studio editing deck and the AJ-D640 recorder/player; 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, the VTRs address applications in linear and non-linear editing.

Panasonic, One Panasonic Way, 2A-2, Secaucus, NJ 07094; 800-524-0864 or 201-392-4319; fax 201-392-6001
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Routing switchers
Leitch

• Xpress 12x1: routing switchers that offer low-cost equalizing and re-clocking digital video routing with the AES/EBU version meeting the need for small digital audio routers; available in 1RU 19-inch rack mounting, local or remote control and capable of being integrated with the existing XPRESS video and stereo audio switchers.

Leitch, 25 Dyas Rd., North York, Ontario, Canada M3B 1V7; 416-445-9640; fax 416-445-0595
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Accessories catalog
The Winsted Corporation

• 1996 Winsted Furniture and Accessories catalog: a free catalog featuring accessories for Winsted racks and consoles, such as doors for vertical equipment racks that feature shatter-resistant tinted Plexiglas and a security lock; two handy items that attach to the underside of the work shelf include a retractable cup holder and a new keyboard tray featuring a unique pull-out mouse pad.

The Winsted Corporation, 10901 Hampshire Ave. So., Minneapolis, MN 55438-2385; 800-559-6691; fax 612-944-1546; www.winsted.com; racks@winsted.com
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New York & Los Angeles

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Quantegy, 1025A Terra Bella Ave., Mountain View, CA 94043-1829; 415-903-1100; fax 415-903-1141
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Videotek

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

A 12-page catalog featuring Frezzi's lighting products, lighting kits, accessories, adapter cables and more; includes recent battery test results and battery comparisons.

Frezzi, 5 Valley St., Hawthorne, NJ 07506; 800-345-1030 or 201-427-1160; fax 201-427-0934
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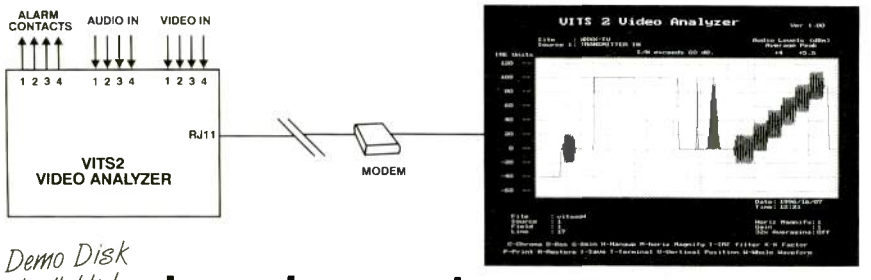

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Miranda

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Miranda, 8055, Transcanada, St-Laurent, Quebec, Canada H4S 1S4; 514-333-1772; fax 514-333-9828
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Thomson Tubes Electroniques, 13 av Morane Saulnier, Batiment Chavez, Velizy Espace, BP 121, Velizy Cedex France F-78148; +33-1-3070-3643; fax +33-1-3070-3650
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Windows-based interface for iNFiNiT! graphics systems
Chyron

• WiNFiNiT! GUI: a graphical user interface for Chyron's iNFiNiT! family of graphics systems; WiNFiNiT! provides a Windows NT front-end for Chyron's iNFiNiT! family of character generators; Chyron offers a new keyboard, keyPC with WiNFiNiTi! that incorporates a Pentium-based CPU and has direct connections for an SVGA color prompt monitor and SCSI-based peripherals; all existing users of iNFiNiT!, MAX!> and MAXINE! graphics systems can add WiNFiNiT! capabilities using the new keyPC keyboard or a 486 or newer external PC and Microsoft Windows NT.

Chyron, 5 Hub Dr., Melville, NY 11747; 516-845-2182; fax 516-845-2058; www.chyron.com
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Continued from page 46

Controlling HVAC noise

Vibration isolation

Airborne noise that radiates directly from HVAC equipment is only one part of the story. Rotating or motor-driven machinery also generates vibration energy that can travel through a building's structure and radiate from the walls, floors and ceilings in the form of airborne noise. It is essential to control vibration at its source, because once it's allowed to transmit into the building structure, vibration from HVAC equipment is widespread and extremely difficult to contain.

Vibration is best controlled by decoupling the vibrating equipment from the surrounding structure. This can involve spring mounts, elastomeric mounts, inertial bases, floating floors and/or structural isolation joints.

Vibration isolators must be matched to the load they carry. It's fairly intuitive that a spring that is fully compressed doesn't offer any isolation from the supporting structure. What may not be so obvious is that an uncompressed spring is just as ineffective. If the weight of the equipment doesn't deflect the spring, it means that the spring is stiff enough that the vibration can transmit directly through its coils. Oversizing a spring's capacity is just as detrimental as leaving it out entirely.

TIP: Use properly sized isolation mounts to keep vibration at the HVAC equipment from being transmitted into the building structure.

Flanking paths

When isolating HVAC equipment or piping or duct work from the building structure, it's important to verify that there are no *flanking paths* or other means for their vibration to be transmitted into the surrounding construction. For example, it is futile to mount a fan unit on springs unless there are flexible canvas or neoprene connectors at the supply and return ducts that attach to the fan. Otherwise, the vibration will travel through the duct to the first place it attaches to the building. Similarly, any piping and conduit that are connected to vibrating equipment must also be isolated with flexible connections.

TIP: Remember that noise and vibration don't always follow the most obvious path in getting from the source to the place you don't want it to go. Don't allow rigid connections to defeat the operation of vibration isolators.

Penetrations

One of the most commonplace problems caused by HVAC systems has nothing to do with noise and vibration generated by the equipment or duct work. As it is distributed throughout the technical spaces, duct work inevitably penetrates the walls, ceilings and floors that are responsible for a room's sound isolation capabilities. If these penetrations are not adequately treated, they allow sound leaks that can render these acoustical barriers completely ineffectual.

First, the penetrating duct work should be supported independently from the partition. If a duct rests on the wall it penetrates, any vibration within the duct can be transmitted into the wall itself, which can then provide a large radiating surface to turn the vibration into airborne noise. Second, the duct should be resiliently isolated from the surrounding construction as it passes through the partition, to avoid any contact that might transmit the vibration into the wall. Third, the area surrounding the penetration should be sealed airtight, using materials that won't allow noise from an adjacent space to leak through the gap.

TIP: Make sure all penetrations through sound isolation walls and ceilings are sealed resiliently and airtight.

The best defense

When it comes to HVAC noise and vibration control, even with the best of intentions, there are hundreds of ways to make acoustical blunders that can render a technical space virtually unusable. There is no substitute for getting qualified help for the mechanical and acoustical design of HVAC systems in a technical facility.

If you're cognizant of the general mechanisms behind typical acoustical problems, however, it's much more likely that you'll be able to avoid at least the most common ones. ■

Richard Schrag is a consultant with Russ Berger Design Group, a recording and broadcast studio design firm in Dallas.

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industry briefs

BUSINESS

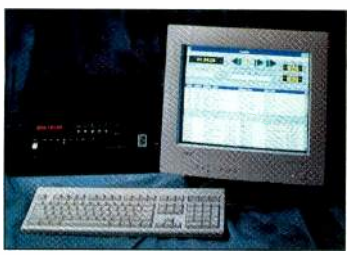
Dielectric, Raymond, ME, and ABC Inc., New York, reached an agreement whereby Dielectric will supply digital and NTSC TV equipment for ABC's stations nationwide.

In a separate agreement, Dielectric will also provide TV equipment to stations owned by Hearst Broadcasting, New York.

Sony, Park Ridge, NJ, announced that it was chosen to design and equip a new direct-to-home broadcast center for American Sky Broadcasting, Gilbert, AZ.

Quantel, Darien, CT, announced the sale of an Editbox 4020 system to Ocean Post, a London-area post-production facility.

Quantel also announced the sale of an Editbox 301 to Flipside Films, San Francisco.



Pioneer New Media, Long Beach, CA, announced that the first Digital FastFile integrated stills and clips system was shipped to WUSA, Washington, DC.

Harris Corporation, Quincy, IL, announced that its broadcast division has entered into a TV transmitter purchase agreement with Tribune Broadcasting Company. Under the agreement, Harris will provide current NTSC and future DTV transmitters to Tribune-owned TV stations nationwide.

Additionally, Harris' broadcast division was selected to provide DTV transmitters for the KCTX/Seattle and Oregon Public Broadcasting, Portland, experimental DTV facilities.

Tektronix, Beaverton, OR, signed an agreement to acquire Dynatech Newstar, Inc., Madison, WI. The terms of the transaction were not disclosed.

Also, Tektronix was awarded an Emmy for Outstanding Achievement in Engineering Development for its Profile Professional Disk Recorder.

Pinnacle Systems has relocated to 280 North Bernardo Ave., Mountain View, CA 94043; 415-526-1600; fax 415-526-1601; tech support 415-237-1800.

Comark, Colmar, PA, and Paxson Communications, West Palm Beach, FL, reached an agreement for the provision of Comark DTV transmitters to all of Paxson's TV stations across the country.

Acrodyne, Blue Bell, PA, was awarded a contract for two diacrode 60kW UHF TV transmitters by the state of Wisconsin. The contract also includes installation services and test equipment.

PEOPLE

Ken Ellis has been appointed chief executive officer of Quantel, Inc., Darien, CT.

Also from Quantel, David Dever was named vice president of business development, broadcast and cable.

Kevin Prince was appointed director of marketing for Digital Graphix, Paramus, NJ.

A runway collision at the Quincy, IL, airport on Nov. 19 claimed the lives of three prominent men in the broadcast equipment industry.

Dennis Reed, 37, was director of international programs for Harris Corporation's Broadcast Division. James Beville, 50, was president of Dielectric Communications Company of Raymond, ME. Mark DeSalle, 43, was Dielectric's vice president of finance. All three were on their way to business meetings at Harris Broadcast's headquarters in Quincy. Their commuter flight had just landed when it collided with a private plane at a runway intersection.

Wayne Coleman, chief engineer for Eagle Mountain Productions, was the winner of a Videotek SDC-101 digital color corrector at the third annual *Broadcast Engineering* Advanced Television Conference held in Chicago. More than 100 engineers from across the country, as well as Brazil, Italy and Mexico, attended the event.

Continued from page 18

mance guarantee may be a service credit if network uptime and bit error rates (BER) fall short of your requirements? If not, can you justify the expense of building a private network or leasing one?

On the technical side, ensuring high QoS requires diligent network administration performed by highly qualified people using the best equipment. Signal switching, coding and timing errors induced anywhere along the signal path can ripple through to the customer if not caught and corrected. Can you afford to hire the best people and provide them with the right tools? Finally, because ATM is relatively new to commercial applications and standards are still evolving, are you willing to spend the time and money required to discover ATM's true potential? Adopting ATM is a bold move and you must be prepared to grow with the technology.

Tracking ATM developments

Most of the current information on transmitting video using ATM comes from international standards bodies and industry consortia comprised of commercial network, service and content providers. Three of the most prominent standards bodies engaged in defining globally acceptable standards for ATM include the International Telecommunications Union (ITU), the European Telecom Standards Institute (ETSI) and the American National Standards Institute (ANSI). ETSI and ANSI are members of the ITU.

Commercial providers are exploring real-world adaptations of ATM for video through implementation agreements (IAs). Interactive TV trials are under way in many locations throughout the United States and the major industry players are involved. Industry organizations actively involved in resolving technical issues surrounding ATM for video include the ATM Forum, the Digital Video Broadcast Project (DVB) and the Digital Audio-Visual Industry Council (DAVIC).

Asynchronous transfer mode networking for voice, data and video holds considerable promise as an efficient connection-oriented technology. It is useful for transmitting complex signals over great distances in short periods of time offering bandwidth on demand that reaches well into the gigabits-per-second range. From all indications, ATM mated to a pay-for-bandwidth-used cost structure can position it as an attractive alternative to today's conventional networking schemes. ■

Richard Duvall is a marketing manager for Tektronix Inc., Beaverton, OR.

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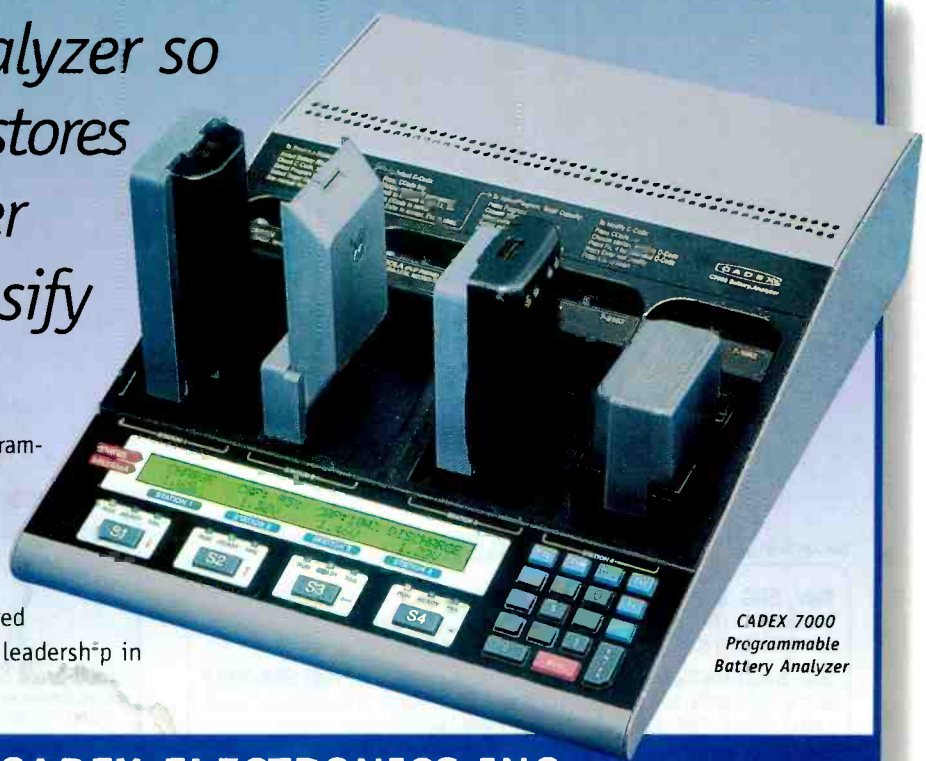

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Continued from page 24

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ANTON/BAUER Circle (151) on Free Info Card	X	X		X		
PRO BATTERY INC. Circle (152) on Free Info Card	X	X	X		X	X*
PERROTT Circle (153) on Free Info Card	X	X	X			
FREZZI ENERGY SYSTEMS Circle (154) on Free Info Card	X	X				
ENERGEX SYSTEMS CORP. Circle (155) on Free Info Card	X	X				
IDX TECHNOLOGY Circle (156) on Free Info Card	X		X	X		
VICTORY BATTERY COMPANY Circle (157) on Free Info Card	X					
CADEX ELECTRONICS INC. Circle (158) on Free Info Card	X	X	X	X		
SACHTLER AG Circle (159) on Free Info Card	X					
SYNERGISTIC Circle (160) on Free Info Card	X	X	X	X		X**
PAG LTD. Circle (161) on Free Info Card	X					

* ALKALINE, CARBON ZINC, SILVER
** ALKALINE

Table 2. Leading battery suppliers and the battery types they provide.

are durable, cheap and provide a high-discharge (2Ah-30Ah) power source. Unlike Nicads and NiMHs, SLAs don't like being fully discharged and must be stored in a charged state. Although still expensive, *Lithium Ion* (Li-Ion) batteries have charge-discharge characteristics similar to Nicads, but much higher capacity and in some low-current applications they represent an interim step between Nicads and Zinc-air.

SLAs and Nicads are noxious to the environment when disposed, while NiMHs and Zinc-air batteries contain little poisonous metals. Some batteries will explode if burned and all batteries should be sent to vendors for recycling rather than being discarded.

As portable equipment's requirements and usage patterns change, keep aware of what different battery types can offer for optimal field performance. ■

Bennett Liles is an audio engineer at Georgia Public Television, Atlanta.

FOR MORE information

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CAMERA MOUNTED BATTERIES

The new Energex 5AH 13.2V (XAB 13) and 14.4V (XAB14) NiCd's use the standard mounting back plate and 3-wire pin connector so they fit your existing cameras and chargers. The battery contains an all-cell sensing system and a premium 5AH fast charge cell pack. Plus your battery can be recelled again and again, since we secure the back plate to our metal case with the standard 4-screw assembly. By using our "Do-It-Yourself" cell packs (XCP13/14) your re-cell cost will be $145/$150.

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QUICK DIAL 74

anton bauer

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

QUICK DIAL 72

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 #3386-3 SD-22 dual fluid and lubricated friction drag pan and tilt head, single telescoping pan 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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GY-X3 3-CCD S-VHS Camcorder

By employing professional camera technology in new economical ways, JVC has succeeded in bringing to market a professional 3-CCD camera that breaks all previous price barriers. The new GY-X3 delivers all the performance of a high end 3-CCD camera—high resolution, high sensitivity, low noise and natural color—at an incredible price.

Features:

- Three 1/3" CCDs provide a sensitivity of 2000 lux at F8.0, signal-to-noise ratio of 60dB and 650 lines of horizontal resolution.
- Low light capability allows you to shoot in as little as 4 lux and still have bright pictures with good resolution and strong, vivid colors.
- Full Auto Shooting (FAS) mode instantly adjusts to changes in shooting conditions. You can go from bright outdoors to indoor lighting and gain, iris, audio level and color balance will all be automatically adjusted.
- Variable Scan View allows flicker-free shooting of a computer monitor.
- Has a built-in 14:1 (5.5-77mm) continuously variable speed zoom lens. The amount of pressure applied to the rocker determines the speed of the zoom. Both the iris and zoom can be controlled manually if desired.
- Built-in Control Track (CTL) time code generator as well as a time/date generator. The advanced CTL time code generator has a "scene finder" function that records an identification code each time you start taping. This lets you easily advance to the next or previous scene when using the JVC Edit Desk system.
- Large high resolution 1.5-inch viewfinder displays comprehensive status indicators.

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
- Micro lens technology provides exceptional sensitivity of F8.0 at 2000 lux and LOLUX 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
- Full Time Auto White circuit lets you move from incandescent to fluorescent to outdoor lighting without changing white balance or the filter wheel.
- Quick Record Mode - when turned on the camera is set to the auto iris even if lens is set at manual. Also activates Automatic Level Control and Extended Electronic Iris which provides both variable gain and variable shutter. Shoot continuously from dark room to bright outdoors without having to adjust gain, iris or ND filter.
- 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

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- Digital Signal Processing circuitry provides four valuable benefits
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  2) Fine adjustment of a wide range of parameters.
  3) Memory storage and instant recall of specific settings.
  4) More flexible and higher quality image processing, as well as easier maintenance.
- 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
  - HIGHLIGHT COMPRESSION - Expands the dynamic range of the highlighted areas and prevents halation. The highlight compression 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 Correction. 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 internal 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.

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- 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 PRO, 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 vica 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 in:sync 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 unparalled 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 PST's within MAX dialog boxes.
- Image selection, background and video post tools in MAX work like standard video streams.
- PVR image sequences show up in the viewports and shuttle with the frame selector bar in MAX.
- Offset and editing tools work natively.
- No more jumping out to the PVR Player or file manager. Lockstep provides direct support for selecting, playing, deleting and managing the PVR disk and files.
- By setting one check box in the rendering dialog, all network rendering machines can render directly to the PVR-2500 while maintaining the correct frame order. It couldn't be any easier.

AD-2500 Component Video Capture Card

Coupled with the AD-2500 live video capture daughter card, the PVR-2500 becomes a broadcast-quality digital disk 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 F/X reduces the waiting to time to under 10 seconds.

DAR-2500 Digital A4V Recorder

Featuring comprehensive audio post-production capabilities, the A4V (Audio for Video) board provides perfect video/audio synchronization when used with the PVR-2500. A full-length PCI card, the A4V's input and output connections are made via the supplied breakout cables while digital audio is stored on the system hard drive. And to ensure compatibility with third-party audio editing software, it plays and records standard uncompressed WAV files. It can also be controlled directly by video editing software like in:sync's Speed Razor Mach III.

- Non-linear, non-destructive audio editing. No waiting for edits to compile.
- True audio scrub.
- Simultaneous record/playback. Play up to three stereo tracks while recording one stereo track.
- Mix four stereo source tracks down to two output channels in real-time.
- Four-band Parametric EQ for each channel (assignable by stereo pair).
- Real-time reverb and compressor/limiter. Additional effects can be easily added via software upgrades.
- Built-in LTC/ VITC time code generator/reader/inserter lets you create window dubs with time code information superimposed over composite or S-video signals.
- Unlimited audio editing capabilities with third party software.

HOLLYWOOD

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

QUICK DIAL 731

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, titling 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 Infiniti-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 Winsows NT-based software (Adobe Premiere 4.2, in:sync 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)	1899.00
TARGA 2000 for Windows or Macintosh PCI (specify)	2899.00
Special! TARGA 2000 for EISA (PC)	999.00
Special! TARGA 2000 for Nubus (Macintosh)	1499.00

NEW!

TARGA 2000 DTX/RTX

The **TARGA 2000 DTX** (data throughput enhanced) is a next generation digital video solution that delivers unmatched price/performance on the desktop, as well as offering a secure, flexible upgrade path to real-time digital video effects. The 2000 DTX offers an open systems architecture and an industry best data rate of up to 12 MB/second to deliver the most pristine video quality available on the desktop today – at any price. A single codec configuration of the award-winning TARGA 2000 RTX, the 2000 DTX is a perfect matc for professional non-linear editing, compositing, animation, and 3D applications.

- Motion-JPEG codec, DVR architecture delivers near lossless quality video. Supports data rates up to 12MB/second (400 KB/frame NTSC).
- CCIR 601 720 x 486 NTSC and 720 x 576 PAL resolution support. Square pixel 640 x 480, 648 x 486 NTSC or 768 x 576 PAL resolution support.
- Synchronized audio and video in hardware.
- Balanced CD and DAT quality audio via XLR connectors with optional Breakout Box. The box can be utilized as a desktop device or rack mounted in a standard 19" rack.
- Drives both RGB and NTSC/PAL monitors simultaneously.
- On-board acceleration up to 600% of 19 popular Adobe Premiere transitions.
- Cross platform support for Mac QT and Windows NT.
- Video-for-Windows native file formats.
- Supports component YUV, RGB, S-Video and composite input and output.
- For those that will come to need non-linear A/B roll editing capability, there is also an upgrade path to the real-time effects processing of the TARGA 2000 RTX.

The **TARGA 2000 RTX** brings real-time processing and the highest I/O throughput to the desktop. It delivers real-time DVE, broadcast quality video, and professional I/O connections with support for industry standard video file formats under MacWindows NT operating systems. The system is designed to meet the needs of video professionals who are looking for an open-system solution for non-linear editing and desktop multimedia production.

- Processes digital video effects such as wipes, fades and dissolves in real-time. These common transition effects now require long render times using the host CPU for many computer-intensive tasks. On the RTX, these frames are created in real-time at full quality. Once frames are created by the RTX, they can be instantly output to tape at the high quality level demanded in professional broadcast applications—full motion 60 field NTSC and 50 field PAL broadcast quality video (300 KB/frame). Supports CCIR 601 as well as square pixel resolutions.
- Fully video-for-windows and QuickTime native, so all your current authoring applications supporting these standards will fly with TARGA.
- Drives both the video monitor and the RGB screen up to 21 inches at 24-bit color and supports full-motion previewing on both RGB and video displays for optimal video editing.
- Designed for easy integration into broadcast and post-production facilities, the 2000 RTX includes a breakout box which can be rack mounted or used as a stand alone device on the desktop. The box allows easy connection to Composite, S-Video or Component input/outputs as well as XLR balanced audio, genlock and alpha channel connections.

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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 4020I, 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

QUICK DIAL 731

SPEED RAZOR MACH 3.5

Digital Video Editor for Windows NT

The ultimate digital video editing software, Speed-Razor MACH 3.5 edits full screen, 60 fields per second, CCIR 601 broadcast-quality video. Designed for the DPS PVR-2500 and Truevision's TARGA series 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.

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 tumbles, 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—analog 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 traviling 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, loop, 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)
- Tities (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, twirl, twist in/out tumbles, flip, turn, scale (zoom)
- Transitions can be applied between infinite inputs

in:sync Speed Razor MACH 3.5 for DPS PVR-2500 and Truevision TARGA Series ..... CALL

TARGA and DPS Windows NT Turnkey Systems:

- 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 (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) • Teac CD-58e 8X EIDE internal CD-ROM drive
- 3.5" floppy drive • Altec-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	$6495	TARGA 2000/ Speed-Razor MACH 3.5	$9595
TARGA 1000 PRO/ Adobe Premiere 4.2	$6795	TARGA 2000 PRO/ Speed-Razor MACH 3.5	$9995
TARGA 1000/ Speed-Razor MACH 3.5	$7695	TARGA 2000 DTX/ Adobe Premiere 4.2	$10,795
TARGA 1000 PRO/ Speed-Razor MACH 3.5	$7995	TARGA 2000 DTX/ Speed-Razor MACH 3.5	$12,595
TARGA 2000/ Adobe Premiere 4.2	$7795	TARGA 2000 RTX/ Adobe Premiere 4.2	$12,995
TARGA 2000 PRO/ Adobe Premiere 4.2	$8295	TARGA 2000 RTX/ Speed-Razor MACH 3.5	$14,795

*PVR-2500/AD-2500 w/Adobe Premiere 4.2 ..... $6995 *PVR-2500/AD-2500 w/in:sync Speed-Razor.. $7995

*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)

Expansions and Upgrades for all Systems:

Full Tower Case (10-bay)	add 100.00	Super Tower Case (12-bay)	add 200.00
Pentium Pro 200 MHz processor (256k cache) and Pro motherboard			add 800.00
Seagate Elite 9.1GB Narrow drive (for DPS)	add 800.00	Seagate Elite 9.1GB Wide drive	add 900.00
MAG Innovision MXP-17F 17" multiscan monitor	add 225.00	MAG MXP-21F 21-inch multiscan monitor	add 1100.00

RAID ARRAYS

With Seagate or Quantum SCSI-2 Wide AV Hard Drives (pre-striped for Windows NT), external case, 3' HQ cable and terminator)

8.4GB Raid Array (Single channel with two 4.2GB drives)	2795.00
18.2GB Raid Array (Single channel with two 9.1GB drives)	4695.00
8.4GB Raid Array (Dual channel with two 4.2 GB drives— one drive per channel)	3095.00*
18.2GB Raid Array (Dual channel with two 9.1GB drives—one drive per channel)	4995.00*
16.8GB Raid Array (Dual channel with four 4.2 drives—two drives per channel)	5495.00*

*Dual channel requires a second SCSI controller or the Adaptec AHA-3940UW Dual Channel Controller.

QUICK DIAL 731

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 an 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 I 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 implemention of the MPEG-1 standard for digital video compression, Broadway includes three levels of encoding 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. Broadway can also 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.

Use With/Within Existing Software:
Take advantage of Broadway's full-motion video capture and MPEG-1 compression from within your favorite application environment. Broadway is accessed within packages such as Premiere and Media Studio by using Broadway's Capture and Compression dialog boxes. In addition, you can easily insert compressed video and audio into popular presentation and authoring packages. Broadway provides seamless integration with PowerPoint, Astound, Persuasion, Compel, Director, Action!, Adobe Premiere, Razor Pro and MediaStudio.

Bring Your Message To Life:
- Use Broadway for your Web site. MPEG-1 is ideal for the Web since its compressed to a size required by travel over low bandwidth channels —Web surfers won't have wait a long time for video to appear.
- Use the power of full-motion video for sales, corporate and in the field presentations on your notebook
- Add excitement to your CD-ROM by using video and sound. MPEG-1 delivers VHS-quality at CD-drive rates. Also ideal for video arcades and computer-based training.
- Enhance your kiosk message by replacing text and still photos with MPEG video

$795

MEDIA 100 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. 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. 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 (Component) version offers broadcast-quality Y, R-Y, B-Y video input and output.

MEDIA 100 COMPATIBILITY:
Provides a software upgrade to the real-time editing functionality of the high-end Media 100. Clips and programs authored on Media 100qx can be used directly by Media 100 systems with no loss. Drag and drop files from one system to another.

SPECIFICATIONS:
- All digital, on-line video quality 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)

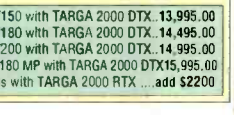
WORK WITH QUICKTIME APPLICATIONS:
Media 100qx runs seamlessly under QuickTime, providing communication between Media 100 qx and hundreds of QT applications such as Adobe Premiere and After Effects 3.0, Specular Infini-D and Strata StudioPro. QT integration lets you "drag and drop" files between multiple applications with no loss in quality.

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

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
- Clips compressed at different rates within a single program
- View or record 32-bit animation to tape in real time
- Playback of eight tracks of real-time audio
- 16-bit CD/DAT-quality audio input/output
- Balanced XLR connectors (with component version)

Media 100qx and TARGA 2000 DTX/RTX Power Mac Turnkey Systems



- *Power Mac 8500 (256K cache) or 9500 (512K cache)*
- *4 MB of VRAM • 32 MB of RAM • Apple 8X Internal CD-ROM Player*
- *2GB FAST SCSI-2 System Hard Drive (8500/150 only includes 1.2GB drive)*
- *Optima DisKovery 8200 8.2 GB Dual Channel Disk Array*
- *AppleVision 1710AV 17-inch monitor with built-in speakers*
- *Adobe Premiere 4.2 Editing Software*

Power Mac 8500/150 with Media 100qx	11,495.00	Power Mac 8500/150 with TARGA 2000 DTX	13,995.00
Power Mac 8500/180 with Media 100qx	11,995.00	Power Mac 8500/180 with TARGA 2000 DTX	14,495.00
Power Mac 9500/200 with Media 100qx	12,295.00	Power Mac 9500/200 with TARGA 2000 DTX	14,995.00
Power Mac 9500/180 MP with Media 100qx	12,995.00	Power Mac 9500/180 MP with TARGA 2000 DTX	15,995.00
For systems with Media 100 qx Component	add $1500	For above systems with TARGA 2000 RTX	add $2200

Adobe After Effects 3.0

Post-Production Tool for Compositing, Motion Graphics and Special Effects on the Macintosh

After Effects combines a powerful interface with high-quality output, giving you the ability to create sophisticated motion graphics on the desktop. Produce on-air promos and bumpers, commercials and music videos, animated titles and complex special effects—with the control, flexibility and savings the Macintosh provides.

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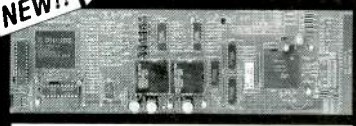
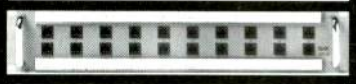


SDV 4-4 - Serial Digital and Analog Video Monitoring DA - 4-2-2/270 mbps. Four reclocked SDV outputs, plus four CVBS or RGB outputs. 10 bit DACs. Fits GVG 8500/8800 DA frames. **$895**

TBC-RMT - TBC Remote Control Unit Remote control of up to 3 TBC's. For use with internal TBC's on BVW, DVW, PVW, UVW, and BVH Beta machines or any machine using Sony BVR-50 controller. Purchased with 1, 2, or 3 modules. With 3 modules. Now availabale for JVC machines - Series 22, 80, 85. **$960**

SCR-4X8 - Serial Machine Control Router - Input/Output Twelve rear mounted DB9-F connectors (four controllers, eight devices). EIA RS-422 send and receive. Controls: Twelve lighted pushbuttons for channel assignment. **$980**



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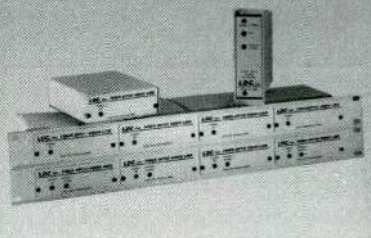

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By Paul McGoldrick

Compression and the video data rate

This is the second version of this column. The first posed a math question that I couldn't figure out. Steve, *BE's* technical editor, found my problem, saving me from a flood of E-mails—all because I hadn't heeded Mr. George.

Mr. George was my senior lecturer in electrical engineering at college. He was a tyrant from the old school and would thunder at innocent idiocy and moan at the ignorance of an 18 year old. He insisted on a couple of things. As far as he was concerned, "bulbs" grew in the garden, the things you plug into light fixtures were lamps. But the things that were right-on were fundamentals and units. It's amazing how many engineers cannot give you the approximate gain of a circuit or understand Kirchoff or who have heard of Lenz. When solving problems, Mr. George insisted on two calculations: the one with the numbers and a separate column showing the units involved and the final result unit.

So what did I do? I took a unit in a competing publication at face value. It is rare that I do not check on a standard, and the unit slipped by me. It is a good time to remind those who know, and to educate those who don't, that there is a fundamental difference between a bit and a byte. There are eight bits in one byte. The distinction seems to be blurry, and hasn't been helped by the computer industry popularizing an incorrect unit.

If you buy a hard-disk drive, the capacity will be given as, say, 2GB. As far as professional engineering societies are concerned, that reads as 2 Giga-Bels (VERY loud). The standard for professional papers and books is to spell out bit and byte. Data rates should be, for example, 100byte/s; using Bps reads as Bels-pica-second, all multiplied. Spelling it out makes it more difficult to change willy-nilly between upper and lower case.

The problem started with an error, but it was intended to lead into the data rates needed for full bandwidth, uncompressed video. We typically see 270Mbit/s for the serial interface, which includes all the frame and line intervals. Let's run through the numbers for the active video of eight-bit, 4:2:2 digital component video for 525 lines. Frame rate is 29.97/s, pixel count is 720 horizontally by 486 vertically, each pixel has two samples (luminance at every pixel and plus the alternating B-Y and R-Y), with eight bits per sample (one byte). That gives a data rate of 29.97x720x486x2x1 byte/s, which computes as 20.97×10^6 byte/s (or 167.79×10^6 bit/s). In computerese, this is equivalent to 20.0026Mbytes/s (1Mbyte=1,024kbytes, 1kbyte=1,024bytes).

Matrox Video Products (Dorval, Quebec) seems to agree with me, nearly. The company uses the same numbers and comes up with 20.02Mbyte/s instead of 20.0026Mbyte/s because they less accurately use the frame rate of 30/s. Matrox shows even more with a little quirk in compression, in a way going back to the fundamentals Mr. George would have been proud of. The concept of getting MPEG-2 or Motion-JPEG signals through a PCI bus has not been popular because of data bottlenecks.

Matrox's "over-the-top" solution, with a separate bus connecting dedicated video application cards in its DigiSuite, shows imagination. The company has put together the ingredients for mathematically lossless M-JPEG on the bus. The theory is simple: instead of the DCT followed by quantization followed by entropy encoding (that is, run-length and Huffman encoding to recognize and dispense with strings of repeat information and shorten up regular codes), you eliminate the DCT and quantization. The latter is where information is lost.

> There is a fundamental difference between a bit and a byte.

The bit-rate reduction is estimated by Matrox at about 1.6:1, translating into a manageable 13Mbyte/s or so data rate, while maintaining the quality of the image and allowing the full benefits of editing. The implementation still requires an M-JPEG codec with an internal pipeline architecture at least at the ITU CCIR-601 clock rate of 27MHz, and the Zoran (Santa Clara, CA) ZR36050 has been identified for the task. The codec with intermediate memory buffer is being labeled DigiMotion. A complete A/B roll editor consists of that plus a Fast-20 Wide SCSI, the preferred storage system and stream management/buffering with Microsoft's ActiveMovie software, the whole handling two lossless video datastreams plus audio.

Peace on earth Mr. George and readers, at least until the computer industry gets a hold of ATV standards. ■

Paul McGoldrick is a free-lance writer and consultant based on the West Coast.

Editors note: *It is* BE's *policy to use MB/s to denote megabytes per second and to use Mb/s for megabits per second.*

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