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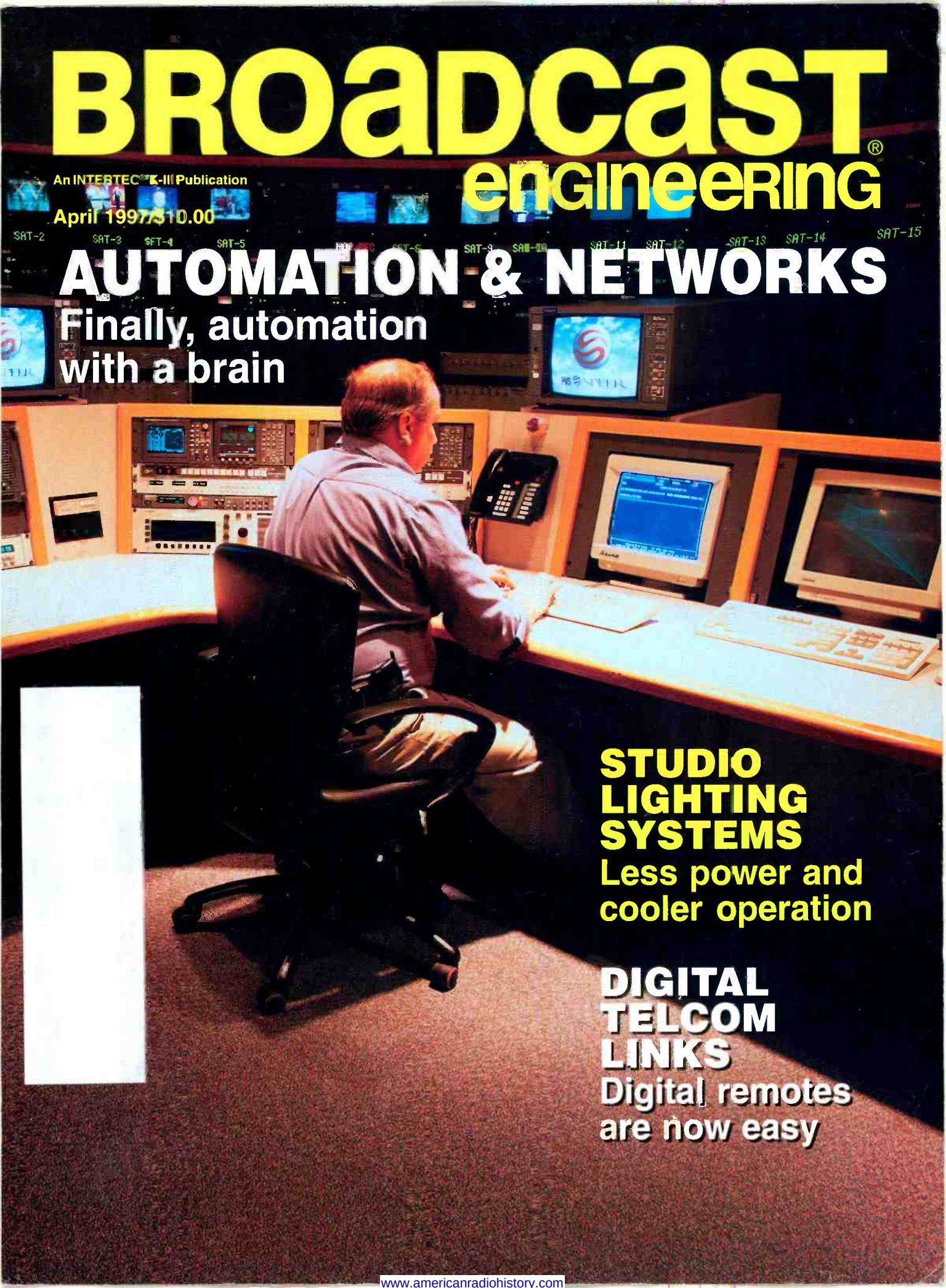

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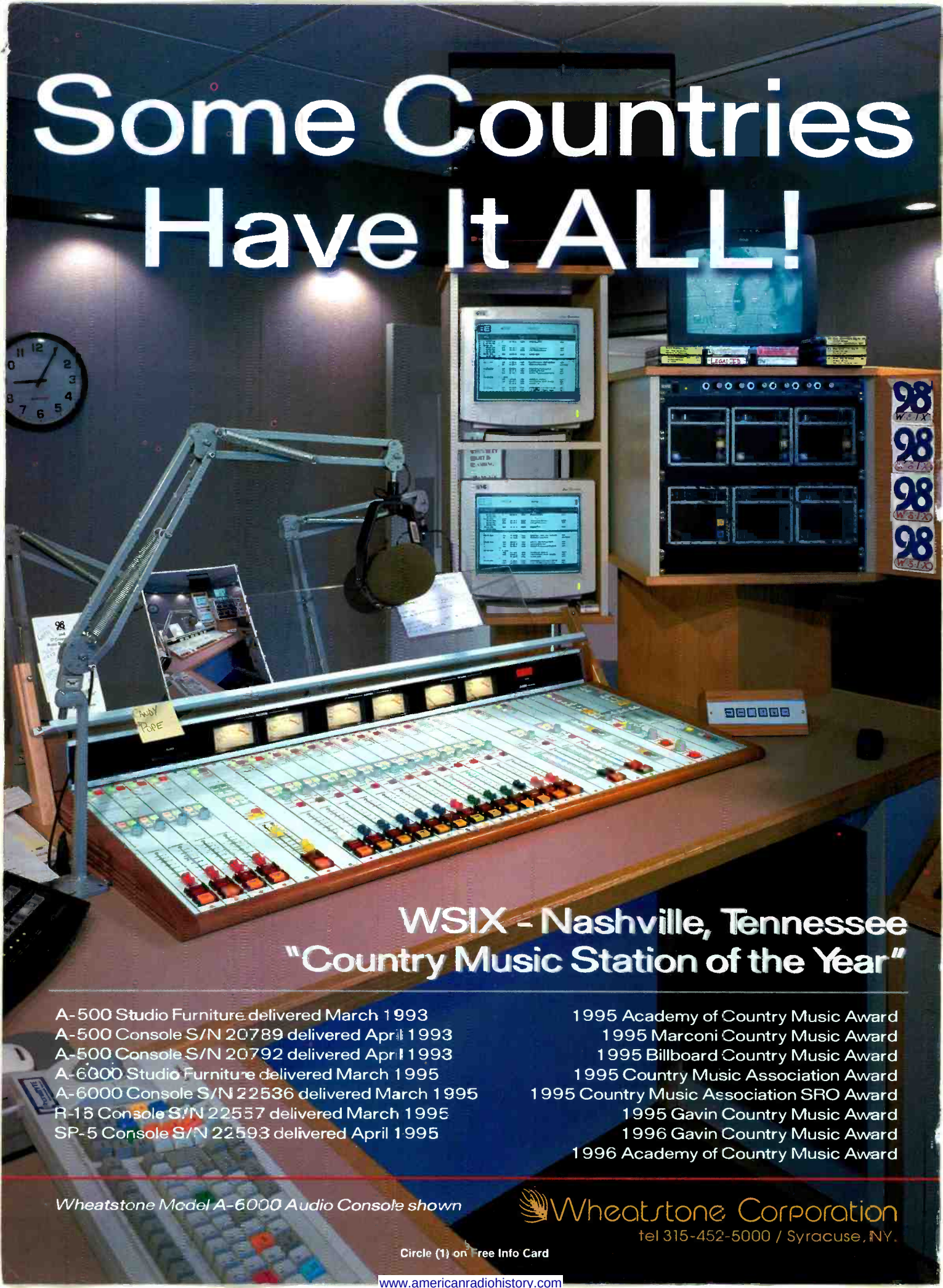

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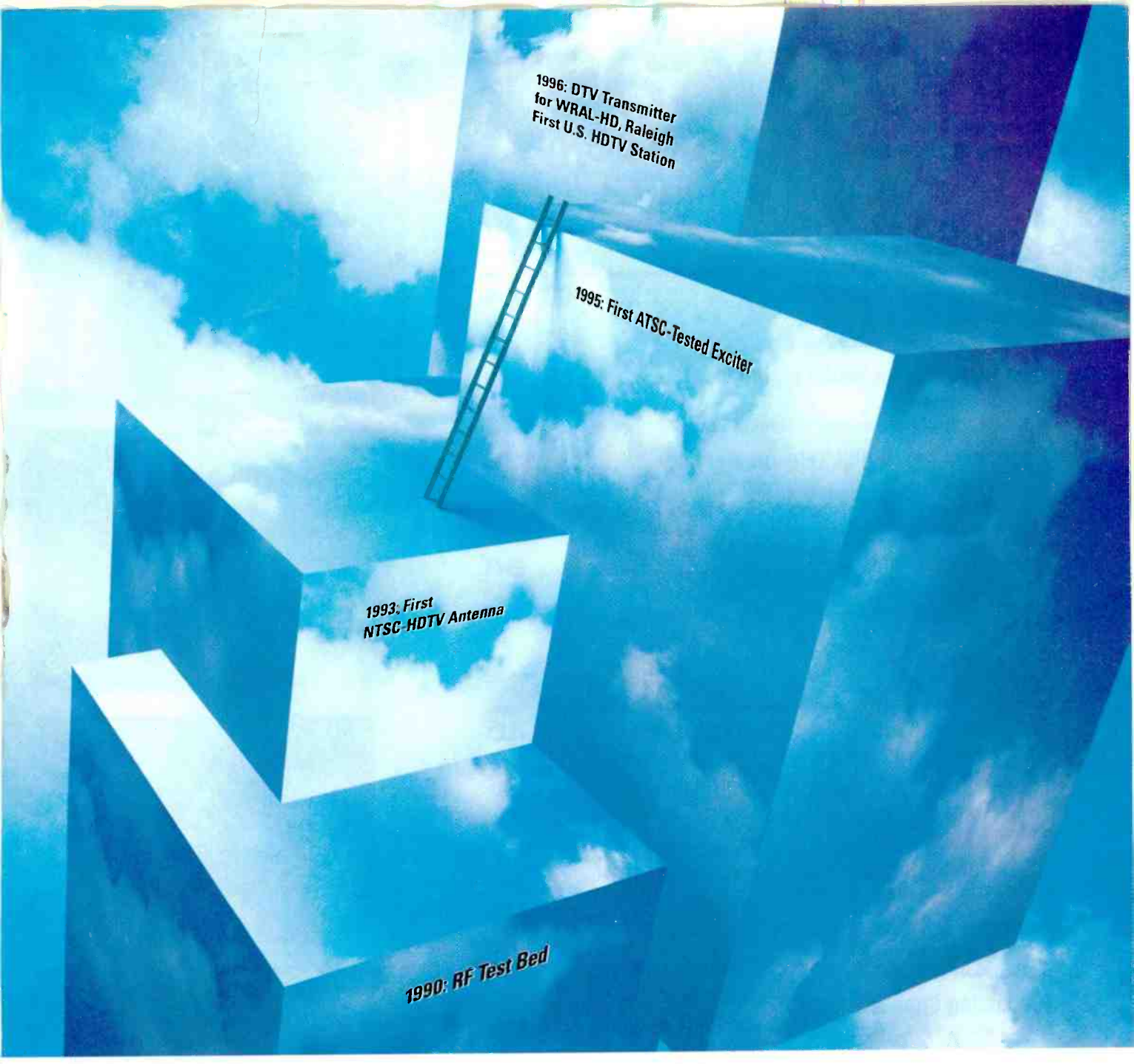

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April 1997
Volume 39, Number 4

features

columns

departments

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ON THE COVER: The transmission control room at Speer Communications in Nashville, TN, is the nerve center for the facility's ability to originate 20 separate digital or analog network feeds. The D-1 facility uses the Alamar Media Manager, the DEC Alphastudio terminal and control terminals for two Philips Media Pool video servers. The TDC intelligent multicolor undermonitor displays provide information on the routing and status of network feeds, as well as providing instant visual error messages about equipment or systems failures.

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Blue bananas

In celebration of the FCC's recent momentous action on DTV, I'd like to offer a moment of reflection on some of the more flavorful comments made by key industry officials as we wound our way to this point in broadcast history. These comments were taken from the book, "Defining Vision: The Battle for the Future of Television," by Joel Brinkley, published by Harcourt Brace.

The observations presented here obviously do not have their full background. They do, however, exemplify the changing public face that was placed on this trek to our digital future. It is only now, with a work such as this from Brinkley, that you can better appreciate the technical and political challenges faced by industry leaders, and especially those lead by Richard Wiley and his Advisory Committee on Advanced Television Service. For me, their challenges and triumphs were made real in Brinkley's book and I highly recommend it. Following are some excerpts:

If American broadcasters "are precluded from offering HDTV as a free, over-the-air service to the nation," that will bring the death of local broadcasting as we know it. NAB president, Eddie Fritts, 1986.

"It (Advanced Compatible Television) will immediately obsolete every TV in America." James Carnes, Sarnoff (RCA) Labs. 1987.

"ACTV's just a ploy to sell more picture tubes." Wayne Luplow, Zenith, 1989.

"We'll have digital television the same day we have an antigravity machine." Joe Flaherty, CBS.

"HDTV is a lot of hot air." Nicholas Negroponte.

"Hot Damn! Now we're getting somewhere. This is HDTV!" Peter Fannon, ATTC, 1991.

"We're staring down the barrel of a gun." TV station owner, 1992.

"HDTV is liable to become the eight-track of the '90s." An ABC vice president, 1992.

"Now is not the time to get weak-kneed." Al Sikes, 1992.

"I'm in the television business. You're telling me I gotta get out of my business and go into the business you think I should go into... (digital broadcasting is) going to drive local TV stations all across the country out of business, and the American people are going to lose their local television service!" Philip Lombardo, group TV station owner, 1993.

"WARNING: The Electrical General has determined that interlace may be hazardous to your health." Poster outside meeting room at Technical Subgroup meeting, July 1993.

"The commission asked them to build us a better bicycle, and they came back with a Ferrari...now we have to decide what to do with this Ferrari." Reed Hundt, FCC, December 1994.

"I suspect you (broadcasters) know better than the government what you should send (transmit)." Reed Hundt, 1995 NAB Convention.

"HDTV is a very marginal and possibly superfluous venture, because standard-definition is going to be just as exciting visually as (HDTV)...So why not have three channels simultaneously at 480 lines as opposed to one channel with 1,080 lines? They'll look the same. The notion of (HDTV) as a single or so-called second channel for broadcasters is defunct." Reed Hundt, 1995.

Finally, from breadboards and computer simulations to reality. HDTV finally happens.

July 23, 1996, WRAL-HD broadcasts first Grand Alliance signal.

July 30, 1996, WHD-TV broadcasts first live HDTV images. The first shots were of the GA equipment racks. But there, hanging from one rack was the engineers' tribute to TV's historic adventure, a hand-painted bunch of blue bananas.

Brad Dick

Brad Dick, editor

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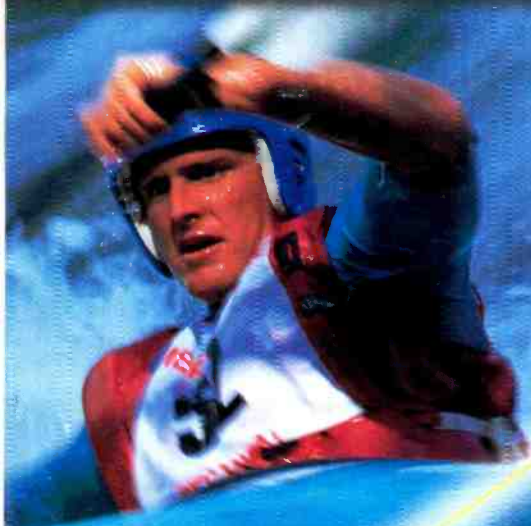

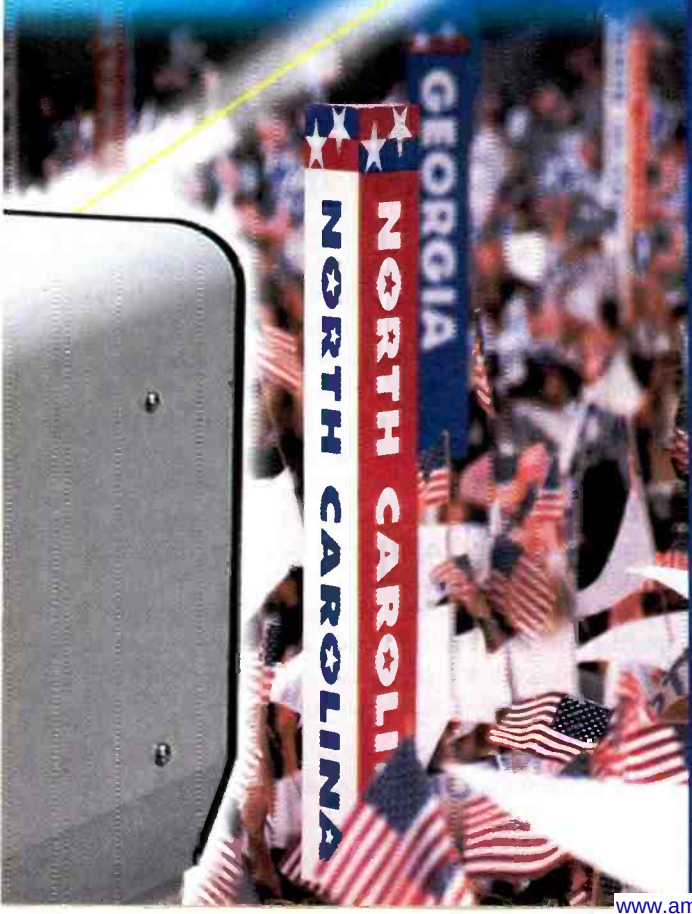

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By Dawn Hightower, senior associate editor

DTV gets the go-ahead

DTV now has a green light, but it may really be up to the consumers as to how long this conversion process will take.

In a decision by the FCC on April 3, digital television will be available to the public over the next two years. The current analog broadcast system will still be operable for the next nine years, but after that, viewers will either have to buy a new digital television or a set-top converter. Consumers will have to fork over about $2,000 for a brand new set or buy a set-top converter that will range from $150 to $300, in order to receive the digital signals.

Hundt got his wish—a short timetable for pushing DTV onto the market.

Twenty-five stations in the top 10 markets have promised to offer digital broadcasts within 18 months. Networked owned-and-affiliated stations in the next 20 largest markets will have 30 months, and the remaining stations will have five years to convert. And now that the plan has been approved, the FCC will be issuing new digital broadcast licenses to every TV station in the country.

According to the FCC, stations will be able to broadcast as little or as much HDTV programming as they want. With the digital technology, TV stations will be able to put more services into their airwaves — however, the FCC mandates that stations still provide free TV service.

During the conversion to digital, broadcasters will be transmitting programs over two channels — the existing analog channel and a second digital channel that they will get from the government for free. The FCC has put stations on notice, however, that they may have to broadcast more public-interest obligations, such as public affairs, kids shows and political ads.

The abandoned analog channels will be auctioned by the government for non-broadcast uses, such as paging, mobile phone and wireless Internet access. The digital channels will come from channels now reserved for UHF stations (channels 14 and higher).

So even though the FCC's plan shortens the conversion time frame from 15 years to nine years (by 2006), TV sets will not be immediately obsolete.

Until the majority of cable systems go digital, many of the more than 68 million cable TV subscribers who purchase new TV sets, however, will still have to use their TV's rabbit ears or a rooftop antenna in order to receive the digital signals.

ATSC creates DTV certification program

To avoid consumer confusion as the new digital televisions come to the marketplace, the Advanced Television Systems Committee (ATSC) is creating a program to certify TV sets, computers and other consumer video devices that can receive all ATSC video formats for the new digital era.

According to ATSC chairman Robert Graves, consumers need to know that what they buy will work now, no matter which ATSC format is used by programmers.

This certification program will be simple and will indicate that a consumer video receiver will work with all of the video formats in the ATSC DTV standard.

Although the program will provide information to indicate whether a television will receive all of the ATSC video formats, it will leave the choice of the display type, such as progressive or interlace scan, high-definition or standard-definition to the consumer.

Stall on cable modem rollouts

Cable operators are beginning large-scale cable modem deployment throughout the United States, although the rollout is slower than expected. Delays in cable system upgrades have contributed to the limited deployment of modems in many markets.

According to the study, "Cable Modems & High-Speed Data Services: Technology, Content and Business Strategies," by Michael Harris, president of Kinetic Strategies, while cable modem service is available to two million homes, cable operators only had captured 19,000 paying subscribers.

Even though some cable operators have only a small portion of their cable systems available for modem service, the systems will grow as cash flow and experience with data services increase.

Read on for Hot News at NAB on page 10.

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Hot news from NAB

Java unveiled

In a move that turns open vs. closed platforms on its head, software developers writing the Java language will be able to write applications for the entire family of Quantel products.

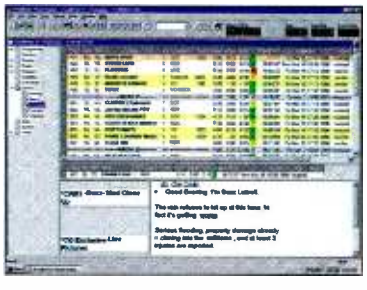
Java is now the first platform-independent programming language. Users will have the freedom to integrate limitless Java applications with the functionality and ergonomics of their Quantel systems. No changes in hardware or software will be required.

Sony opts for open architecture, seeks partners for SX

Sony has committed to open systems and to providing customers with a working digital solution to encompass hardware and software from other vendors when appropriate. In addition, Sony will make available SX compression ICs and SDDI networking chips to third parties so they can develop their own products. Sony's Charlie Steinberg said that the company wanted to be a true partner, not just a vendor, in the industry's transition to DTV.

Sony announces DVCAM tape format

Sony has announced a new recording format for HDTV. Dubbed HDCAM, the format is based on the SX recording platform. The announced products include a one-piece HD camcorder, editing VTR, digital switcher, DVE and control room HD monitor. The system, which adheres to the SMPTE 292M standard, is designed for baseband distribution and networking. Key operational features include dual HD and SDTV outputs. The SDTV output can operate in 16:9 or 4:3 aspect ratios.



AVID launches AvidNews

Avid previewed its new digital news-gathering technology, showing a complete disk-based production system. Based on client/server architecture, the Avid DNG stores digital video, audio and graphics in a single central video server. Data can be simultaneously accessed by Avid's client workstations for recording, editing and playback.

The company based the new system on the strength of its purchased BASYS and SofTECH companies. AvidNews uses a Windows 95 interface, provides video on the desktop, advanced machine control and allows users to post material directly to the web.

The Clipbox on steroids

That might describe Quantel's new version of its famous Clipbox. Now much more than a clipstore, the Clipbox is capable of storing up to eight hours of uncompressed video. User-selected compression ratios of 5:1, 10:1 and a mirrored storage of 20:1 are available, providing a total of 160 hours of video. The new Clipbox comes complete with automation interfaces and a user-control system for those yet without automation.

Roswell who?

Odetics introduced a facility management system titled Roswell. Controlling a variety of storage and switching systems, Roswell signifies Odetics' entrance into the stand-alone broadcast management system market. The software system automates material, media tracking, provides multichannel automation and real-time machine control. The system is scalable for operation from small stations just getting into multichannel operation up to large broadcast installations.

Panasonic, Philips-BTS and Sony agree on common digital standard

An upcoming SMPTE vote could put the stamp of approval on a common transport layer for digital video interconnection. While Sony and Panasonic have been publicly locked in a battle for their own versions of SDI (SMPTE 259M), consumer realities seem to have forced the giants to put aside their differences. Sony had originally proposed its SDDI system as a proprietary version of SDI, whereas Panasonic and BTS supported what came to be called CSDI. Agreement on a common transport layer means that devices can exchange video files. Although an SX file will not be the same as a DVCPRO file, those files can still be transported around a facility on the same networking topology. According to SMPTE, the final stamp of approval by all parties on the specifications should be in place by June. ■

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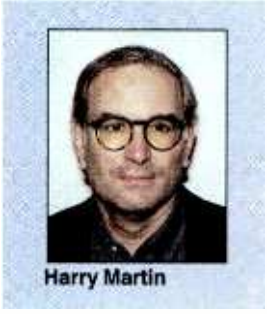
By Harry C. Martin

DTV public-interest obligations

The White House is asking the FCC to move expeditiously on issuing digital TV licenses. In a news conference in February, Vice President Gore said President Clinton and his administration are convening a special advisory group to study and make recommendations within one year on what the public-interest responsibilities of broadcasters should be regarding digital television.


Harry Martin

Gore further noted that it is the administration's position that the FCC should keep the question of public-interest obligations open while proceeding with digital license allocations. FCC chairman Reed Hundt and public-interest groups welcomed the proposal with open arms. Hundt said he totally supports the idea that no DTV licenses should be issued unless and until it is clearly understood that licensees must serve the public interest in a variety of ways. He later added that the commission might establish a general public-interest mandate — such as a requirement that 5% of the digital channels be devoted to public-interest use — that regulators would later develop into specific rules.

Hundt further noted that a perfect example would be Barry Diller's big, brilliant proposal to use digital television to help solve the campaign finance problem. Diller proposed that broadcasters give free time to political candidates in return for less regulation. Hundt said he sees the administration continuing to oppose DTV auctions and repudiating the FCC policy of the 1980s which, according to Hundt, said the public interest is served merely by the commercialization of the spectrum. Hundt interprets the administration policy to mean the FCC should get licenses out quickly, but they should be written to serve the public interest. Hundt further called it a great idea to have public debate on what the public-interest obligations of digital broadcasters should be.

Vice President Gore's chief domestic policy advisor, Greg Simon, said the administration continues to support the early awarding of broadcast spectrum, with auctions of analog spectrum in 2002 and broadcasters returning spectrum in 2005. Broadcasters are hardly enthusiastic about additional public-interest responsibilities, but the real news for them was the White House's call to move forward with the issuing of digital licenses. ■

A notice of Proposed Rulemaking has been released for the 1997 regulatory fees. See the table below.

TV-VHF COMMERCIAL		TV-UHF COMMERCIAL	
MARKETS 1-10	$44,700	MARKETS 1-10	$18,875
MARKETS 11-25	30,500	MARKETS 11-25	15,625
MARKETS 26-50	16,350	MARKETS 26-50	8,250
MARKETS 51-100	4,925	MARKETS 51-100	2,875
REMAINING MARKETS	835	REMAINING MARKETS	815
CONSTRUCTION PERMITS	7,750	CONSTRUCTION PERMITS	5,950
SATELLITE TV STATIONS	$975	LPTV, TV/FM TRANSLATOR & BOOSTERS	$225
CONSTRUCTION PERMIT (Satellite TV)	$350	BROADCAST AUXILIARY	$25

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

dateline

All stations must file their 1997 annual employment reports (FCC Form 395-B) on or before May 31. Tower owners in the following states must file their tower registrations on the dates indicated: Louisiana, Maine and Rhode Island by May 1-31; Colorado and Minnesota on June 1-30.

TV stations in Michigan and Ohio and LPTV/translator stations in Utah must file their renewal applications on or before June 2, 1997. Commercial TV stations in the following states must file their annual ownership reports or ownership report certifications on or before June 2: Arizona, Washington DC, Idaho, Maryland, Michigan, Nevada, New Mexico, Ohio, Utah, Virginia, West Virginia and Wyoming.

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NEWS SOLUTIONS

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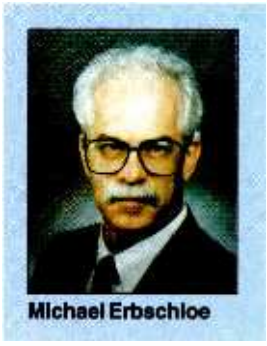
By Michael Erbschloe

Training needs in the information age

In the search for greater productivity, healthier profits and a jump on the competition, stations are relying heavily on desktop computers. Although these systems can do everything from word processing to project management and accounting, it's their power for creative and editing tasks that make them most desirable for TV stations. It's also in this area that your staff can benefit from proper training.


Michael Erbschloe

Many times, stations will include training in the purchase of new systems. And, if you press hard enough, the vendor may throw in some training just to close the deal.

Sometimes, a station may forgo the training if it's too expensive. Bean counters may balk at paying for training saying, "Why can't we train ourselves?" Or, "We'll learn as we go along." This is short-sighted and can be an expensive mistake.

You can't avoid training costs

Good training can be expensive and time-consuming. Without a structured and results-oriented training program, your staff is forced to adopt one of several approaches to survive. First, even though you bought the hardware to provide your staff with greater productivity and creativity, they may avoid using it. Or second, they just may put off tasks or continue for as long as possible to do things the old way. Or third, they may try to get others to do those tasks that require heavy use of the new system. Many times, projects just don't get done.

People who fear technology will avoid the new equipment. This is less the case in broadcasting because technology is so much a part of our business. However, just because you install a new automated master control system, don't *assume* your operators will quickly or willingly embrace it. In some cases, there may be a fear that if the darn thing works, they'll be replaced.

Help me

Another problem with no official training is that some of your staff will rely on their co-workers for help. This may sound harmless, but it can diminish the productivity of your best and brightest staff members.

It often works like this: Those that are having problems won't look in the manual, assuming there is even one available; they'll just start bugging somebody to help them. The slower learners are, therefore, forced to ask questions and interrupt the concentration of others. This disrupts the work flow of the department and can go on for weeks or even months until the slow learner gains enough skills to survive, or really screws something up.

An equally undesirable, but common, result is that one person quickly masters the technology and becomes the default help desk and trainer. Everyone runs to her for answers. Meanwhile, the work she was supposed to do begins to suffer.

Most of these problems can usually be avoided if a proper training program is put into place when the equipment is first installed! ■

Michael Erbschloe is a management consultant, author and technical editor and teaches management courses at Oklahoma State University.

Where to look and who to send

Training on many editing and creative systems is available at or after the time of purchase. However, it can be expensive. Training may run hundreds of dollars per day or even thousands of dollars per week. Even so, the vendor is usually the first, and best, place to look for help.

Third parties also provide training on the high-end production systems. This includes products from vendors such as Avid, Quantel, Discrete Logic, Abekas and others. Sometimes, these third parties are officially approved by the vendors, even to the point of handling the training for new clients if the vendor's classes are full or too far away for the client.

Because of the expense, there may be a temptation to send only one or two staff members to the training. That may be a mistake. If you are running several hours of newscasts a day, sending one or two people to school hoping they'll train all the others, probably won't work.

Instead, send the supervisor for each shift of your production staff. Or send the lead creative person and one assistant. That way, you'll have at least one properly trained person on each shift. But don't stop there. Try to schedule training for others on the staff within several months after you've had the systems up and running. That way, your operators will understand the basics and can gain even more from the factory training.

Also, training is usually seen as a benefit and recognition. Treat the training as a reward. You may be surprised how hard your staff will work just for the privilege of going back to school.

Now if you could get your kids to think that way about their homework. ■

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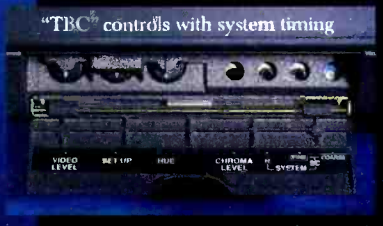

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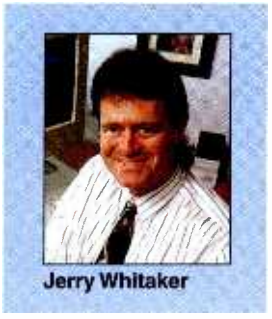
MPEG-2: A closer look

The primary application of interest for the MPEG-2 standard is true TV broadcast resolution, as specified by CCIR-601. This is roughly four times as much picture information as the MPEG-1 standard provides. MPEG-2 is a superset of MPEG-1. As such, MPEG-2 decoders should also decode MPEG-1 datastreams. MPEG-2 adds to the MPEG-1 toolbox with provisions for dealing with interlace, graceful degradation and hierarchical coding.


Jerry Whitaker

Although MPEG-1 and MPEG-2 were each specified with a range of applications and resolutions, the committee's specifications form a set of techniques that support multiple coding options. Variations exist with regard to picture size and bit rates. Although MPEG-1 can run at high bit rates and at full CCIR-601 resolution, it processes frames, not fields, limiting the attainable quality, even at data rates approaching 5Mb/s.

Keep in mind that the MPEG specifications apply only to decoding. The ramifications of this approach are:

- Owners of existing decoding software can benefit from future breakthroughs in encoding processing. Furthermore, suppliers of encoding equipment can differentiate their products by encoding quality, cost and features.
- Different schemes can be used in different situations.

MPEG-2 layer structure

To allow for a simple yet upgradable system, MPEG-2 defines only the functional elements — syntax and semantics — of coded streams. Using the same system of I-, P- and B-frames developed for MPEG-1, MPEG-2 employs a six-layer hierarchical structure that breaks the data into simplified units of information. (See Table 1.)

The sequence layer defines the decoder constraints by specifying the context of the video sequence. Its data header contains information on picture format and application-specific details. The second level allows for random access to the decoding process by having a periodic series of pictures; it's this group of pictures (GOP) layer that provides the bidirectional frame prediction. Intracoded (I) frames are the entry point frames, requiring no data from other frames for reconstruction. Between the I-frames lie the predictive (P) frames, which are derived from analyzing previous frames and performing motion estimation. These P frames require about one-third as many bits per frame as an I-frame. Finally, B-frames, which lie b frames or P-frames, are bidirectionally enco use of past and future frames. The B-frames re about one-ninth of the data per frame as the I-

Different compression ratios for the frames different data rates, such that buffers are required encoder output and the decoder input to ensure tha sustained data rate is constant. Unlike MPEG-1, MPE 2 allows for a variety of data buffer sizes to accomm date different picture dimensions and to prevent buffer under- and overflows.

The data required to decode a single picture is embedded in the picture layer, which is comprised of horizontal slice layers, each containing several macroblocks. Each macroblock layer is made up of individual blocks. The picture undergoes DCT processing, with the slice layer providing synchronization, holding the precise position of the slice within the image frame.

MPEG-2 places the motion vectors into the coded macroblocks for P- and B-frames; these are used to improve the reconstruction of predicted pictures. MPEG-2 supports field and frame-based prediction, thus accommodating interlaced signals.

The last layer of MPEG-2's video structure is the block layer, which provides the DCT coefficients of either the transformed image information for I-frames or the residual prediction error of B- and P-frames.

Spatial and SNR scalability

Because MPEG-2 was designed for handling different picture sizes and resolutions, including standard definition television (SDTV), as well as HDTV, provisions were made for a hierarchical split of the picture information into a base layer and two enhancement layers. In this way, SDTV decoders would not be burdened with the cost of decoding an HDTV signal.

An encoder for this scenario could work as follows. The HDTV signal is used as the starting point. It is spatially filtered and subsampled to create a standard resolution image, which is then MPEG encoded. The higher-definition information could be included in an enhancement layer.

Another use of a hierarchical split would be to provide different picture quality without changing the spatial resolution. An encoder quantizer block could realize coarse and fine filtering levels. Better error correction could be provided for the more coarse data, so that as signal strength weakened, a step-by-step

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reduction in the picture signal-to-noise ratio would occur in a way similar to that experienced in broadcast analog signals today. Therefore, with poorer reception, the viewer would experience a more graceful degradation in picture quality instead of a sudden dropout.

SYNTAX LAYER	FUNCTIONALITY
Sequence	Context unit
Group of pictures	Random access unit: video coding
Picture	Primary coding unit
Slice	Resynchronization unit
Macroblock	Motion compensation unit
Block	DCT unit

Table 1. Layers of the MPEG-2 video bitstream syntax.

Profiles and levels

Six profiles and four levels describe the organization of the MPEG-2 standard. A profile is a subset of the MPEG-2 bitstream syntax with restrictions on the parts of the algorithm used. Profiles are analogous to features, describing the available characteristics. A level constrains general parameters, such as image size, data rate and decoder buffer size. Levels describe the upper bounds for a given feature and are analogous to performance specifications.

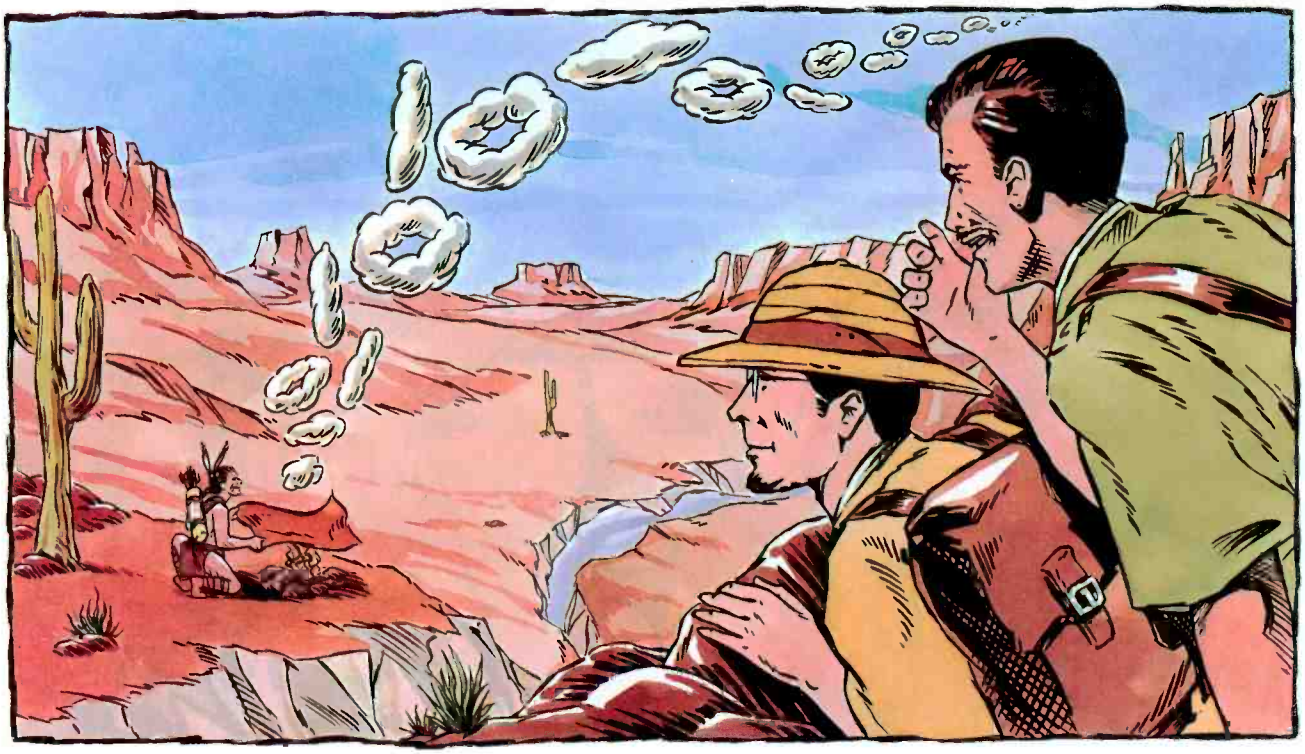
The most popular element of the MPEG-2 standard is the Main Profile in conjunction with the Main Level, which gives an image size of 720x576, a data rate of 15Mb/s and a frame rate of 30fp/s. All higher profiles are capable of decoding Main Profile@Main Level streams.

Table 2 lists the overall MPEG-2 classifications. With regard to the table, these generalizations can be made:

- The three key flavors of MPEG-2 are Main Profile/Low Level (SIF), Main Profile/Main Level (Main) and Studio Profile/Main Level (Studio).
- The SIF Main Profile/Low Level offers the best picture quality for bit rates below about 5Mb/s. This provides acceptable quality for interactive and multimedia applications. The SIF profile is replacing MPEG-1 in some applications.
- The Main Profile/Main Level grade offers the best picture quality at rates from about 5Mb/s to 15Mb/s.
- The Studio Profile offers high quality for multiple-generation applications.
- The High Profile targets HDTV applications.

The Studio Profile

MPEG-2 is capable of coding interlaced source video at full bandwidth while reducing storage and bandwidth costs. However, the MPEG-2 Main Profile/Main Level remains a less-than-ideal choice for production because individual frames are hard to access due to the larger group of pictures structure. For this reason, the



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4:2:2 Studio Profile was developed. The Studio Profile expands upon the 4:2:0 sampling scheme of MPEG-1 and MPEG-2. In essence, "standard MPEG" samples the full luminance signal, but ignores half of the chrominance information, specifically the color coordinate on one axis of the color grid. Studio Profile MPEG increases the chrominance sampling to 4:2:2, thereby accounting for both axes on the color grid by sampling every other element. This provides better replication of the original signal.

The Studio Profile is intended for editing applications, where multiple iterations of a video signal are required or where the signal will be compressed, decompressed, and recompressed several times before it is finally transmitted. ■

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

			LEVEL			
PROFILE	GENERAL SPECIFICATIONS	PARAMETER	LOW	MAIN (CCIR 601)	HIGH 1440 (HDTV, 4:3)	HIGH (HDTV, 16:9)
SIMPLE	PICTURES: *I, P* CHROMA: 4:2:0	IMAGE SIZE[1] IMAGE FREQUENCY[2] BIT-RATE[3]		720x576 30 15		
MAIN	PICTURES: *I, P, B* CHROMA: 4:2:0	IMAGE SIZE IMAGE FREQUENCY BIT-RATE	325x288 30 4	720x576 30 15	1440x1152 60 100	1920x1152 60 80
SNR-SCALABLE	PICTURES: *I, P, B* CHROMA: 4:2:0	IMAGE SIZE IMAGE FREQUENCY BIT-RATE	325x288 30 3, 4[4]	720x576 30 15		
SPATIALLY-SCALABLE	PICTURES: *I, P, B* CHROMA: 4:2:0 ENHANCEMENT LAYER[5]	IMAGE SIZE IMAGE FREQUENCY BIT-RATE IMAGE SIZE IMAGE FREQUENCY BIT-RATE			720x576 30 15 1440x1152 60 40, 60[6]	
HIGH[7]	PICTURES: I, P, B CHROMA: 4:2:2	IMAGE SIZE IMAGE FREQUENCY BIT-RATE		720x576 30 20	1440x1152 60 80	1920x1152 60 100
STUDIO	PICTURES: I, P, B CHROMA: 4:2:2	IMAGE SIZE IMAGE FREQUENCY BIT-RATE		720x608 30 50		

NOTES:
1 IMAGE SIZE SPECIFIED AS SAMPLES/LINE x LINES/FRAME
2 IMAGE FREQUENCY IN FRAMES/s
3 BIT RATE IN Mb/s
4 FOR ENHANCEMENT LAYER 1
5 FOR ENHANCEMENT LAYER 1, EXCEPT AS NOTED BY [6] FOR ENHANCEMENT LAYER 2
7 FOR SIMPLICITY, ENHANCEMENT LAYERS NOT SPECIFIED INDIVIDUALLY

Table 2. The MPEG profiles and levels in simplified form.

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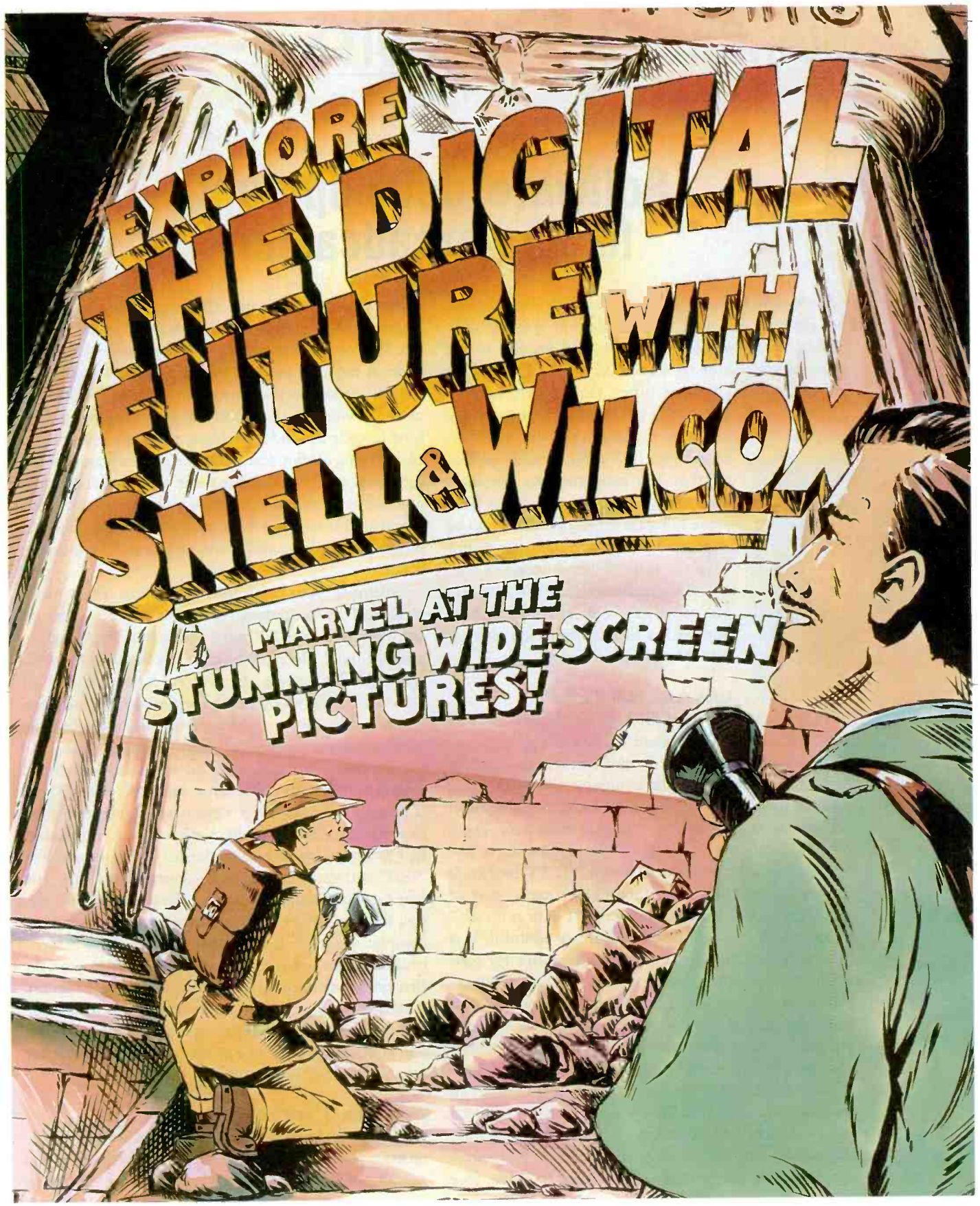

SNELL & WILCOX

Engineering with Vision

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By Brad Gilmer

Software development for the broadcaster

Software projects start off many different ways. Perhaps you have taken a class at a community college, come back to the station, and decided to put some of your skills to work. Or, maybe you have a group of folks in your office that knows how to program — the boss walks in with a task, and you are on your way. You also might have an information technology (IT) group in your company that has programming resources available to you. Or, you might have some software project that needs to be done, and you realize that you do not have the skills in-house to do it. You hire a company to write the software for you. Let's look at each of these approaches to identify which alternative may be best for you.

Brad Gilmer

Look ma, I built it myself

Many software projects are handled this way. You or someone in your department is a computer hobbyist. They see an opportunity to put something together, make things better for the company and they get to exercise their programming skills all at the same time.

There is nothing wrong with this approach. These days, a little Visual Basic or C++ programming is like a screwdriver or some other tool in the TV facility. It allows you to build or maintain some useful part of your equipment. Advantages of the "I built it myself" approach to software development are plentiful. It is almost always the least-expensive alternative for software development. It makes for fast "idea-to-product" time if you do not bite off more than you can chew. It gives the person who writes the program a sense of accomplishment and ownership. In addition, it allows you to develop small projects economically. These projects might never be tackled if they had to go to an outside vendor. Generally, it gives a close fit between the need and what the product will do. This is because the person who develops the product is intimately familiar with the problem he is trying to solve. (See Figure 1.)

Of course, the "I built it myself" approach does have some disadvantages, too. Imagine having to tell your manager, "There is only one person on the planet that knows about this software, and he quit three years ago." This frequently happens when you develop software in-house. But it can also happen if you have a system developed by an outside vendor. Typically, there is a lack of documentation with internally developed code. It requires an iron will and excellent self-discipline to document your own code properly. In the heat of battle, when you have just had a brilliant insight into how to code around a problem, it's really tough to sit there typing all this text in quotes so someone else can figure out what you did. Frequently, the problem is that you can be a little too clever for your own good. In six months, you will not have a clue what this brilliant scrap of code does, and it will take you days to figure it out.

Sometimes, people fall into the trap of trying to fix structural or procedural problems with a piece of software. We have all heard the saying, "garbage in, garbage out." No piece of code, no matter how well-written, will take care of a problem if the real solution is to change the way you are currently doing business. It can be difficult to see this if you are developing the code to solve a problem in your own back yard.

A common problem with an internally developed code is biting off more than you can chew. Many "I did it myself" projects die a slow whimpering death because the code writer got in over his head. Unfortunately, I am speaking from experience. If this is your first "real" software project, pick something you are sure you can do. Getting through the first project will give you the confidence and experience you need for more complex projects. If all you have ever done is write programs that you use yourself, you will be amazed the first time someone else sits down to use your program.

Even though there are some challenges to writing your own code, I encourage you to give it a shot. It gives you confidence, plus the experience needed to manage others who may write code for you in the future.

We're from IT, and we're here to help you

Using programming resources within an IT department in your own company can be challenging. If you are fortunate enough to be in a company that has an internal computer software development department, and if you have a customer/client relationship with them, this can be a real advantage.

However, there are definitely some things you can do to make things go more smoothly. First, be sure you are clear about what you want to accomplish. This will

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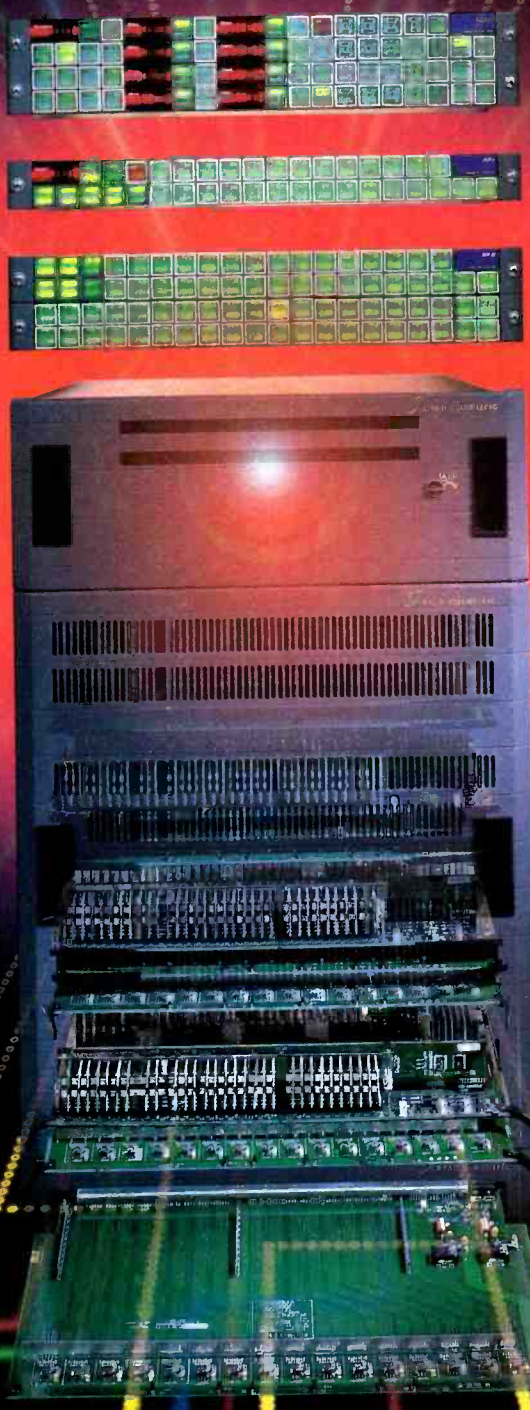

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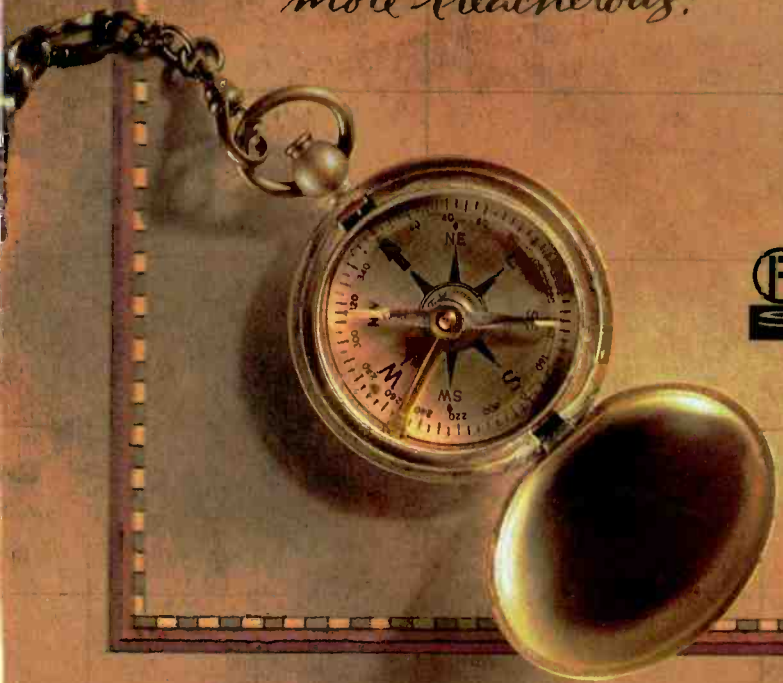

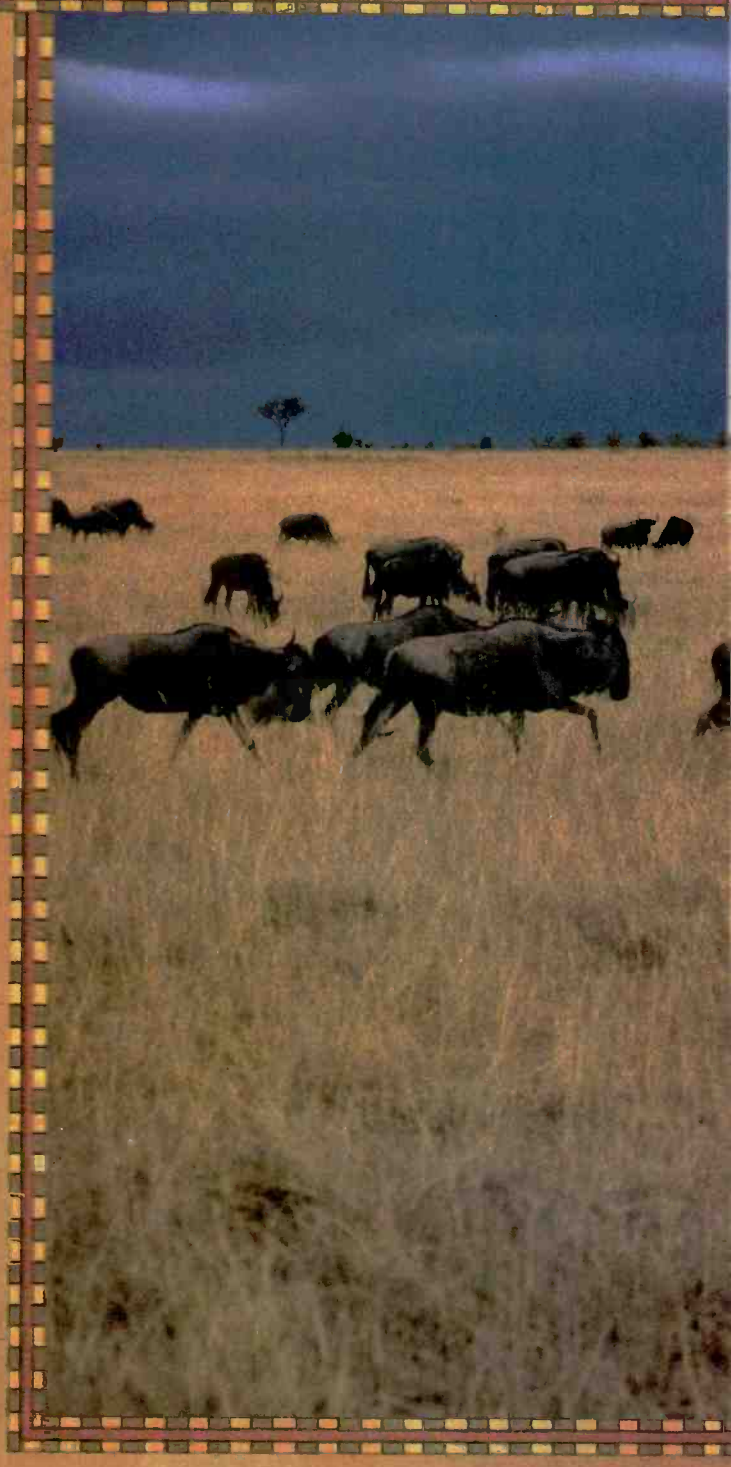

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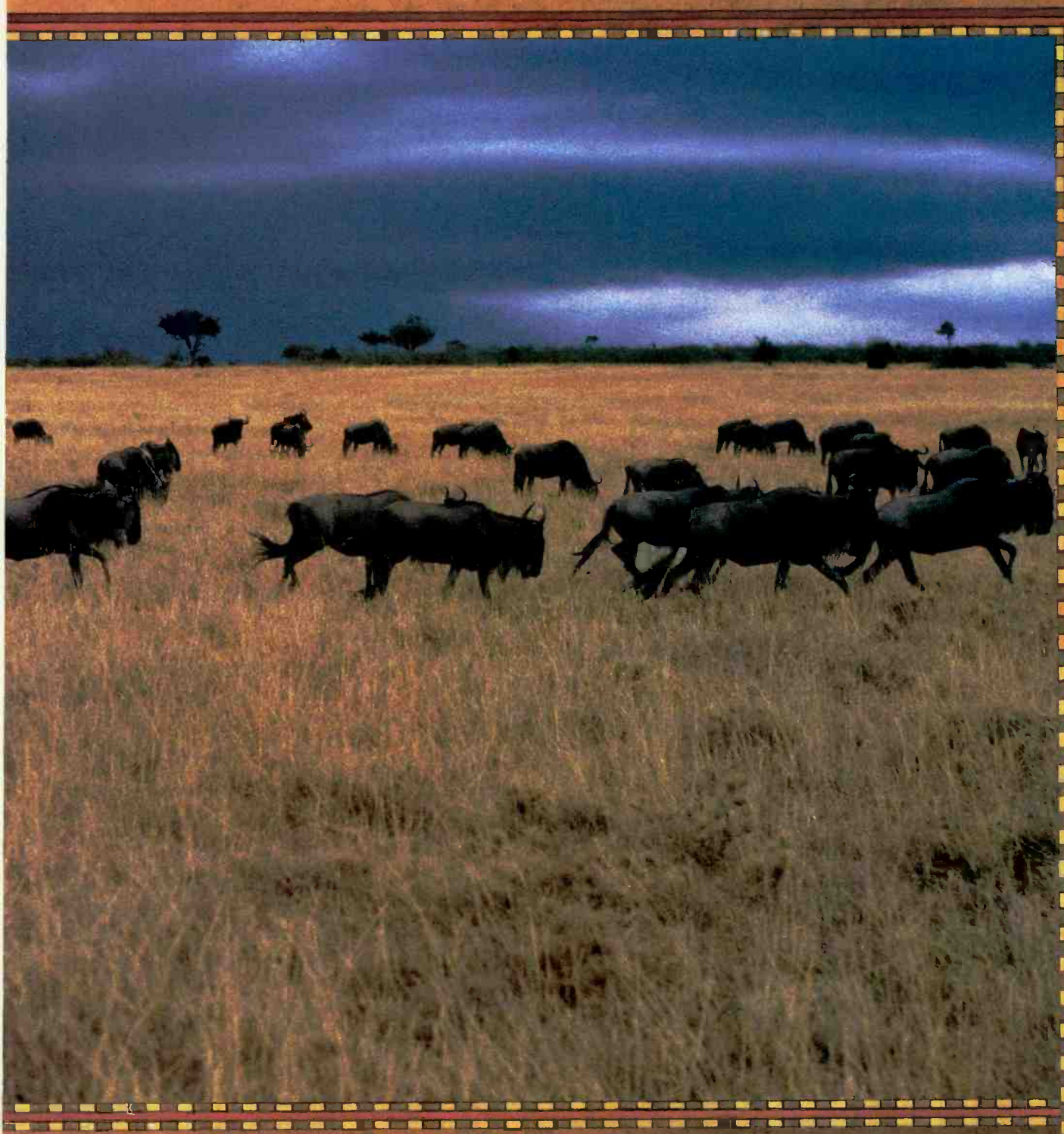

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help you relate the information to your IT group, thus avoiding misunderstandings down the road. Second, talk to others in your company who have used your IT department for development and see if they have any recommendations on making the relationship work. Third, take the time to educate your IT folks about what you and your department do on a daily basis. The suitability of your final product to task is to some degree determined by how well the programmer understands what you are doing on a daily basis. Finally, you should be clear up front about shared decision making on the project; compare agendas. The IT group may be trying to maintain particular hardware platforms across departments. They may be trying to best fit their knowledge base to your problem (Visual Basic programmers to a solution that it best resolved with a C++ programmer), and so on. On the other hand, these differences in agendas can lead to problems for your application and your company. Be aware of these differences in agendas.

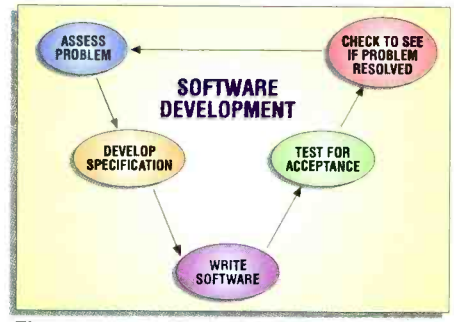


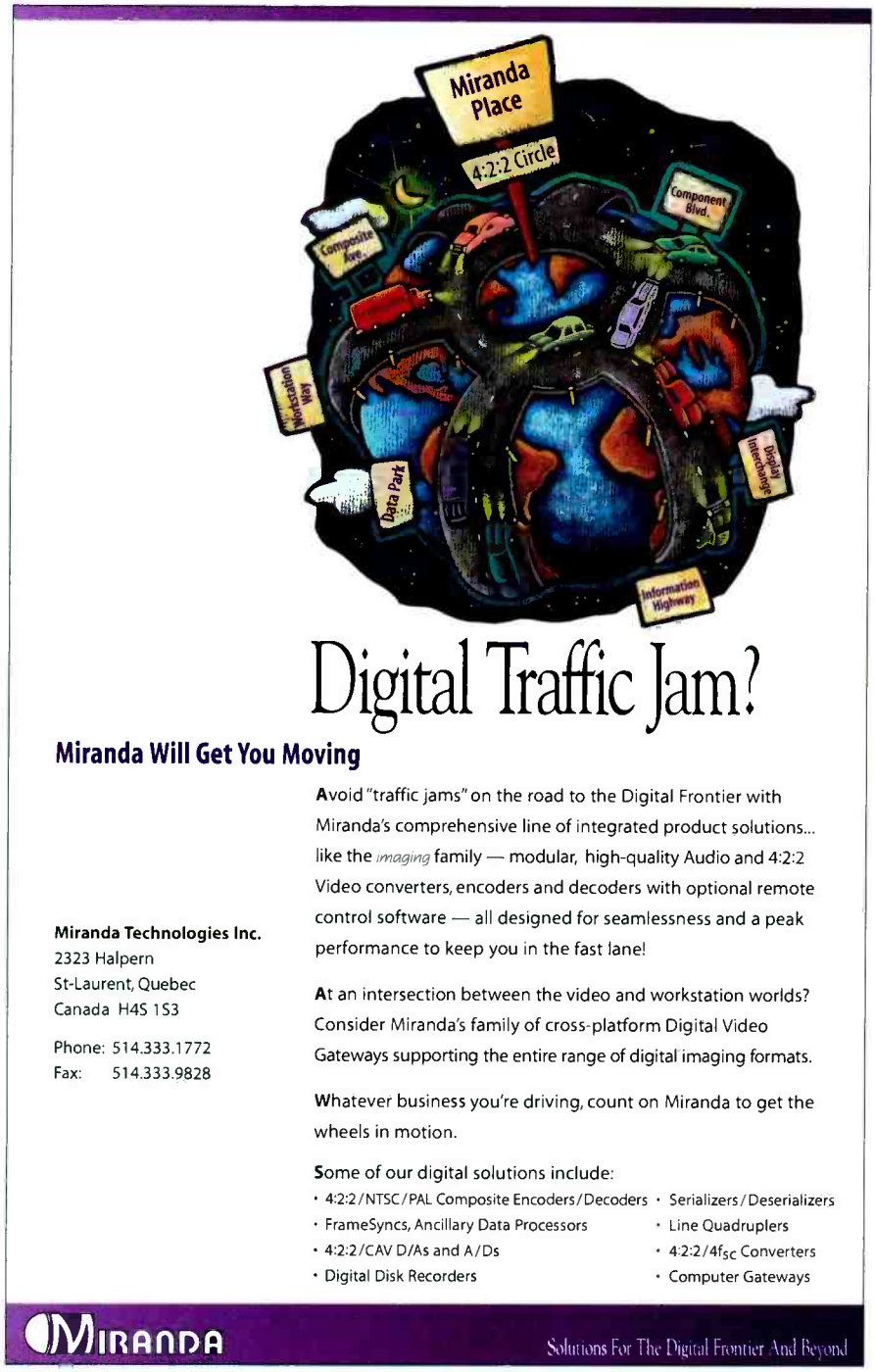
Figure 1. Steps broadcasters should take when developing software.

Other alternatives

You might want to consider taking small- to medium-sized projects to a small software house or individual developer. This can be a good alternative when you do not have the resources internally to develop what you need.

Here are some general suggestions that apply to all software development. First, use a prototype, especially if someone other than yourself will be using the program. Second, try to do as much work on the specs up front as you can. The better your specification process is, the clearer you will be on what you are asking for. This has another benefit — you will know that your program (or one written by someone else) meets your needs. In even smaller systems, tight specifications up front help you achieve your results. Finally, for real-time broadcast applications, I prefer to write in COBOL using the IBM 360 operating platform. The flexibility of COBOL, combined with the easy modification of punch cards, makes the 360 ideal for this application (you did notice that this is the April issue, didn't you?). See you next month. ■

Brad Gilmer is director of advanced network operations & technology for Turner Entertainment Networks.



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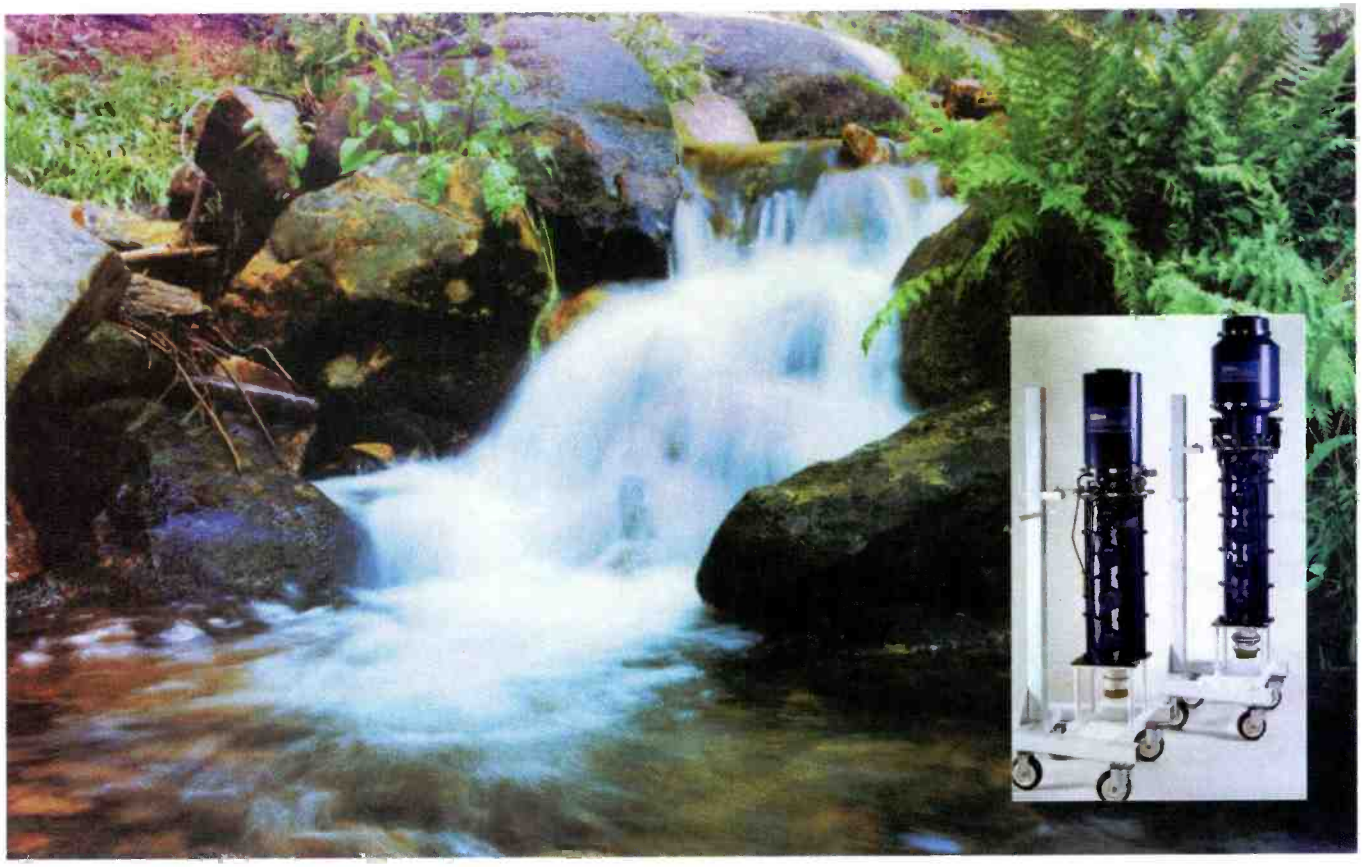

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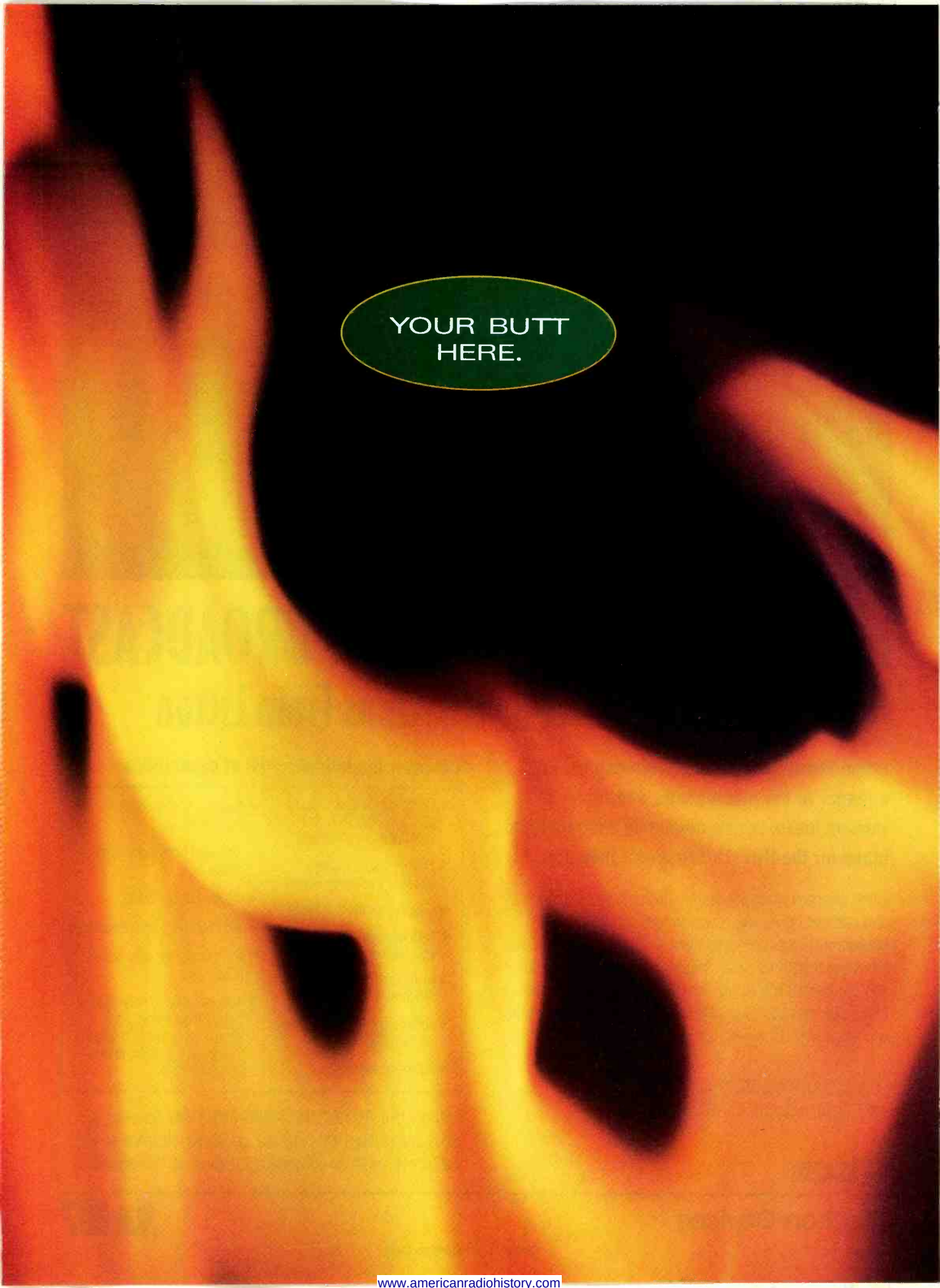

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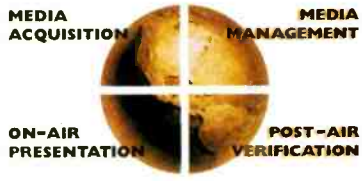

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By Skip Pizzi, technical editor

Digital audio dynamics

In the days of analog audio, recording media always dictated the limiting factors of dynamic range. Even with noise reduction, an analog tape recorder's dynamic range was much narrower than a good analog console's.

This is no longer the case in digital audio recording. Today's DAT, CD-R, digital audio on videotape or computer-based systems almost always meet or exceed the dynamic range of the audio electronics associated with them. This affects the way in which interfacing between such audio devices should be handled.

Defining dynamic range

Although misunderstood, there is standard terminology for defining an audio system's dynamic range. (See Figure 1.) The limiting factors of any audio system's dynamics are *distortion* as a maximum and *noise* as a minimum. The difference, in dB, between these two points is the dynamic range of the system.

To navigate between these extremes, a middle-ground target is established, called the *reference level* or *design center*. This defines a signal amplitude point that is far enough below the system's maximum level to have minimal risk of distortion, while being above the system's noise "floor" to sound quiet. Operators are then trained to steer the variable levels of program audio they work with toward this central zone around the reference level.

Those two areas above and below the reference level also have standard names: From the reference up to the distortion point is called *headroom*, and from the reference down to the noise floor is the *signal-to-noise ratio* (S/N). Each is quoted in dB, and summed together their values equal the dynamic range of the system.

Storage vs. signal path

Analog storage devices have a much smaller dynamic range than signal paths. For example, a good analog tape

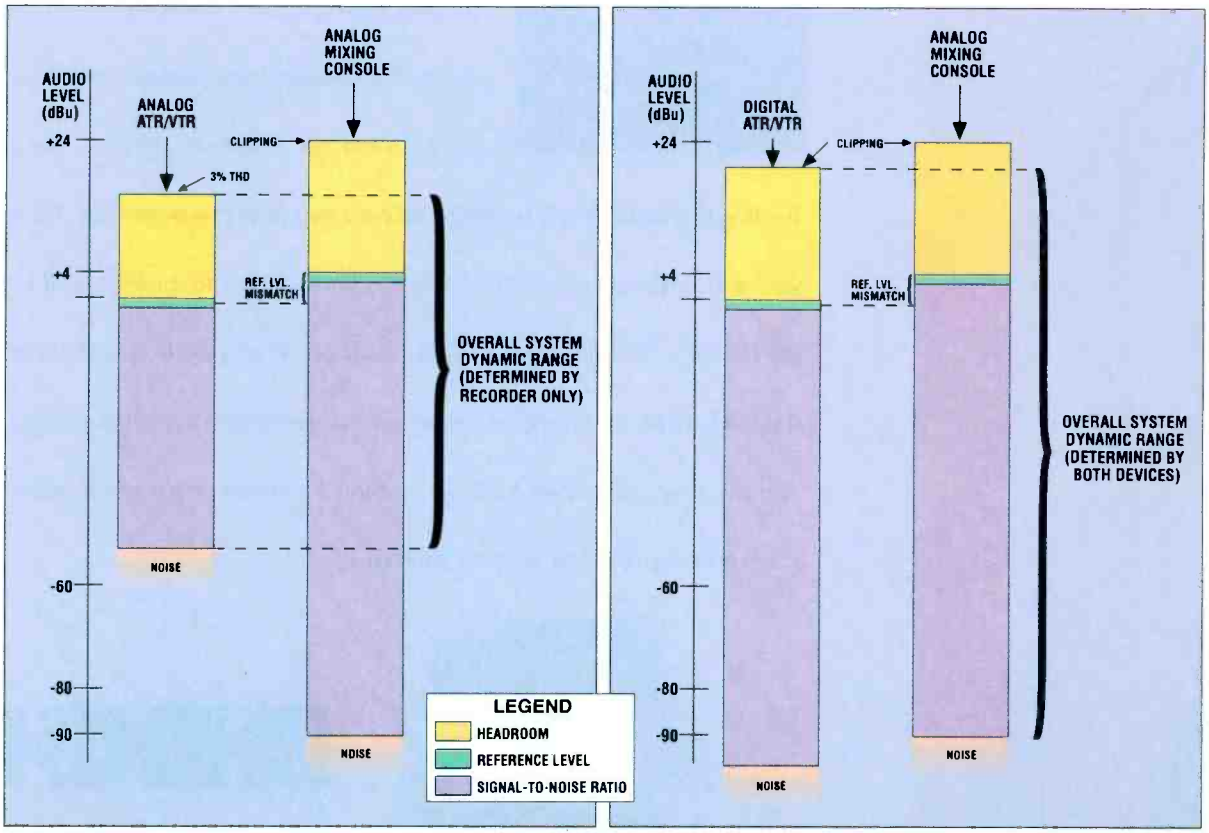

Figure 1. Comparison of dynamic range in analog and digital/analog hybrid systems. Note that a mismatch in reference level alignment between recorder and mixer is of little consequence in the pure analog world (at left), but the same mismatch has the effect of reducing system dynamic range in the hybrid environment (at right).

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recorder might provide some 55dB or 60dB dynamic range, while a decent mixer or routing system can offer 90dB or more. This means that the storage device will always define the limits of the analog system's overall dynamic range.

As long as the tape recorder's limits fell within those of the much wider signal path's, the dynamic range of a system was considered "in alignment" (as in Figure 1). Small to moderate mismatches of reference levels between recorders and mixers had no real effect on overall system dynamic range.

With digital audio storage systems, all this has changed. Now, digital storage and analog signal-path dynamic ranges are roughly equivalent. This means that if the dynamic ranges of digital recorders are not precisely aligned to the analog signal paths they interface with, overall system dynamic range will suffer.

Maximizing system dynamic range

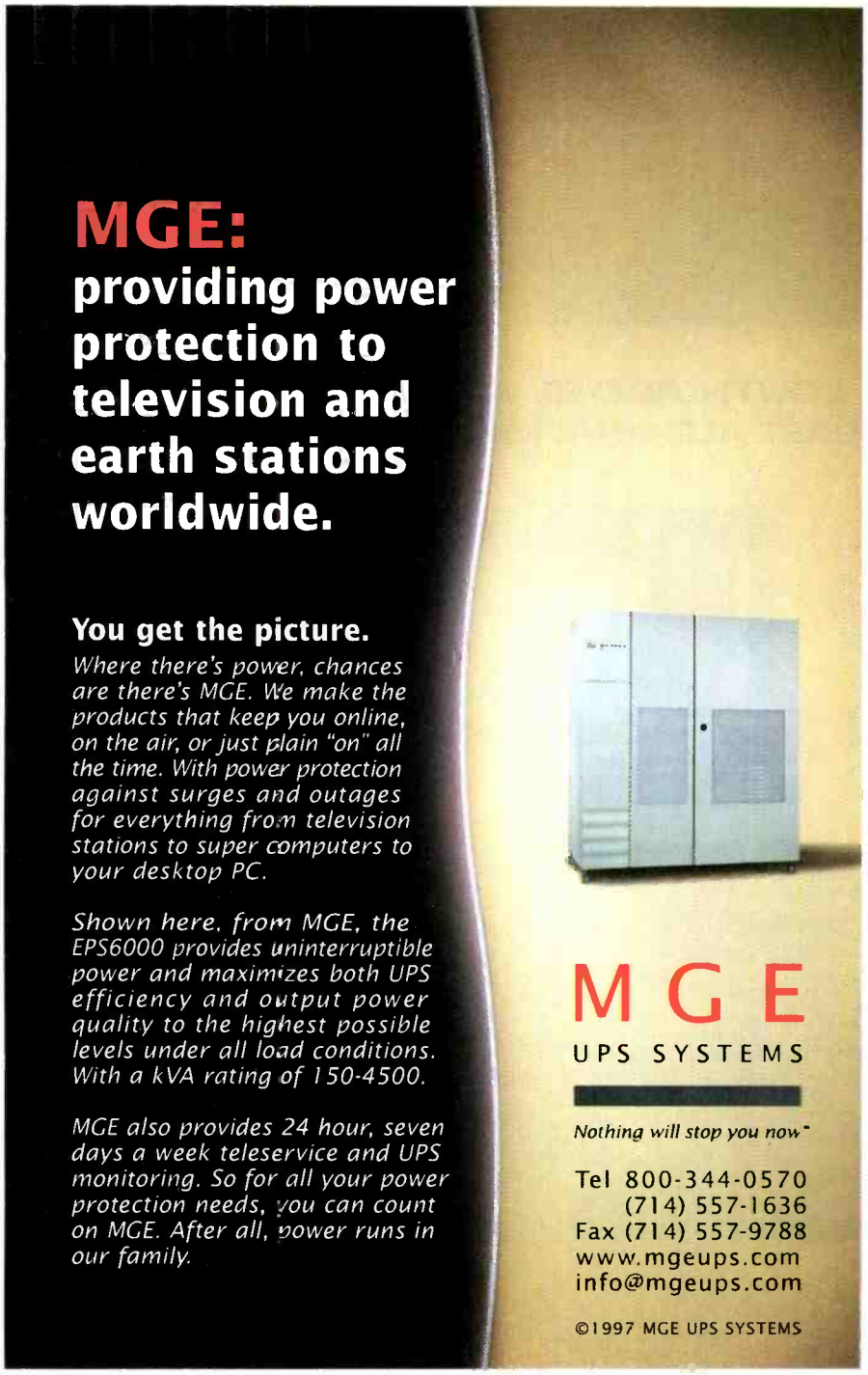
How a system's dynamic range is divided into its two components — headroom and S/N — is up to the system designer. There is always some flexibility for where the reference level is placed. Headroom can always be traded for S/N or vice versa.

When designing such an interface, the analog reference level can no longer be cited simply in relative terms (e.g., "20dB below clipping"), but in *absolute* terms (e.g. "+4dBu," equivalent to 1.23v). Proper system design evaluates each device's clipping point and aligns them to get the maximum dynamic range from the system. This may require some attenuation or amplification between one device's output and the following device's input, to ensure that design centers of all variable-gain stages are also well aligned. Ideally, when all devices in a system are properly interfaced and operating at unity gain, they will all clip simultaneously when signal level exceeds a given value.

Incidentally, clipping is used as the level-alignment reference in these interfaces rather than noise, because noise levels are often less critically defined, and system noise is an additive function, dependent on the current number of active inputs. Clipping, on the other hand, is a singular and well-defined level that remains constant regardless of a system's operational status.

These dynamic range problems are largely eliminated in *fully* digital systems, where standard AES/EBU interfacing between devices inherently guarantees proper level alignments throughout. A host of *other* interface issues do arise in such systems (primarily in the timing domain), but we'll leave those for another day.

Meanwhile, without an understanding and alignment of dynamic range in hybrid digital/analog audio systems, the best equipment items will underperform as an ensemble. Maximize the value of your audio investments by examining this level interface carefully. ■



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By Mark Dillon and Steven Blumenfeld

Bigger data pipes: Cost and risks

Video-on-demand has not become the killer interactive TV application, nor has fiber optics become the essential transport layer. The killer app is the Internet itself and existing phone and data networks are the transport layer. Though success has begun to clog these skinny copper pipes because the applications that run over them use more and more large audio and video files, there is increasingly less reason to believe that fiber optics and coax are the solution to this congestion. To the contrary, there is more and more reason to believe that the existing twisted pair copper plant has lots of head room to accept high-speed data rates.

Mark Dillon and Steven M. Blumenfeld

Last month, we looked at some of the ways to get high-speed Internet access — cable modems, ISDN and ADSL. This month, we'll look at some of the practical and operational issues affecting their deployment.

Telco solutions

• *Cable modems. Most* existing cable systems are immense hierarchical tree structures feeding thousands of subscribers. Before these systems can support cable modems, the plant must be upgraded or, as a few are doing, built from scratch.

Upgrading older systems presents two problems. First, they are usually not two-way. The line amplifiers are one-way only and must be replaced. The second problem is ingress, the insertion of noise that occurs in a shared media system. In a shared medium environment, every on-line user inserts noise into the larger system.

The customer side cable plant is also extremely noisy. Though repairable on a household-by-household basis, home cable wiring is often a mess. The coax spread around the house behaves as a large antenna, collecting noise from household devices and inserting it into the outside network. Turning such gerry-rigged nightmares into a clean two-way system will be a real challenge.

• *ISDN.* Using ISDN requires a box that currently sells for about $400. Like most consumer products, in sufficient volume, the price drops considerably. On the telco side, ISDN-compliant digital switches must be provided. Approximately 80% of American phone lines are so provisioned. An additional cost (also shared by ADSL) is "line conditioning." Line conditioning is the removal of load coils that were originally installed to clean up the analog signal, but which effectively act as notch filters, blocking ISDN and ADSL signals.

Today, the biggest risk to ISDN seems to be the installation process. Many telcos lack sufficient numbers of trained field personnel to install ISDN efficiently. In response, some ISDN equipment manufacturers have actually begun providing assistance to customers in facilitating phone company installations. Despite this, ISDN is the only high-speed data pipe that most of us can order tomorrow. It is here now and it works as advertised; no waiting — not much anyway, just a few weeks. Just get ready to pay an additional $30 to $60 per month, plus an installation fee of $67 to $457. (See May 1996, "Editorial," for example of installation costs.)

• *ADSL.* Though ADSL has been tested in real-world conditions by many telcos, notably Bell Atlantic and GTE, it is the least mature of the technologies. There are several conditions that affect an ADSL circuit. First is length of run. The current practical limit for an ADSL loop is 12,000 to 14,000 feet. Second is crosstalk created by other high-speed lines. The presence of a T-1 line within the same bundle can interfere unacceptably with the ADSL circuit. Figure 1 illustrates the bandwidth required by a two-way ADSL system.

ADSL is delivered via a single subscriber line. Consequently, the user is not affected by competition for local

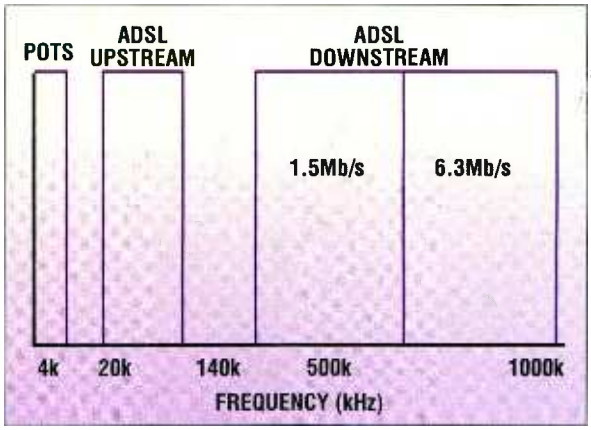

Figure 1. ADSL frequency spectrum.

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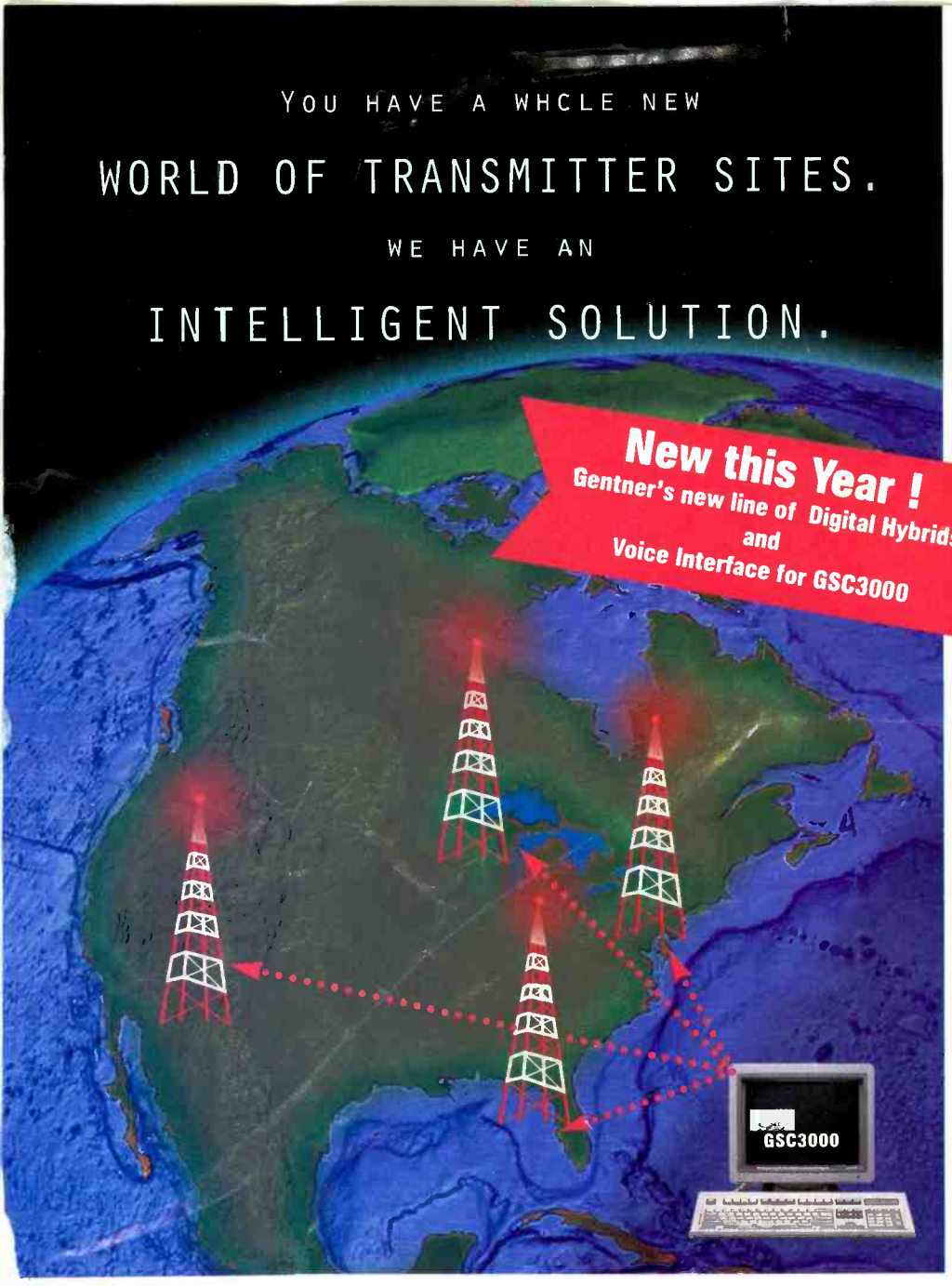

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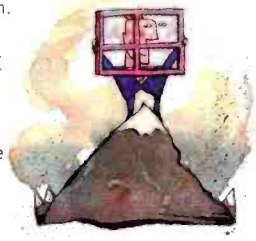

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access. However, if there are many users, the impact upstream may be tremendous. There can be contention for resources at the head-end, where users are combined to share a single Internet connection, and of course, upon servers and, ultimately, the entire Internet backbone.

Although the per line cost of ADSL modems is currently high, that will drop to be comparable with cable and ISDN modems as mass production is reached. Recent announcements by a number of phone companies suggest that by the end of 1997 or 1998, ADSL will become as available as ISDN or cable modems in some markets.

Turning gerry-rigged nightmares into a clean two-way system will be a real challenge.

With the dramatic increases in bandwidth that ADSL provides, it probably offers the greatest long-term potential for an increase in performance. However, that promise will be restricted until the bandwidth of today's Internet infrastructure is increased.

ISDN's additional demand for bandwidth is minor compared to cable modems and ADSL. Neither of these big pipes will flow freely if the upstream distribution and storage systems are not there to support them. That being the case, the thoughtful observer of this situation might ask: "Just who will be in the best position to see that their competing technology gets the required back-end infrastructure improvements?" Without those supporting elements, it won't matter how big the pipe is into the home. ■

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

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By Louis Libin

Get on the queue now

By now, we are aware of the extremely aggressive DTV build-out schedule that the FCC pressed hard for broadcasters to follow. There are many difficult issues associated with a quick build-out. A glance at any of the associated editorials in the major newspapers during the last two weeks of March demonstrated the high-level press regarding the fast-build schedule for DTV, and not all was good.


Louis Libin

Broadcasters took major public-relations hits because the schedules proposed to the commission included the necessary lengths of time for financial, regulatory and equipment availability delays. The new schedules are much more aggressive. The reality of the schedules is that for individual cases, all of the schedules are based on the assumption that certain waivers will be secured.

Political pressure

Broadcasters responded to the FCC pressure by offering a shorter construction plan for DTV that has faster implementation dates than those originally proposed by the broadcasters. The broadcasters now plan to provide a minimum of one digital signal to at least 43% of all TV households in just over 18 months. The major O&Os have made significant 18-month build-out commitments.

Back in the FCC's court

The FCC has now completed the process of assigning a new channel for DTV to each of the 1,700 NTSC TV stations. All the new DTV channels are being paired with the current NTSC channel. The vast majority of the new DTV assignments are in the UHF band. In past columns, we have reviewed the basis for the DTV assignments. An important question for station management remains: Will my current viewing audience be able to receive the new DTV signal? Or an even better question is how much of my current NTSC audience will receive my new DTV channel and will I lose some of my NTSC audience?

Broadcasters have worked hard to ensure that existing audiences will be able to receive DTV as well as they receive NTSC. The principle of replication was proposed by the broadcasters and was subsequently adopted by the commission. The allotment/assignment program was designed so that, in most cases, a good outdoor antenna will allow virtually everyone who is able to receive NTSC on Channel 4 to also receive DTV on UHF Channel 54. The laboratory and field tests confirmed that DTV outperforms NTSC transmission. Generally, with sufficient power, a DTV transmitter can deliver HDTV-quality pictures into the fringe areas of where we now receive NTSC.

Spectrum and power issues

VHF stations are able to serve a large geographic area, including the service beyond the horizon, without employing massive amounts of power. On the other hand, NTSC stations operating in the UHF band have nominally smaller service areas because of the massive amounts of power necessary to transmit a signal. Accordingly, VHF analog NTSC stations that have been matched with a UHF DTV channel require more power to replicate the coverage area of the existing analog VHF station.

Alternately, UHF NTSC analog stations that have been matched with a UHF DTV channel will need significantly less power to replicate their actual geographic coverage areas. This is the reality of the implementation of the replication principle. In some cases, a power disparity arises out of this situation. Sometimes the power disparity can be large. However, according to the FCC and the Broadcasters Caucus, the allocation/assignment plan provides for replication. It is hoped that the final FCC table replicates without a power cap imposition. With a power cap, there is no replication.

The generally lower DTV ERPs proposed for existing UHF TV stations have raised concerns about the difference between indoor and outdoor signal strength. However, because of the replication, the same exact indoor/outdoor attenuation factors apply for NTSC and DTV service. For satisfactory NTSC reception, a signal-to-noise (S/N) ratio of approximately 40dB is required. A digital TV signal requires a S/N of only 16dB, a difference of 24dB. Therefore, if the average receiver DTV power level is less than 24dB below the received NTSC peak power level, DTV reception should be satisfactory.

The basis for the broadcaster table of assignments

In early 1995, the Broadcasters Caucus submitted its recommendation for a nationwide DTV channel assign-

Continued on page 128

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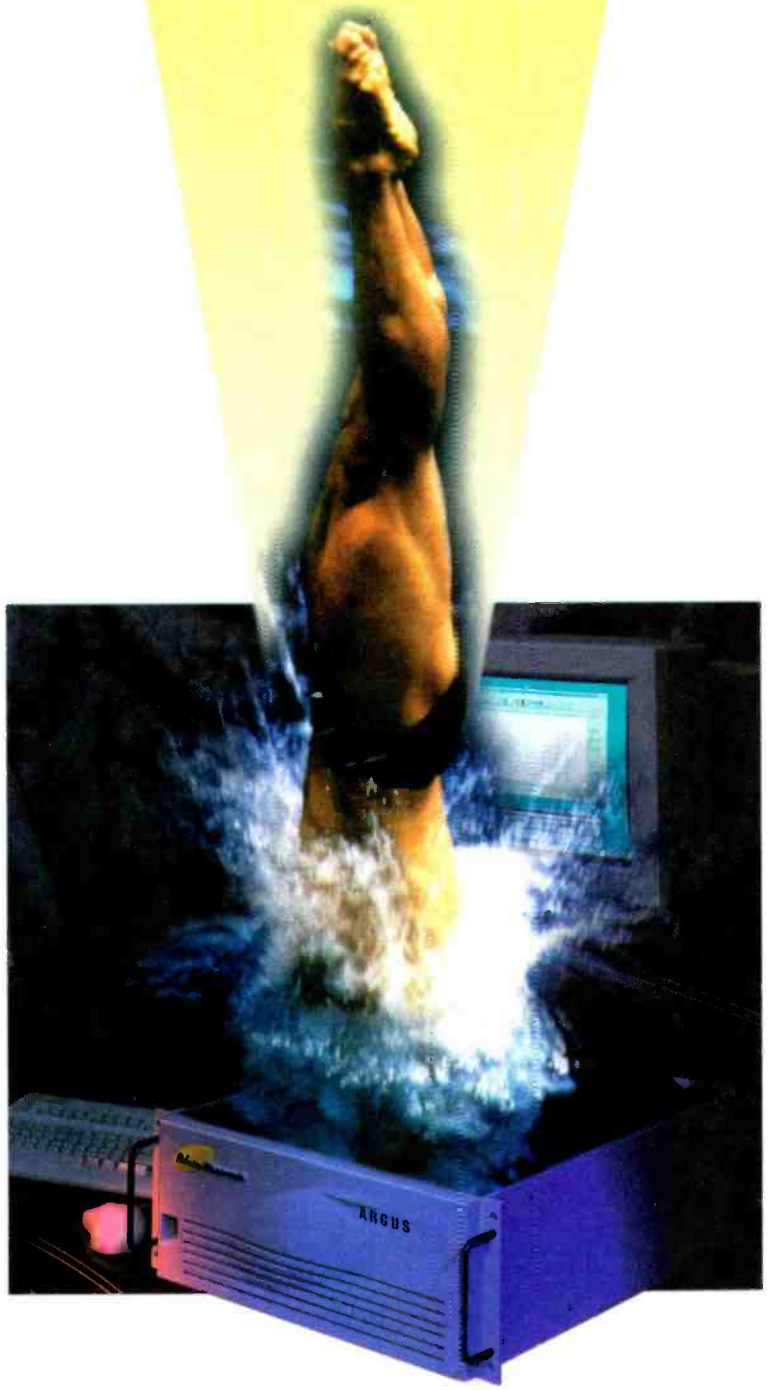
The Cost Of MPEG-2 AFF Encoding Is Taking A



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By Brian Quandt

MPEG-2: Making the right choices

MPEG-2 video compression has emerged as a major technical force in the broadcast, entertainment, computer and cable industries, yet will MPEG-2 eventually solve the problem of multiple formats and transport protocols? Let's look at the issues surrounding the use of MPEG compression in TV facilities. What critical issues need to be evaluated before buying your first piece of equipment?

How TV operations can use MPEG-2

• *News and acquisition.* Today's acquisition equipment relies on non-linear editing systems and still-stores based on Motion-JPEG. We've figured out ways to transcode JPEG files to MPEG, but the challenge has been concatenation as material is decoded and encoded multiple times while moving from one piece of equipment to another. This problem is being solved by MPEG-2 4:2:2@ML, which provides high picture quality for improved multigeneration capabilities with a maximum data rate of 50Mb/s. Studio MPEG-2 also allows frame-accurate editing.

• *Pre-processing and multiplexing.* MPEG can be used for pre-processing and multiplexing satellite feeds, videotapes and even Internet web pages. Many incoming signals can benefit from pre-compression filtering, which may improve the look of the product.

• *Spot playback.* Compression is used in cable head-ends and in TV stations that have replaced their aging cart machines with file servers. These storage systems mostly are based on Motion-JPEG, and all are proprietary implementations. Early adopters quickly found that software is critical to enabling interstitial materials to be inserted on transmission. Control, applications and networking increasingly will be MPEG-driven. The trend will be large, linked systems, with sister operations accessing multiple servers.

• *Archiving.* Storage technology is often based on desired quality levels and needed capacity. Useful here is MPEG-2 with its high data rate and IB GOP (group of pictures) structure. Another area of confusion (and opportunity) is library management where browsing applications need to access low bit-rate thumbnails using lower compression ratios on the file server. Hierarchical systems for storing content require scaleable compression methods.

• *Distribution.* All distribution file servers use MPEG in some way, whether the vendor's own or another vendor's MPEG module as a front-end. With target transmission data rates of 15Mb/s (MPEG-2 4:2:2@ML) to feed an NTSC/PAL transmitter and downward to 1.5Mb/s in DBS multichannel applications, MPEG- 2 is being implemented within TV stations. Cable and DBS or direct-to-home distribution operations may rely on the 4:2:0 format of MPEG-2 MP@ML.

Choosing what works for you

MPEG-2 has emerged as an international standard to help TV stations deal with the transition to digital. MPEG-2 aims to fill the need for flawless interoperability of those systems. MPEG-2 is also a highly sophisticated technology that, when correctly applied and properly supported, will produce higher quality video. ■

Evaluating MPEG-2 solutions

1. ***Study the vendors.*** Identify the key players and industry leaders in MPEG-2 compression technology. Check out their web pages for technical papers. Compare how various equipment adheres to standards and compliancy. (See *BE's* home page for an index of articles on MPEG at be@intertec.com.)
2. ***Talk to vendors.*** Ask your vendors how they plan to route MPEG-2. How do the various file sizes fit through various routers and switchers? Cascading of compression systems has been a hot topic at the last few SMPTE conferences, so look for papers on the subject.
3. ***Talk to vendors' customers.*** Ask vendors for the names of their Beta testers and other early adopters. Have the infant mortality issues been solved?
4. ***Ask about testing and measurement.*** Various compression quality measurement methodologies are being developed. Ask them how to measure your own operational performance. Ask them how you can monitor signal errors/correction as video data moves from one place to another within your facility.
5. ***Talk about interoperability.*** Vendors often expect customers to choose the various modules and figure out how they interconnect. That's why the Internet, SMPTE, STE, SBE, ITS and other industry group meetings can be great sources for sharing data about interoperability problems and solutions. Will your chosen technology work with existing equipment? How about another vendor's equipment?
6. ***Emphasize system integration.*** Consider consulting a reliable systems integrator or engineering firm to assist with evaluating your design, implementing and testing. Many issues will be addressed and questions answered by actual MPEG-2 deployment and experience. (See the *BE Buyers Guide* for a complete list of system integrators on p. 22.)

Brian Quandt is president and founder of HEURIS/Pulitzer in St. Louis, MO, a full-service provider of MPEG video compression solutions for professional video and multimedia developers. A partner of Pulitzer Broadcasting Company, HEURIS/Pulitzer can be reached on the Internet at www.heuris.com.

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Automation and networks

Finally, automation with a brain

By Carl Ostrom

THE BOTTOM LINE:
With an increase in multichannel facilities, managers must find ways to do more with little or no increase in equipment and/or personnel. In many instances, today's automation systems can be used to streamline operations that take place throughout a facility rather than just in master control. $

From commercial insertion for local CATV systems to large-scale multichannel network facilities, broadcast automation needs have become increasingly diverse over the last few years.

For multistation broadcast groups, one notable trend is in operational streamlining. Many have chosen to reduce costs by feeding two or more TV stations — for different markets or for the same market through creative "cooperative" ownership agreements. This trend is creating a growing demand for complex multichannel facility management.

For years, "satellite stations" commonly carried programming and merely inserted local commercials and IDs over the originator's commercials and IDs. Although this situation might work for a station with network programming today, it is unlikely that, in this highly competitive market for syndicated programming, two different stations in two different markets will have identical programming contracts. It is also improbable that the two different market demographics would even support the same programming. The point? In today's broadcast world, these two stations will probably have to run separate programming, as well as separate commercials, thus acting like two completely different

Photo: WDRB-TV in Louisville, KY, currently uses the Odetics TCS2000 for station automation.

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stations within the same facility. So, where are the savings?

Storage and playback is a hardware issue

This scenario begins to look more attractive once you add in a program and commercial storage device large enough to store and playback all the material for two or more stations. Still, the task of managing the logistics of acquisition, inventory, scheduling and presentation of a multichannel system is monumental. Mix in the needs for local news, live sports, program segment timing and special programs, and it borders on inconceivable.

The solution to the storage and playback challenge is primarily a hardware issue. A number of manufacturers have been touting such products for the last two years. And, with storage costs decreasing and storage system size increasing, it appears that large-scale data storage and servers will continue to dominate the future of broadcast presentation for a long time to come.

With increased storage capacity and the emergence of MPEG-2 as a new distribution standard, it is feasible to envision a large-scale data storage network that contains enough programming for more than one day. This can be done with just more than 500GB. Even if the onset of DTV requires twice as much storage capacity, the trend in storage advancement should meet and surpass that requirement far before capacity becomes an issue.

Automation is a software issue

While the hardware accomplishes the storage of data, the critical task of managing that data is primarily a software issue. Yet, few suppliers have developed software solutions to fulfill the presentation needs for such systems. Why? The problem here is twofold.

First, the solution must currently come from multiple manufacturers. Although each may claim to have compatible products, this scenario can frequently result in extensive finger-pointing sessions as the different manufacturers attempt to sort out interface issues. This should read as, "Beta testing done while you operate."

The second issue is that no system presently covers the entire station operation. Typically, there is one software solution for acquisition, another for news, and yet another for traffic and presentation. This creates the largest problem caused by using multiple computer management and automation systems within one facility: the presence of multiple databases. Multiple databases require that information from the acquisition database be entered into the daily log and then into the master control automation system — a process that can also involve a manual media transfer as a videotape is stored and reloaded for playback.

This transfer process opens a wide door to the single largest source of system error: human intervention. Data transfer is time-consuming and cumbersome. Keeping all records straight and the databases matched, demands absolute accuracy. But unfortunately, this task is performed in an environment of stress, time constraints and numerous distractions. This is not a recipe for success. Furthermore, if this facility also has a news automation and commercial video library, each with its own database, the problem becomes significantly larger.

But wait. We thought all this automation was supposed to improve accuracy and reduce labor, right? Now, it's like we're driving a team of horses without a harness — lots of power, without enough control.

Automation, in and of itself, can solve some problems, but it can also initiate others. The success of any computer-based management or automation system is based on the system's ability to perform tasks and manage data reliably with minimal human intervention.

Does this mean that "HAL" should take over the facility? No. It does mean that once a human has entered data, based on a predictable, functional process, the system should know all the

As station automation increases, operators are required to oversee an increasingly diverse equipment set.

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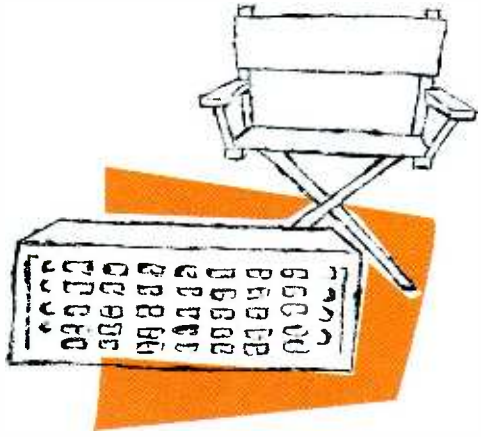

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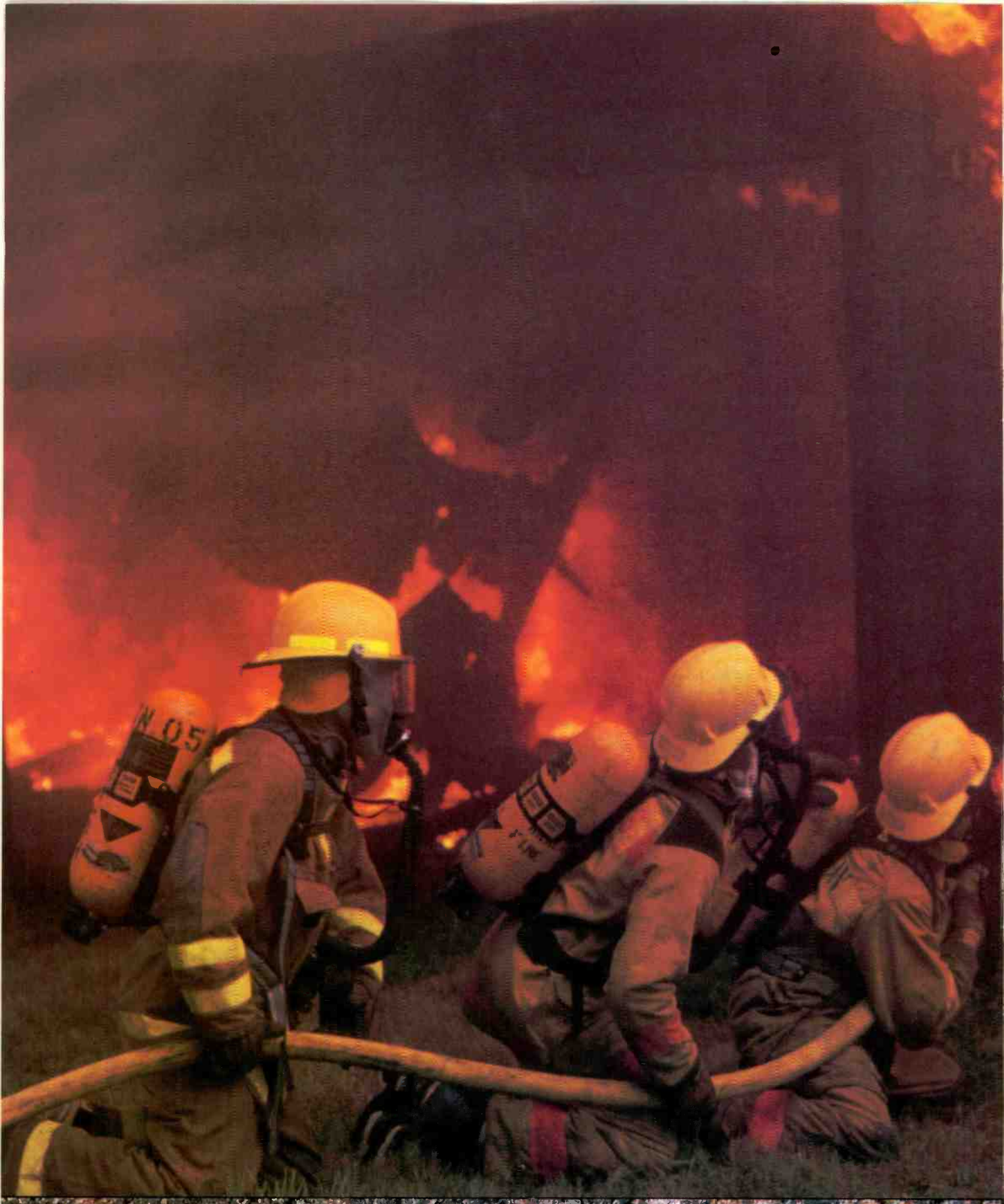

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steps necessary to perform that function from inception to completion. The system should also have the ability to control the devices necessary to perform each function.

The integrated system concept

The only way to accomplish this goal is to have one integrated system that involves every facet of the programming process. Take, for example, a syndicated talk show. Ideally, the acquisition time and location for the talk show would be entered into the database along with the air time. With this data, the system should be able to assign a satellite receiver to the task, move the dish to the location of the required satellite, select the proper channel on the receiver, locate and assign a storage device with enough space to record the feed, establish the path from the receiver to the storage device and initiate the record process at the assigned time. The system would then designate a file name or number to this program and enter that file on the appropriate play list (or lists if multichannel) for the air time designated.

In a perfect world, a subprogram would be able to locate the break times and durations during the record process. These would be entered into the database as links to the program file. The traffic data entered into the database appointing commercials and promos to this program would then be automatically assigned to the proper break locations. Finally, the segment times, break locations and content would be calculated from the available data and entered as a complete play list.

This program would sit in the storage device until the proper time. Then, the system would initiate a play command to run that specific file. When the program has run its course, the file would be marked as expendable to allow space on the disk for a new program. If necessary, the file would be spooled to a DLT or archive s

Predictal fect for an most of the every day — automation sy this and allow a events to be kept schedule in the dat

The key element system is a large-sca agement approach. Re functions that are comn and multichannel broadc this approach provides a s tom-suited to these issues. that each user is going to hav application for facility mana the ideal system would provide product approach and an open col, based on a standard platforn allow users and peripherals ven integrate custom applications.

This necessitates that the system b designed in a hierarchical modular format to allow extreme flexibility. Be-

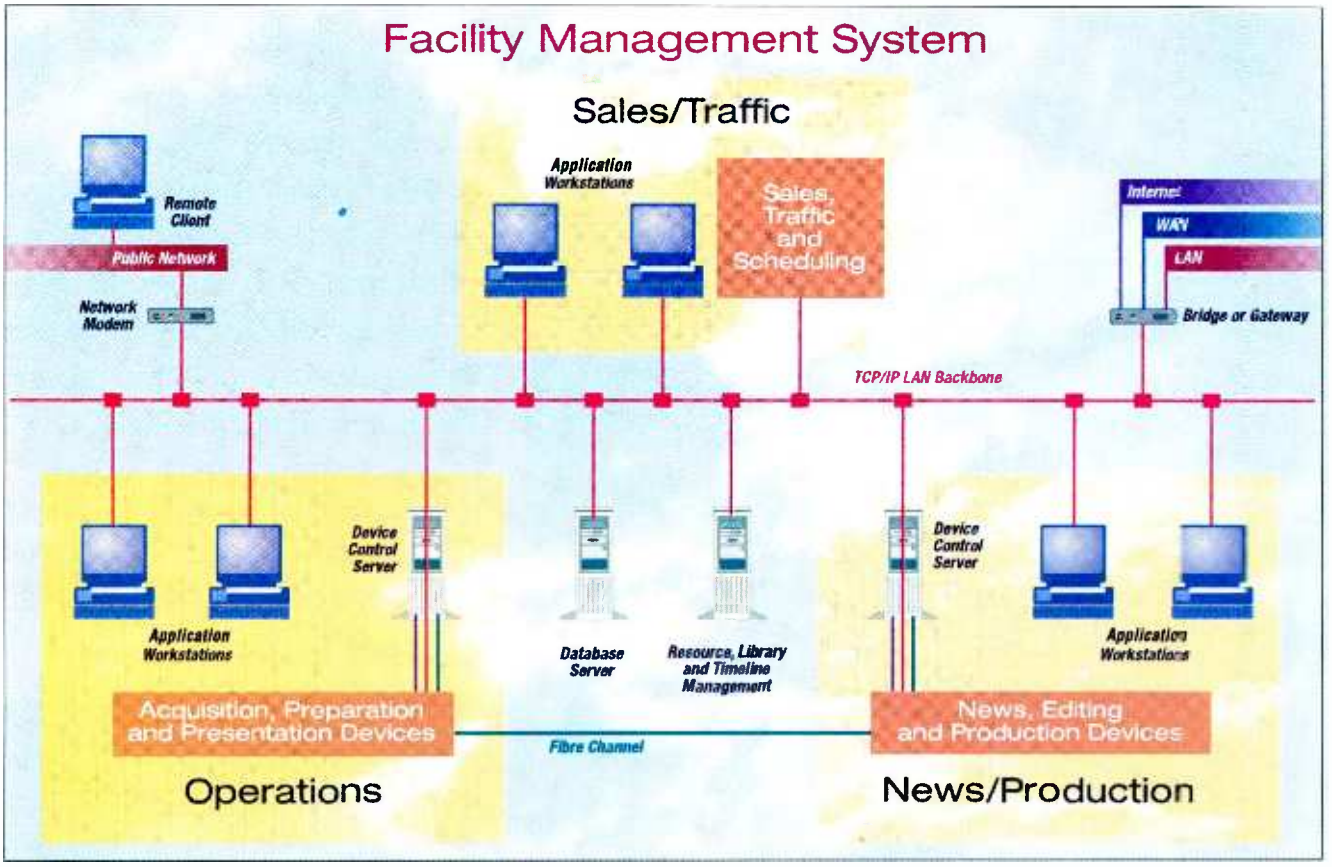

Figure 1. A total facility management system would have access and content capabilities across a variety of station resources and equipment. (Diagram courtesy of Odetics.)

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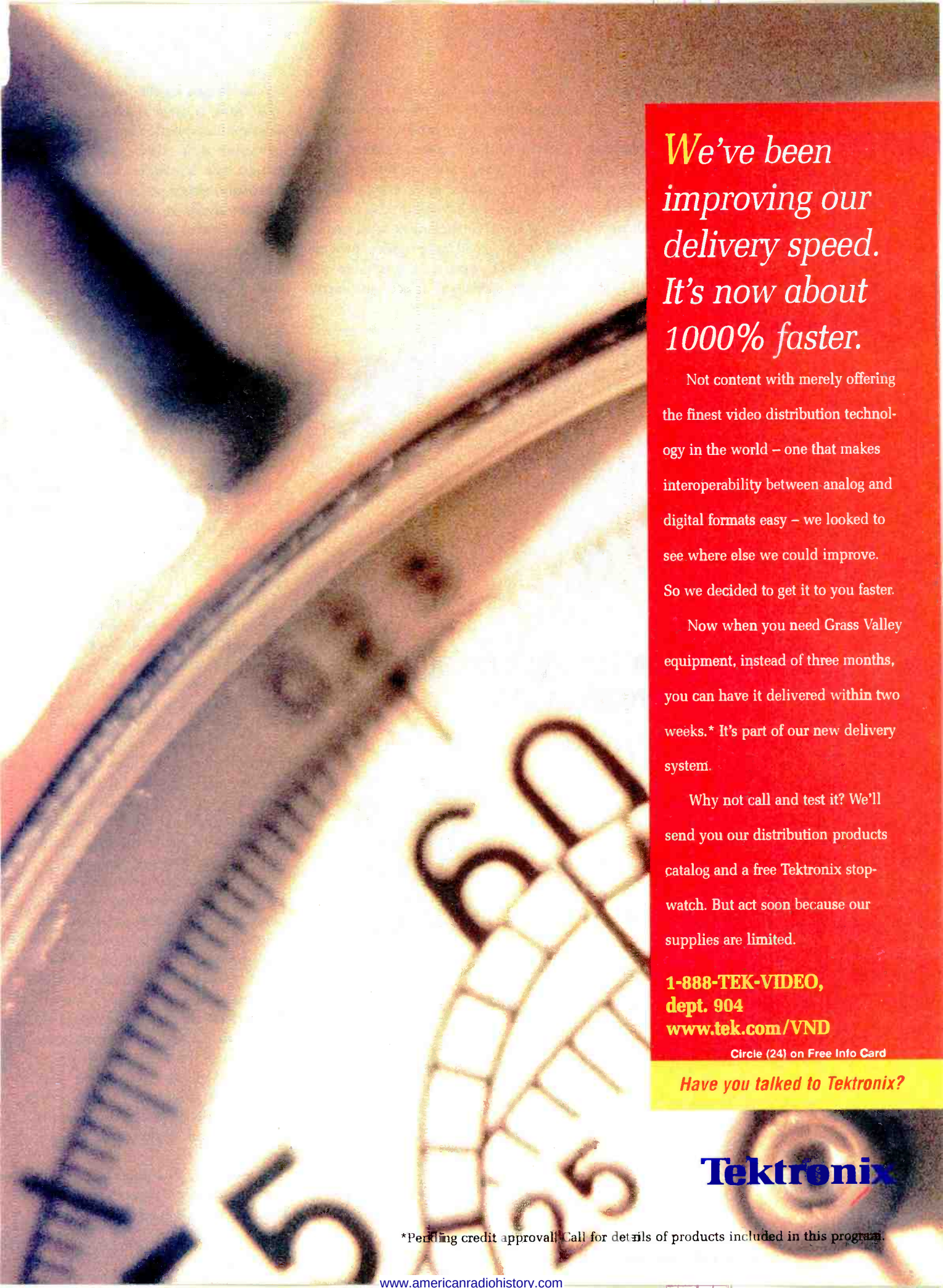

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cause the needs of every organization are unique, it is important that any large-scale total facility controller be adaptable to the needs of the user. It clearly cannot force fit the user to the assumptions of the vendor.

This is not rocket science. Editor products have used this philosophy for a number of years. They take a standard platform computer, write an application-specific software machine-control and media-management software program, and use this program to communicate with a number of media control devices through an existing RS-422 machine control protocol. Most broadcast products provide an RS-422 interface. This gives the system the ability to select and control devices chosen by the user.

The basic concept is simple. Build a software-based station automation system using a standard protocol, and partner with hardware manufacturers to provide a single-station product with different hardware options. In order to prevent another intervendor gunfight, the automation system manufacturer must also accept responsibility for the entire product. One vendor – one product, tested and delivered as such.

So, if one vendor must assume responsibility for the entire product, why not have one vendor also create the entire product, including all the media control hardware?

There are two issues here. First, most facilities will desire to use as much of their existing equipment as they can to make the implementation affordable. The second issue involves the need for flexibility in product choice when either available funds or technology call for upgrading certain portions of the facility.

Each storage vendor has its own unique place in the market and subsequent appeal to different users. Having the ability to choose the quality, signal format, size, protection and cost relationship of each product to suit each users' needs and emotional bent is extremely important.

When hardware products change, as they certainly can do rapidly, these changes can be implemented quite easily. This is much like the editor analogy mentioned earlier. If the new device emulates an existing protocol, no new driver is needed. All the system needs is the device parameters entered into the database to allow the management software to know what it has to work with.

Any system architecture must be designed to control multiple channels with separate programming. The single database concept is extremely important in multichannel operations. This gives stations the ability to keep track of all the media necessary, with respect to physical location on a drive and where it is needed in each current play list, as well as future use requirements.

For example, if a particular media segment runs one day a week on three different channels at separate times, the

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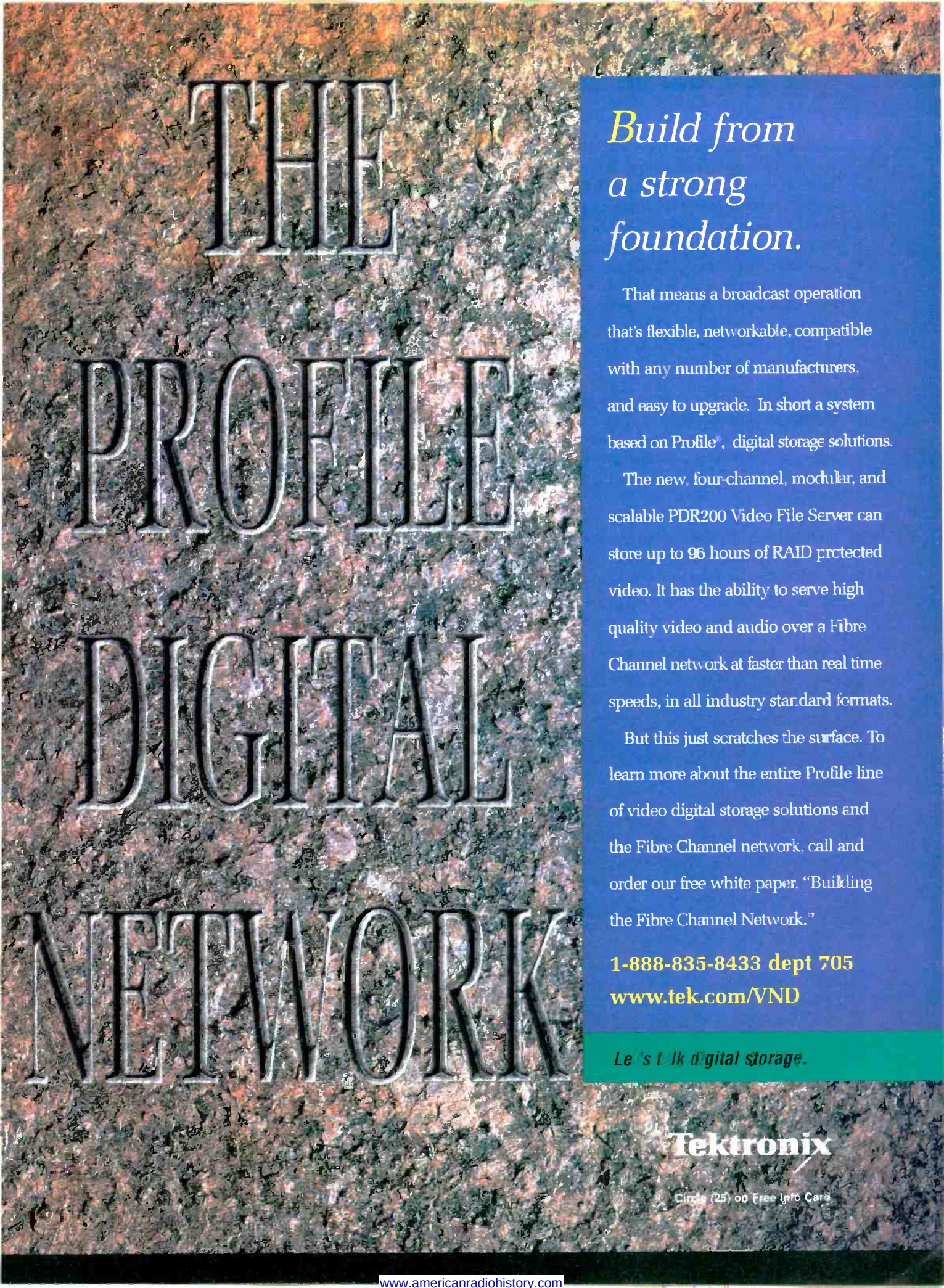

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video segment is loaded from off-line storage to a server on the air day. After the segment runs on the first channel, it stays in the server for the subsequent air times on the other two channels. After the last channel has aired the segment, the video clip is deleted from the server because it already exists in off-line storage for use next week. The data management system can ascertain each channel's criteria from all the data available on one database.

Is facility management here?

So now that you're ready to start your system with a push of a button, where can you find an automation system like this?

NBC recently faced this issue. Its solution was to build a custom proprietary system called GEnesis. But, the capital budget for most stations doesn't include funding for development of a custom-based system. So are the rest of us doomed to endless data entry and solving intervendor interface problems? Maybe not.

What is really needed is one organization that will step up and provide the complete package as a product. In fact, hope is on the horizon. Odetics Broadcast introduced a new product at NAB this year, called the Roswell Facility Management System, which is based on many of these concepts. It can only be a short time before others will follow suit.

Using a typical system as shown in Figure 1, we can see how the concept of a single, global system might function. Notice that all devices are connected to the LAN backbone. This is the single point of control and database management. So, as video clips are moved from the production editing disk recorder to the presentation video servers over the fiber channel link, the data management system is keeping track of where the file is going and where it eventually resides on the server.

Having a standard LAN system for management allows access from remote locations over traditional network equipment. This would allow a remote sales person the ability to query the database to see if the commercial he or she just sold for the "Annual Arbor Day Chainsaw Sale" is still in the archive file from last year. The sales person could then look to see if there is still an avail in the last break of "Rush."

This facility management system also permits all news story material to be recorded from remote sources and archived onto raw dedicated disk drives or VTRs. All news material can subsequently be edited from these devices and recorded to a common drive or server for air playback. During the newscast, each story is then played back from this disk drive without any physical media movement.

If a story is about to air and the producer does not have the video clip file name on the drive directory, he or she would then know that the story is not ready. A decision can be made to

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move to a new story and run a different video clip. The producer simply modifies the news story play list from a workstation in the control room and the original story is moved to a later segment in the program.

That's the easy part. How to manage the talent and the teleprompter copy is another problem. This is where an open architecture system has an advantage. Many news departments have some form of software management in place. The ability to interface with an existing product through open architecture allows the rest of the station to tool up for full automation without forcing the news department to abandon its current investment and operating process.

One huge issue related to automation systems is the fact that the eggs are all in one basket. Thus, it had better be a good basket.

Loading videotapes in the event of an automation system failure is no longer an alternative function in most facilities. Failure of any system must be soft. Redundant controllers, redundant data files and instant access to redundant media storage all help to solve the problem. However, when any part of the system fails, a manual or semi-automatic backup function should be available to allow the operational elements of the system to continue to function in their original capacity.

Anyone in the video business has a number of stories to tell about non-video companies and their lack of understanding about broadcast issues and priorities. Manufacturers must know broadcast operations. They need to know the need for multiple play lists in a live sports event filled with pitching changes, 20-second time-outs and the like. They need to know that some news stories are created during the news show and not canned 30 minutes before air. They need to know that a recorded message on the manufacturer's customer service line is an unacceptable response to a live operation.

So, are we there yet? Not quite. But, I think we can see it from here. A deep and comprehensive data management system is a concept that extends far beyond the explanation in this article. Yet, it is quite another issue to make the data easily accessible and intuitive to operate and use. But, that is precisely the task of any provider wishing to offer a complete station automation system. ■

Carl Ostrom is a video system consultant with System Resources in Nevada City, CA.

Monitoring the monitors

By Skip Ferderber

The new Speer Communications facility in Nashville, TN, is capable of simultaneously originating up to 20 channels of video — quite a record for a traditional broadcaster. In spite of the high level of automation involved, operators still need to track the large number of separate elements required in any broadcast channel; programs, commercials, bumpers, promos, etc. A typical installation would simply assign a separate monitor to each video source. However, in the case of the Speer installation, the dynamic nature of the broadcast day and the need to provide 20 times as many output channels as most TV stations, that wasn't possible.

The monitor solution

The solution was to develop a large bank of monitors and then switch the feeds to each monitor as needed. However, as sources changed, some way needed to be developed to label those sources by monitor. The solution was provided by TDC, formerly Tally Display Corporation. The company provides intelligent dynamic multicolor undermonitor displays that can provide source identification, as well as instant visual error messages.

Each monitor has a TDC display mounted below it to identify the source of the video. The key was to use displays that can be controlled by the automation system, so as the video sources change, so does the label below the monitor. The dynamic nature of the display and external automation control allows the TDC displays to also provide other information to the operators — equipment status, clip IDs and error messages. Another advantage of dynamic labeling is that monitors can be assigned *intelligent names* that mean something to the individual client or production. The days of the black marker and white tape labeling are gone.

Each display panel is controlled by a serial BCD datastream providing the information to be displayed on the panel. Messages can be coded to display in different colors, helping operators understand what's happening more quickly. Even long messages or several short ones can be scrolled across the panel.

The transmission control room at Speer Communications, Nashville, features the Alamar Media Manager, the DEC Alphastudio terminal, control terminals for two Philips Media Pool video servers and TDC undermonitor displays.

As facilities move to multichannel operation, operators need to be able to monitor more status points and sources. An intelligent display system fully integrated with an on-air automation system can go a long way toward reducing operator mistakes and keeping all of those channels running error-free. ■

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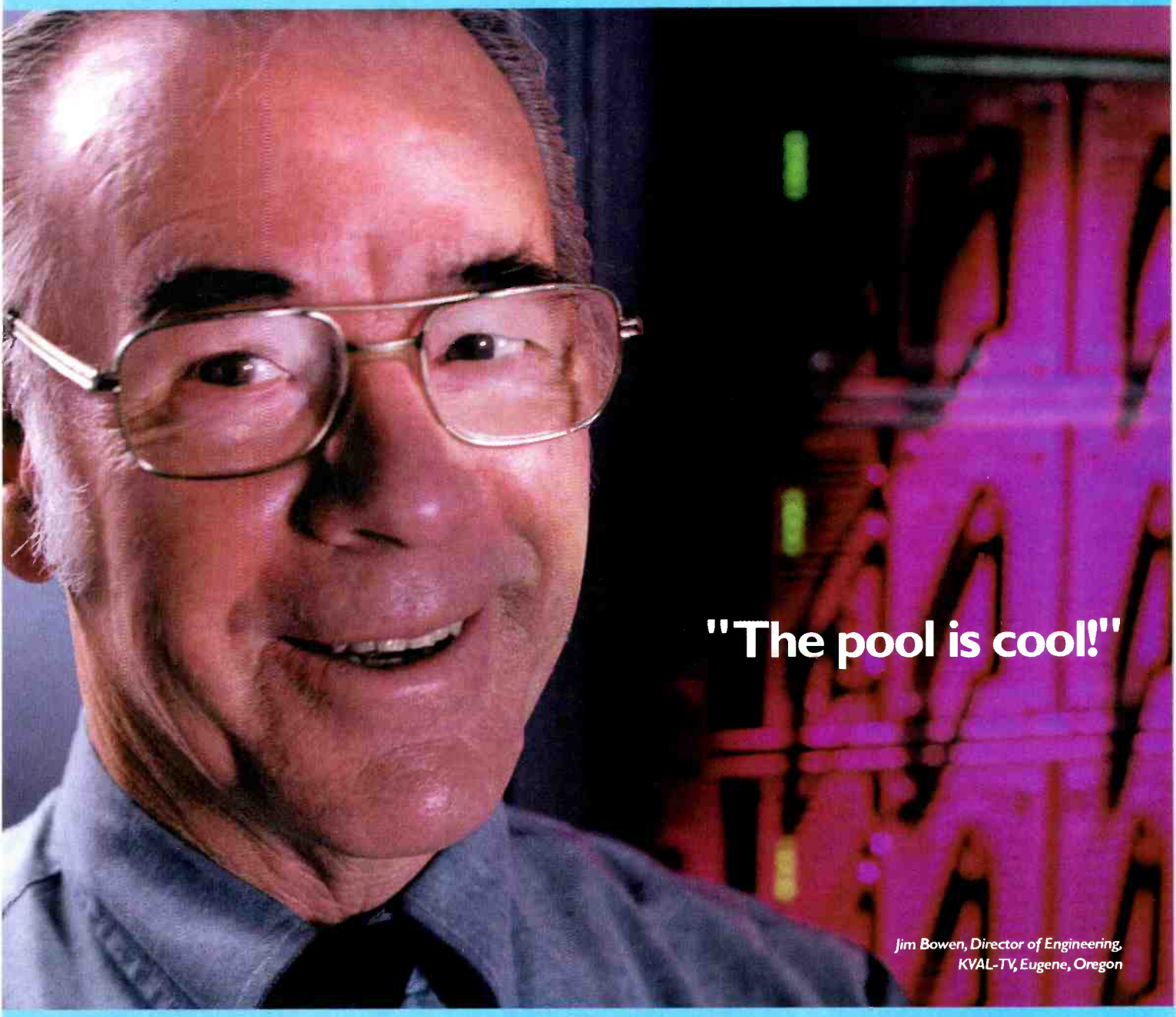

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Automaton is vital for facility networking

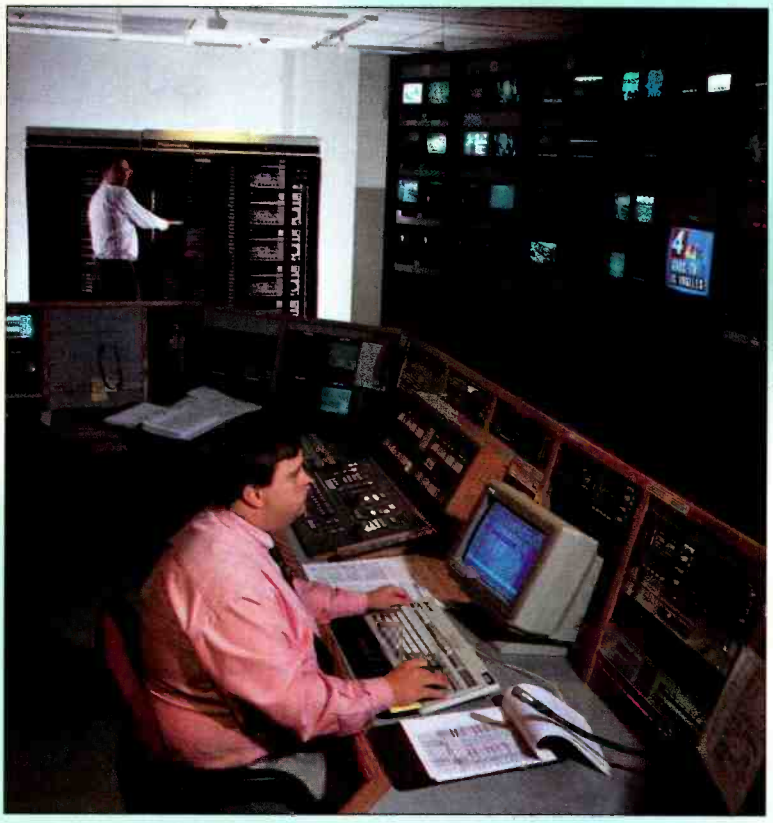
By Ken Freed

Any comprehensive solution for facility networking must include plans for automation. What factors need to be considered in automation system design and integration?

First, any kind of automation system needs to be modular and scalable. A modular system lets station engineers choose only those components that actually fit their requirements. System scalability is crucial for supporting facility expansion down the road.

Second, systems today must use open architecture design. With the wide range of digital equipment in use today (and an even wider variety soon to be developed) closed systems don't make economic sense. Manufacturers recognize that and are providing interfacing solutions to meet this need.

"In the overall operating environment today," says Frank Alioto, chief operating officer of Alamar, a wholly owned subsidiary of Philips, "you need a very open architecture if you're going to automate. For instance, you need a good traffic interface software package that can take the log generated by any traffic system and then convert it to a play list. You also should have a media management capability that lets you catalog and trace all media within the facility."



The Alamar MC-2095 automation computer in the foreground at KNBC-TV, Los Angeles.

Third, the heart of an effective automation system is a comprehensive media management component. Today's stations must handle perhaps hundreds of tapes a day and several thousand over a couple of weeks or a month. To prevent errors and lost spots and programs, all of this media, reel, cassette and server stored, must be effectively tracked. The importance of this capability can't be understated. If your station played only 100 breaks a day, with multichannel operation (DTV) that number could easily jump to 500 or more. Manual tracking simply won't work.

Fourth, an automation system must accommodate flexible resource allocation. This means that any tape machine or hardware, including server channels, can be switched to anything. This includes both input and output channels. The system must be able to foresee hardware needs far enough out to effectively allocate resources in advance so that at no time do conflicts develop.

To illustrate the possibilities, at the high end is the DirecTV 200-channel automated DBS operation in Colorado that has interfaces at 22 computers distributed over the entire facility. So much media comes into the facility from so many different sources every day that the staff uses bar code guns to feed information into the media manager.

At the other end of the spectrum is a single-channel operation providing tourist information in hotels in Branson, MO. The station has one computer and a couple of tape machines hooked into its media manger. That basic configuration can be upscaled, when needed, to automated multichannel service.

Where the trend is taking us

The trend is toward multichannel information in all TV environments, including broadcast facilities. Why? Because broadcasters are looking for new revenue streams anywhere they can find them, for they increasingly need to have multiple-channel capability, if even only two channels — one for analog and one for digital.

Today, and in the future, automation can solve two operational problems. First, automation can reduce your total personnel overhead. Of course, on-site staff can't be eliminated altogether. You can't just turn on the system and walk away from it. You still need someone to make everything work properly.

Second, automation permits you to do some things you couldn't do manually. A busy multichannel environment can become so demanding that your station probably cannot afford the needed staff to accomplish all the diverse tasks involved.

Today, it's possible for almost all of the drudgery work to be handled by automation. Tracking, recording satellite feeds, logging material into the system's database, time-shifting, router switcher control, as well as standard program, spot and promo playback can all be handled by automation. Your operators should monitor your automation, not be stuffing tapes into it. ■

Ken Freed is a technical writer specializing in cable and interactive television, and is based in Denver.

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SYSTEMS INTEGRATION

New directions in studio lighting

Is it time to replace your studio lighting system?

By Peter Bryenton

THE BOTTOM LINE:
The advantages of tungsten light are numerous, but efficiency and cost-effectiveness are not high among them. New lighting systems based on more efficient fluorescent technologies are making inroads, as the quality of their light moves closer to traditional tungsten bulbs, and users become more familiar with their applications. $

Television is one of several color reproduction systems invented by people for people, so it isn't surprising that it needs much the same kind of illumination as the human eye. Therefore, because visible light energy includes wavelengths from roughly 400nm to 700nm, this is just the right stuff for broadcast-quality cameras, as well. Their light-sensitive chips have an inherent infrared response, but built-in optical filtering blocks this. (Consumer camcorders are unfiltered, however, as you will see if you use one to look at the emitting end of a hand-held infrared remote-control unit when it is transmitting.)

Figure 1 shows the output of a typical three-chip broadcast studio camera. It analyzes colors using overlapping bands of red, green and blue light. Ideal light would have a spectral content matching

Photo: This four-person news desk at KOIN-TV, Portland, OR, is lighted with SRGB products from Videssence.

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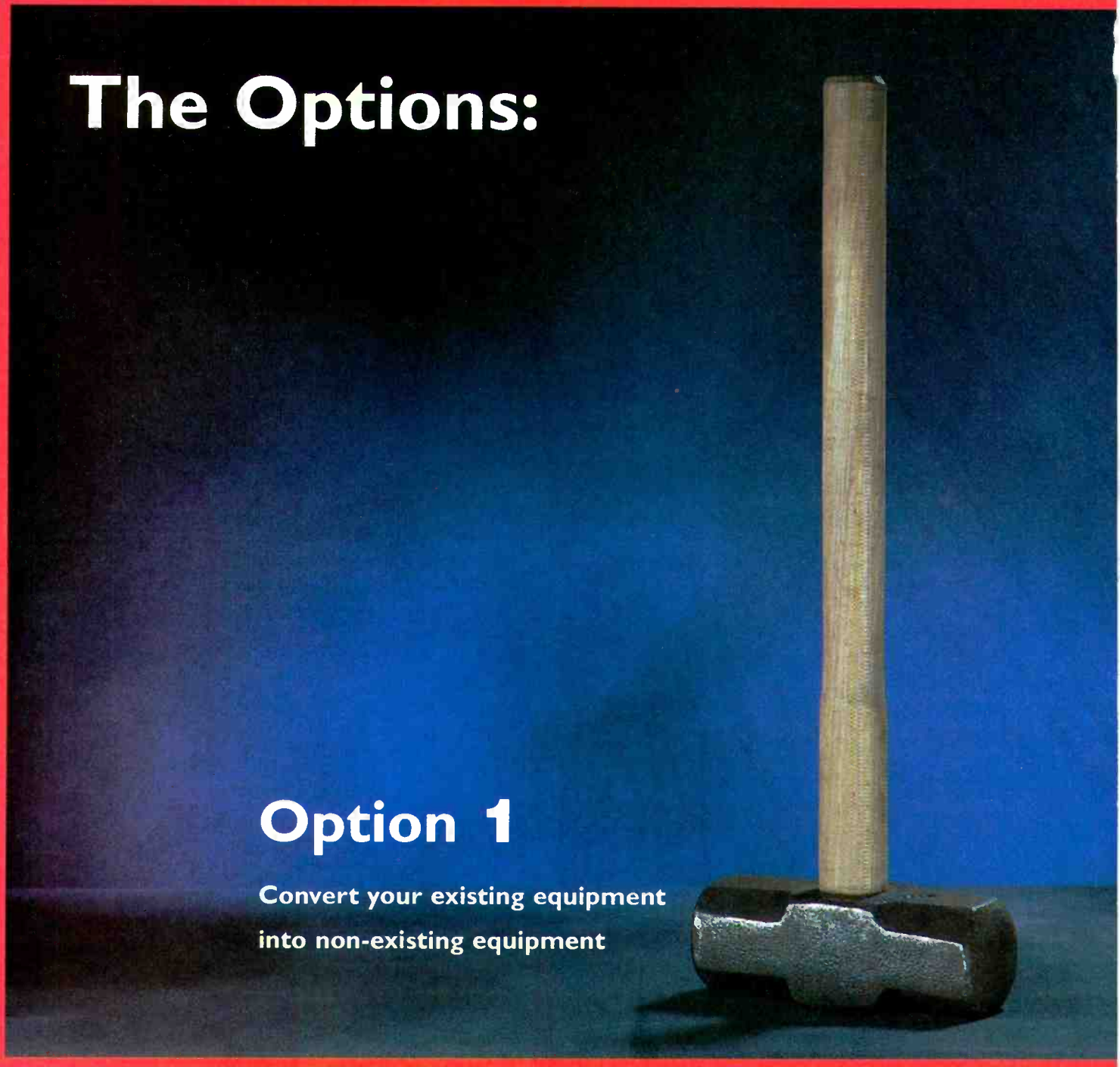
The Good News: The US HDTV

The Not So Good News: Your



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New directions in studio lighting

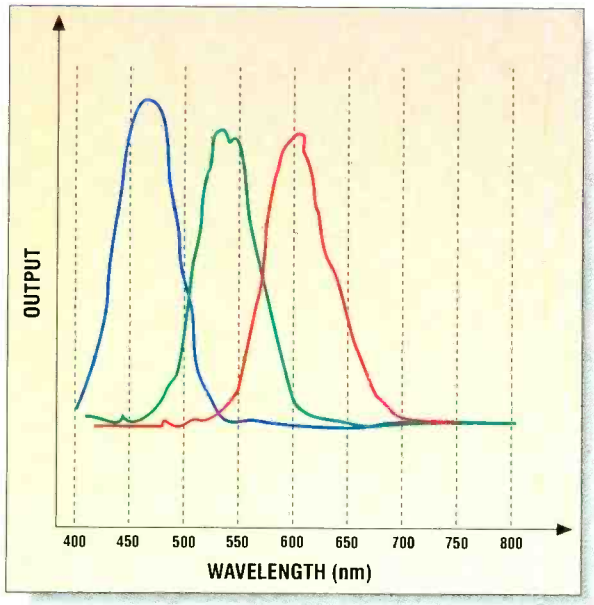

Figure 1. A typical camera's spectral response. (Source: BBC.)

these curves.

Color

One way to measure the performance of lighting for any color-imaging system is to define the fidelity with which colors in the original scene are reproduced. A system has been devised: the color *rendering index*, with units (Ra) ranging from 0 to 100. Tungsten lamps mimic the sun's radiant energy and so have the maximum rating of 100Ra. Broadcasters generally accept anything over 70Ra as adequate.

Tungsten lamps remain the most common studio light source. The graph in Figure 2 shows they are weakest in their blue output, increasing through green to red. They aren't terribly efficient either: little light out for power in. Most of the electricity making the bulb filament glow actually produces heat, which is radiated as infrared energy. With cameras deliberately blinded to that energy, the situation is wasteful, and made further so because the unwanted heat must be removed by air-conditioning systems, which in turn consume even more power. An additional expense to broadcast facility construction is added by the difficulty in getting these big air conditioners to work quietly for sound-recording purposes.

Containing errant light

Fresnel spots offer easy beam control with their lenses and barn doors. Naked, they are a cruel thing to shine onto a face, however. Used carelessly, they can appear to age the talent. Softer light is needed for flattering portraiture. Unfortunately, the untamed soft stuff escaping from man-made lighting units tends to go everywhere. Unchecked, it can flatten a scene, lifting shadows to the point where modeling is weak, contrast is lowered and colors become desaturated.

Lamp head design can help. Adding louvers or deep baffles to a soft light

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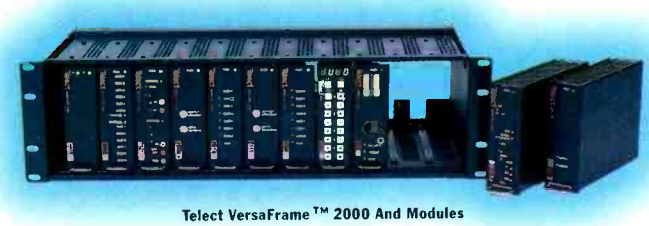

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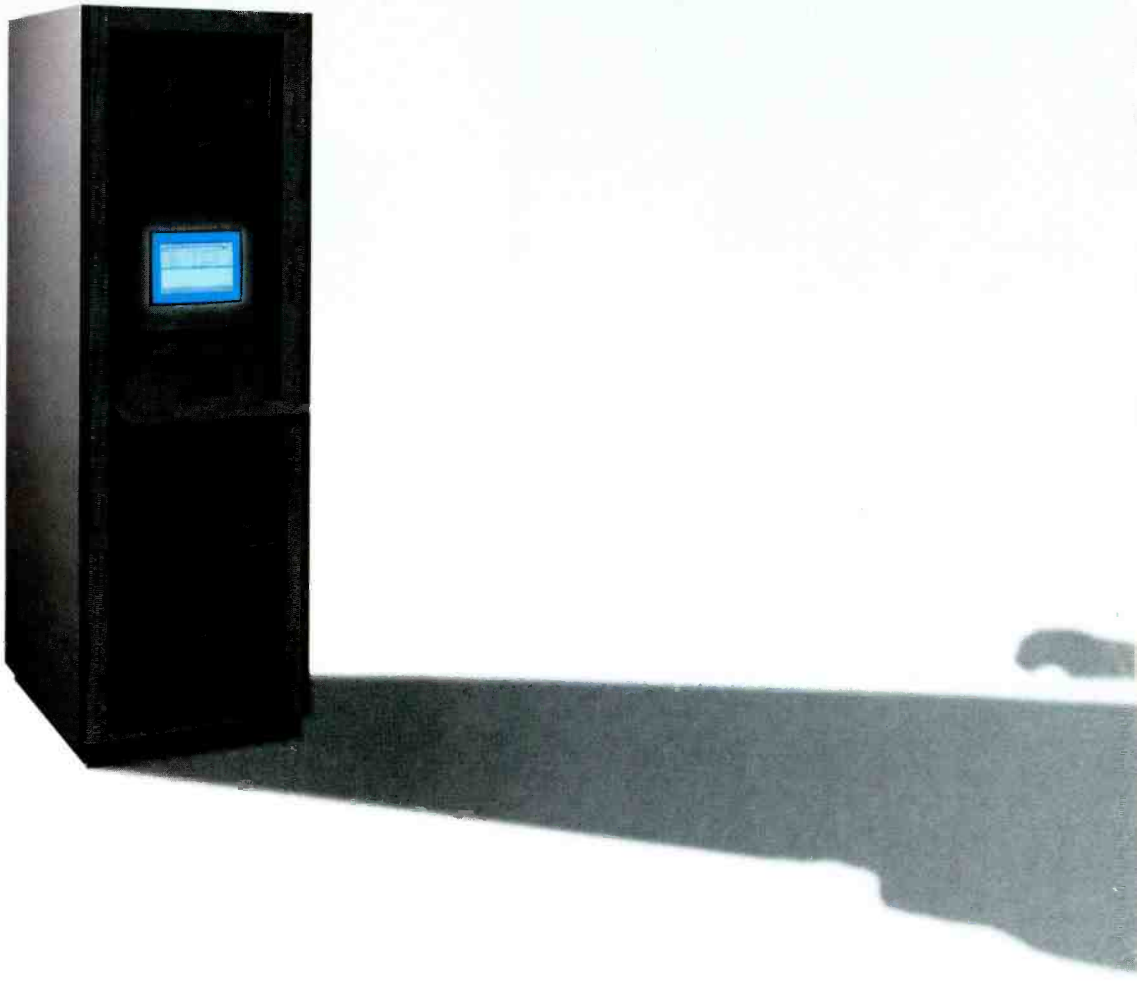

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Let me introduce myself.

My award-winning creators at Odetics Broadcast set out to build a practical solution to a monumental problem. This problem has the potential to overwhelm those who are not prepared for it.

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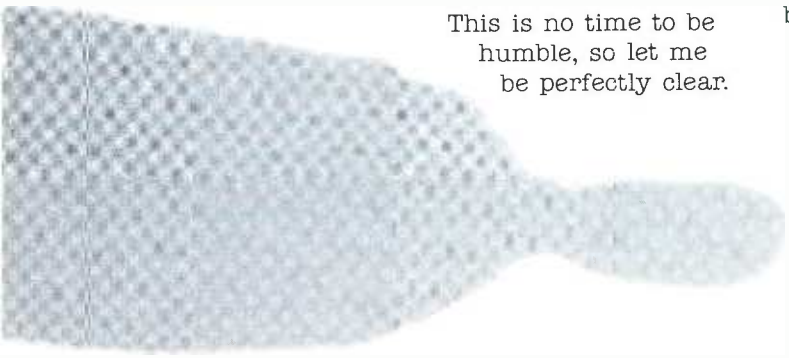

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New directions in studio lighting

restricts the beam width and shape, thus limiting the amount of unwanted light released in the studio.

Lighting isn't everything

Successful video images take more than just good lighting. The set designer can also make a positive contribution. Separating vertical planes by putting plenty of distance between surfaces allows space for light to fall off naturally. This opens the possibility of differential exposure between foreground and background planes.

Introducing color as an integral part of the overall design helps to maintain saturation. Textures, absorbent and reflective surfaces all add interest. The lighting director completes the picture, enhancing the illusion of three

> Tungsten is still essential for large-area coverage where clean shadows thrown from afar are needed.

dimensions with light and shade in appropriate quantity, quality and direction. The most interesting set will look flat and boring if lit only with frontal soft light. Whatever the light source, if it's in the wrong place, everything becomes two-dimensional.

The cost of tungsten

In today's energy-conscious culture, tungsten is greedy, not green. Accountants are looking to reduce running costs in simple, contemporary studio setups located in modest buildings. In addition to the inefficiency and high infrared heating problems noted earlier, bulb life is also a concern. A good tungsten bulb only lasts about 250 hours.

Furthermore, consider that a large chunk of the capital investment required for a new studio is to support

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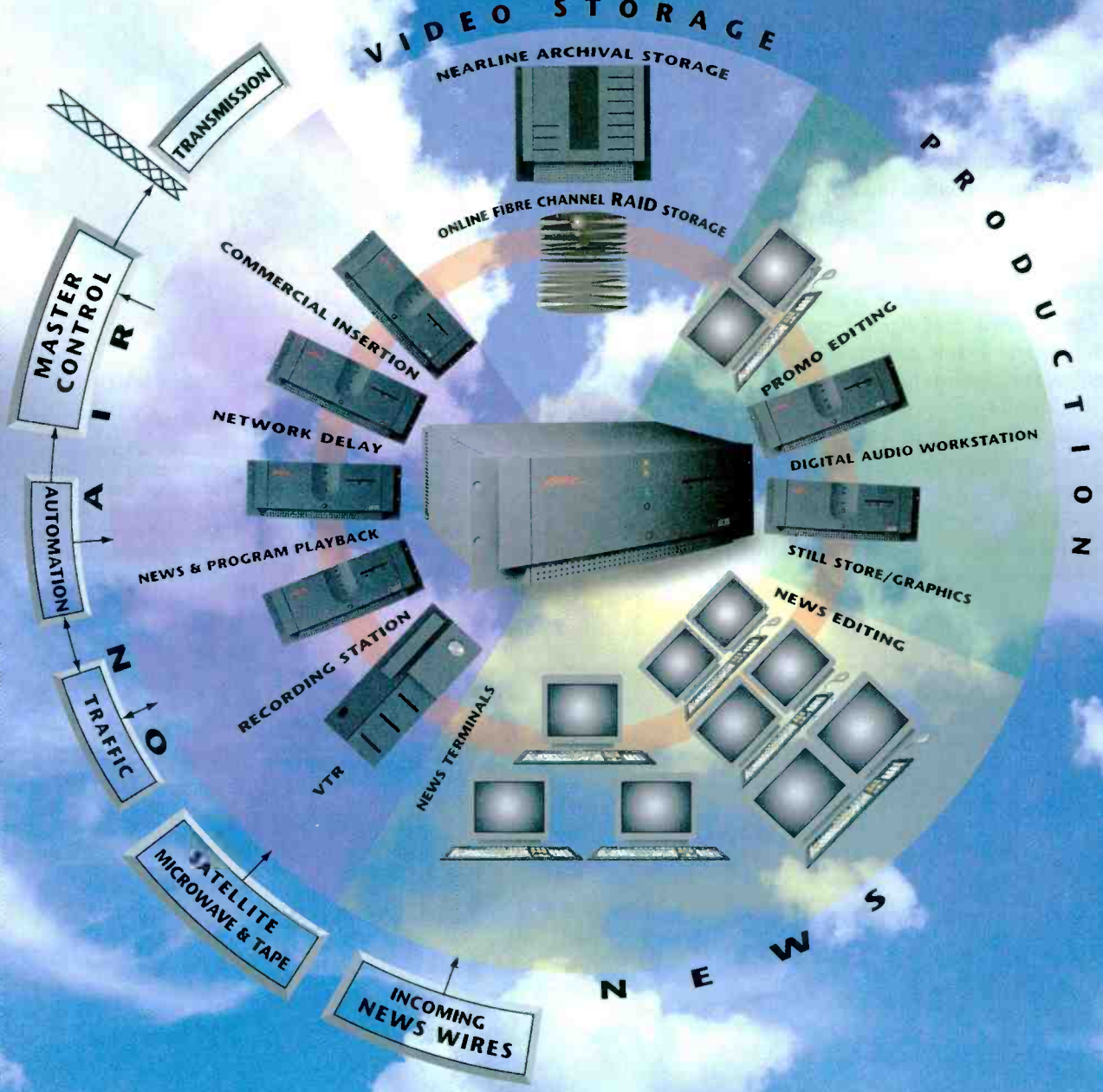

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New directions in studio lighting

the overhead lighting suspension system. Structural walls and floors are built on foundations of cash.

The tungsten studio lamp has long been the standard for TV productions. While advances in TV technology have happened at an astonishing rate recently, the basic design of the Fresnel spot lamp has changed little in 60 years. Small wonder then that some have started looking at alternatives for the new millennium.

Fluorescent studio lighting

Often called *cold lights* because of their relatively low operating temperatures, fluorescents have been around since the 1940s. Commonly, a low-pressure mercury vapor tube produces mostly ultraviolet light. A coating of phosphors on the inside walls of the glass envelope reacts to this ultraviolet energy by emitting visible light: *fluorescence.*

In the cold-light tube, some of the energy transfer incurs a slight delay, introducing an afterglow: *phosphorescence.* Modern tubes have an efficacy of at least three times that of tungsten, generating upward of 75 lumens per watt. The right mix of three phosphors makes visible light in the broad bands of red, green and blue.

The light output of fluorescents is neither continuous in time nor constant in level. Fluorescents flicker at main frequencies, which may be noticeable in our more motion-sensitive peripheral vision. A camera scanning at a different frequency may strobe. If the lamps run at high frequencies relative to

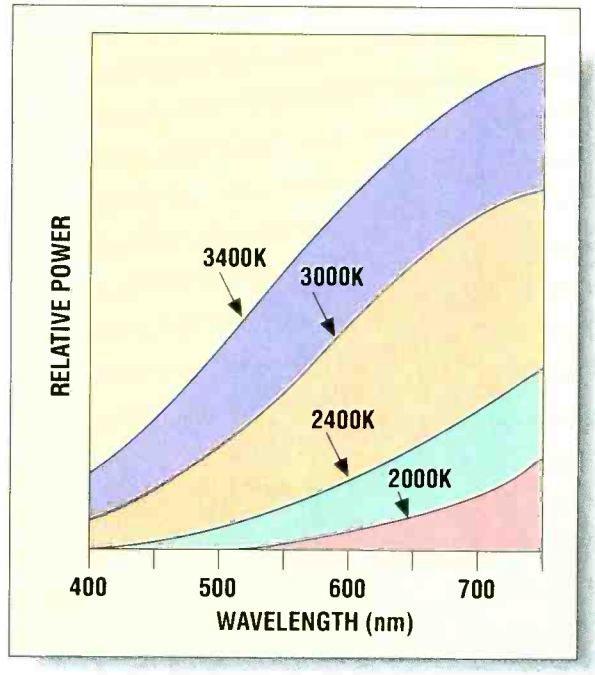

Figure 2. The spectral power distribution curves of tungsten lamps at four different color temperatures. The efficacy of the lamp increases at higher color temperatures because more visible light and less infrared light is emitted for a given wattage. Typical efficacies for tungsten filament lamps would be about 25 lumens/watt at 3,200K with a color rendering index of 100Ra. (Source: "The Reproduction of Color," by R.W.G. Hunt.)

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New directions in studio lighting

the camera scanning rate, they will appear flicker-free, however.

The combination of an appropriate phosphor color balance and high flicker frequency has led to the development of successful broadcast lighting systems using fluorescent technology. This approach is generally referred to as *sustained RGB* (SRGB), and is most notably associated with the lighting manufacturer Videssence, which has pioneered much of the development in this area.

Videssence's light fixtures use what the manufacturer calls *tri-phosphor* tubes. There are two color-balanced versions offered: daylight and tungsten, so mixing these units with other forms of lighting is not a problem. Using the color-rendering index, Videssence bulbs have been measured at 87Ra. SRGB lighting can also be fitted with the light control fixtures mentioned earlier, to keep errant light under management.

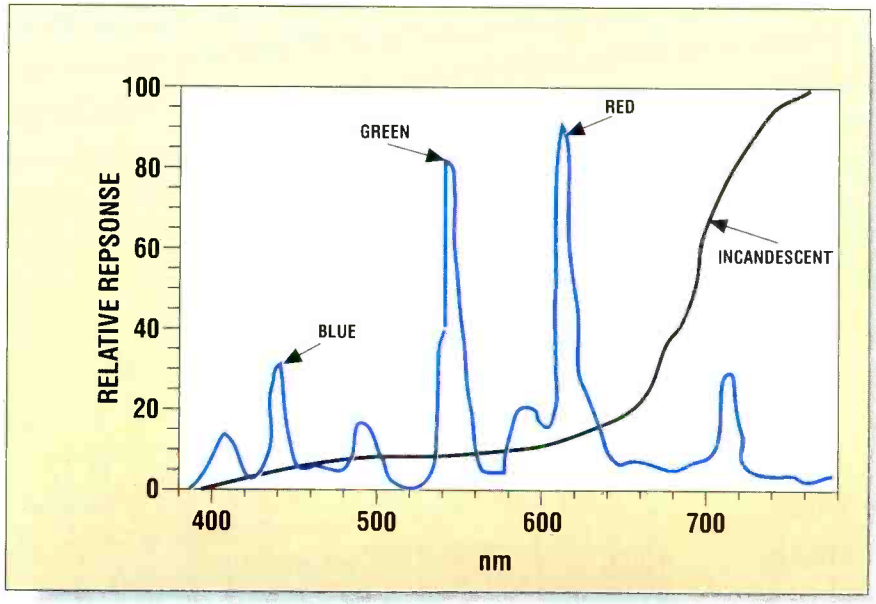

Figure 3. Exemplifying the emission of today's fluorescent studio lighting is this spectral plot from a Videssence SRGB 3000K lamp.

SRGB lighting is also attractive because its tubes have long life spans. The ones used by Videssence are rated at 10,000 hours, about 40x that of the typical tungsten bulb.

Controlling fluorescents

The basis of dimming fluorescent lights electronically has been known for a long time, but it's only recently been possible to make the controllers small, low-cost and reliable enough to

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New directions in studio lighting

be practical. This allows dimming at constant color temperature over a wide range of brightnesses.

When a tungsten lamp is dimmed conventionally, it changes its color significantly. Faded between 25% and 100% of its output, changes of +/- 150K are experienced. This is noticeable on pictures, but can be recovered by altering the color balance of the camera channel using the red, green and blue "paint pots." Such remedial requirements can be reduced significantly with constant color-temperature dimming systems. Dynamic (real-time) color correction is still desirable in order to accommodate changes in optical flare as cameras move or change lens angle, however, regardless of the type of source illumination.

Using SRGB products

Makers of SRGB lighting provide a wide variety of lamp heads. The larger ones are designed for studio rigs and the smaller designs for location use, though a flexible working philosophy that views any lamp as a light source shouldn't restrict the way they are used.

For more unusual situations, there are a range of modular units that can be assembled as required, making conferencing, tabletop product shots and animation work less cumbersome. (Plasticine models won't be as warm and pliable as they used to be, but at least the dinosaurs won't droop from the heat in the desert scenes.)

Some users have complained that SRGB makes a set look flat and two-dimensional. However, the technology has become quite popular with talent who appreciate the cool working conditions it provides. Studio owners and their accountants are also convinced of its value in reducing the costs of facility construction and operation.

Application-based solutions

So is tungsten dead? No! A big, powerful tungsten lamp is still essential for large-area coverage where a single set of clean shadows thrown from afar is needed. Studio dramas involving sunshine or moonlight are done that way. Entertainment shows with live audiences (where the action may need to be lit from behind a large seating area) sometimes need long throws and high output levels. So, tungsten isn't dead — it's just not dead center stage these days. It has taken a more mature and balanced place in the field of contenders for creative lighting. Relatively new technology like SRGB lamps have earned their rightful place, too. Lighting designers must use what is appropriate in order to produce elegant solutions to modern video lighting challenges. ■

Peter Bryenton is a lecturer at the BBC's Centre for Broadcast Skills.

FOR MORE information

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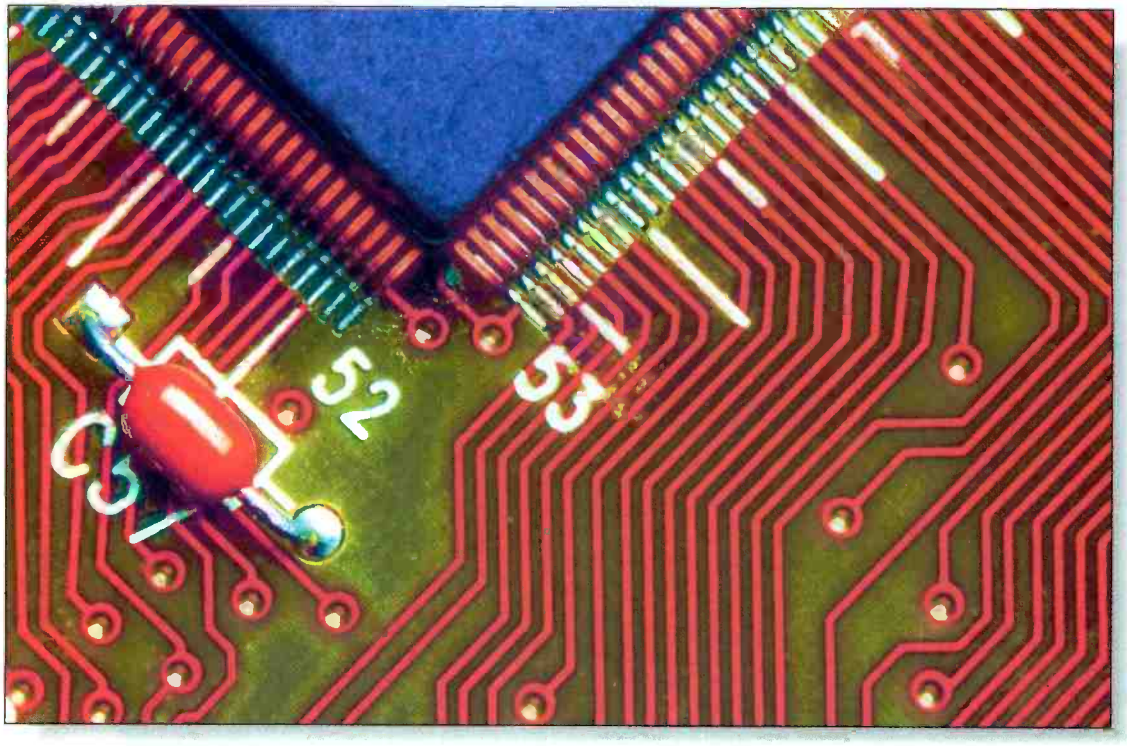

Understanding digital telecom services

Digital technology is affecting significant change in the wired telecommunications world.

By Ken Freed

THE BOTTOM LINE:
For acquisition, production or distribution, television has long used telecommunication lines. New technologies have vastly changed this landscape, however, and broadcasters need to have at least a basic understanding of what kinds of services are available today or emerging for the near future. $

Broadcast content often contains video and audio that at some point was carried by telephone networks. This technological partnership between broadcasting and "telco" has existed since the earliest days of wireless, but changes always seem to take place faster in the telecom world than in broadcasting. This challenges broadcasters to keep up with what telcos are up to, and lately, there's been plenty of movement afoot.

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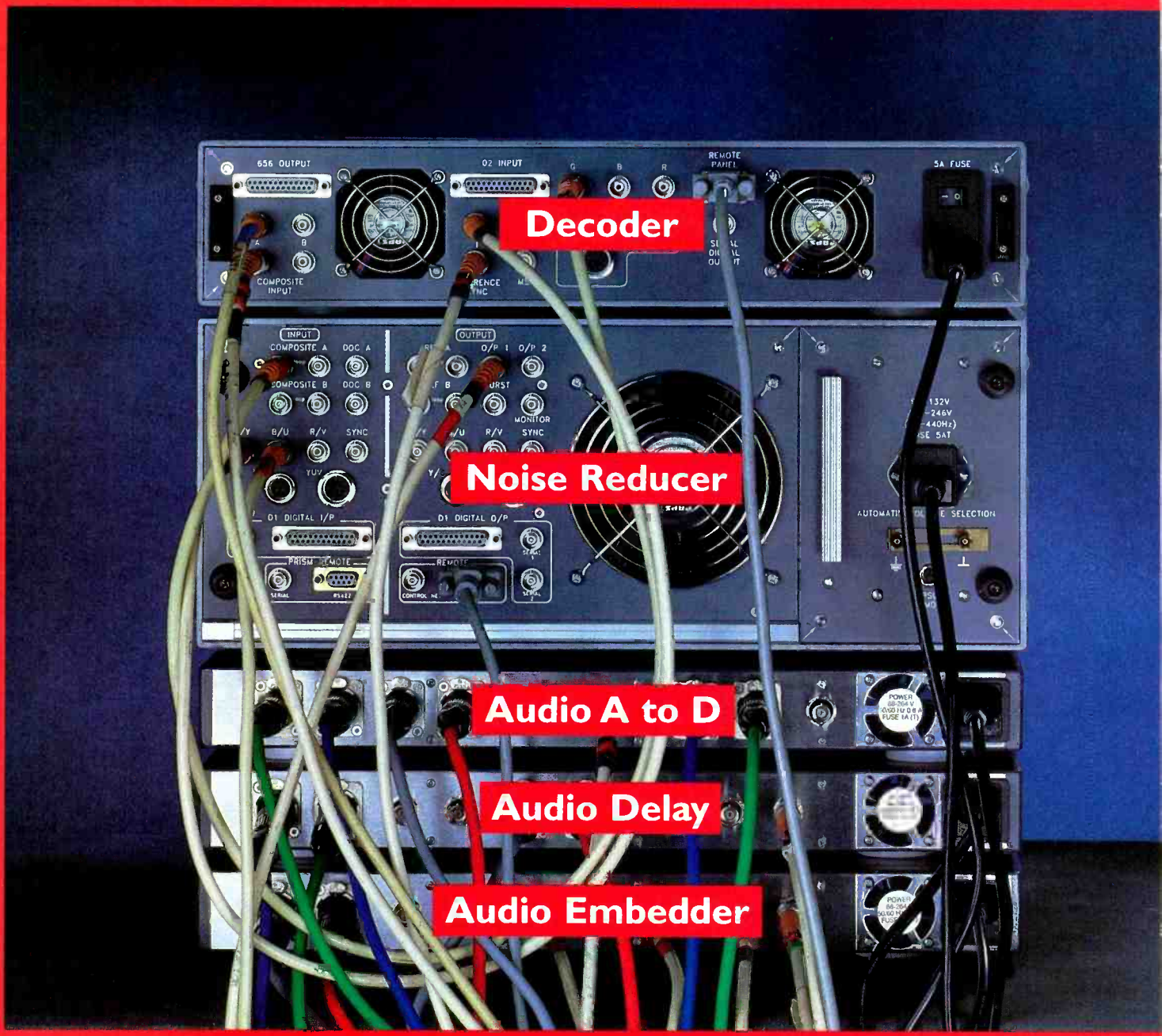

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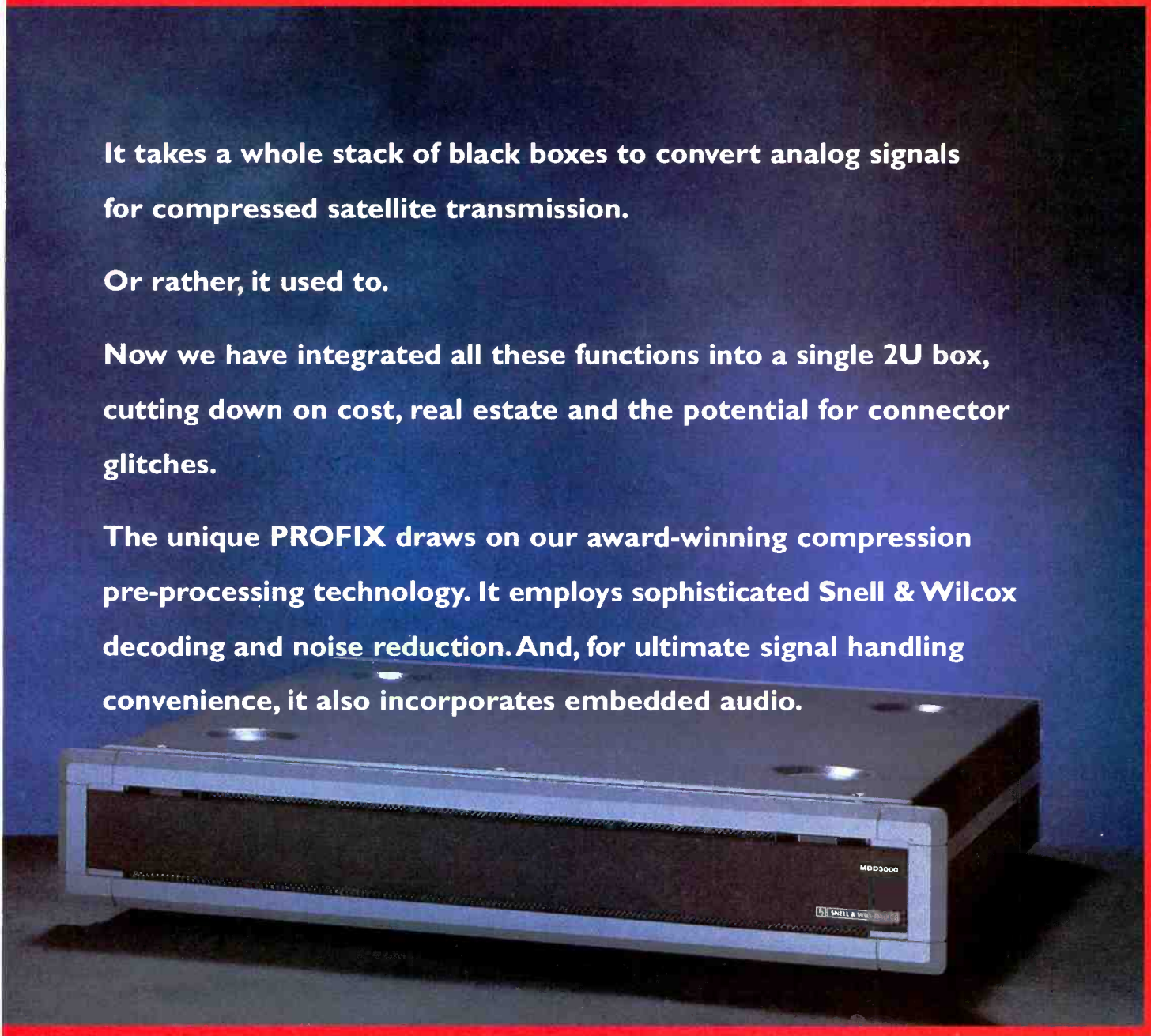

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Understanding digital telecom services

handset over "plain old telephone service" (POTS) lines to the *central office* (CO) of the local exchange carrier. From there, calls directed beyond that CO are digitally encoded, switched and multiplexed with other calls for transmission on copper or fiber backbones to destinations where other COs decode the signal and switch it to another analog telephone.

That may work fine for voice calls, but broadcasters undertaking digital operations are increasingly reliant on upgraded telecom facilities that provide sorely needed wide bandwidth. Digital telecom services support higher data rates than analog can deliver, which equates to higher-quality signals.

Transmission-line principles still apply, and in the digital world this means that the shorter the telco line, the faster the *bit rate* it can handle. Engineers can benefit from understanding the kinds of digital telecom services available, the methods of gaining access to them and how to apply them to broadcast operations.

DS1 and DS3

A place to start is with understanding the four major classes of digital telco lines: DS1, DS3 and two forms of Integrated Services Digital Network (ISDN), each involving paid carriage over multiple twisted pairs. (DS1 and DS3 are also known as T1 and T3, but in the strictest telco definition, this terminology only applies to the copper implementation of service networks at these data rates.) The line classes vary by bandwidth capacity. (See Table 1.) As benchmarks, keep in mind that uncompressed serial component digital video needs about 240Mb/s, yet an MPEG-2 datastream requires a pipeline of 3Mb/s to 30Mb/s, depending on the amount of compression applied.

CLASSES OF DIGITAL TELECOMSERVICES	BITRATE	MONTHLY RATES	APPLICATIONS
BASIC ISDN (2B+D)	128kb/s	$25 - $100	DESKTOP VIDEO TELECONFERENCING (15 fps) QUICKTIME AND AVI ISDN MODEMS MOTION-JPEG
PRIMARY ISDN (23B+D)	1.288 - 1.472Mb/s	$600 - $1,200	HIGH-END VIDEO TELECONFERENCING (30 fps) ISDN MODEMS MOTION-JPEG MPEG-1
DS1 (T1)	1.536Mb/s	$400 - $1,000	"APPROVAL QUALITY" VIDEO LOW-SPEED CABLE MODEMS MOTION-JPEG MPEG-1 MPEG-2 ON MULTIPLE T1
DS3 (T3)	44.736Mb/s	$2,000 - $10,000	"BROADCAST QUALITY" & COMPRESSED NTSC HIGH-SPEED CABLE MODEMS MOTION-JPEG MPEG-1 MPEG-2 D1 ON BUNDLED DS3

Table 1. The four digital telecom services most widely used by today's broadcasters.

In telco parlance, a line able to handle one digital signal is labeled a Digital Service zero (DS0). The voice-grade audio carried on a DS0 is sampled at 8kHz, with eight-bit PCM resolution. Each DS0 produces a 64kb/s data rate. When 24 DS0s are multiplexed into one signal, the result is a DS1, with its effective data rate of 1.536Mb/s. (An additional 8kb/s of sync data brings the actual DS1 throughput to 1.544Mb/s.)

Further multiplexing allows higher bandwidths to be carried on fewer cables. These include DS2, which combines four T1 channels for a throughput of 6.3Mb/s; DS3, which provides 28 DS1s for a data rate of 45Mb/s; and DS4, which offers 168 DS1 channels for a total data rate of 274Mb/s. The most common services used by the TV industry are DS1 and DS3 lines, which are available in and between larger cities.

DS1 can deliver at least "approval quality" video. The service supports cable modems, low-end Motion-JPEG and MPEG-1. DS1 offers variable, non-real-time video acquisition, production and post applications, including digital effects systems when bundled. Multiple T1 lines can handle low-end MPEG-2.

The distribution of a single wideband data signal over multiple data circuits is the opposite of what telco does with voice-grade circuits on such digital links. Instead of bundling separate signals into one datastream, a single high-speed datastream is spread across several digital circuits. Such a process is called *inverse multiplexing* (IMUX).

A DS3 line can handle 44.736Mb/s, sufficient bandwidth for real-time and non-real-time acquisition, production and broadcast of compressed NTSC for full-motion video at 30fps. DS3 can also handle one or two MPEG-2 channels with room for additional data overhead.

IMUXed DS3s can handle transport of digital video recordings in formats like D-1, as used by the film industry, TV network production, satellite broadcast centers, cable and wireless head-ends and testing of telcos' *Open Video Systems*.

At the other extreme, there are still numerous installations of *Switched-56* service. Switched-56 can stream low-end video like QuickTime and AVI for computer applications.

ISDN

Besides DS1 and DS3 lines, the most ubiquitous digital telecom service is ISDN. Deployed as an eventual replacement for POTS, ISDN has two classes:

1. ISDN's *Basic Rate Interface* (BRI), for domestic consumer use, includes two 64kb/s "B" (*bearer*) channels for content, plus one 16kb/s "D" (*Delta* or *Data*) channel for address signaling and other call-direction data. Designated "2B+D," ISDN BRI operating in IMUXed fashion at 128kb/s is suitable for desktop video applications. The BRI also supports non-real-time Motion-JPEG for TV production and post-production.

2. Intended for business customers, *Primary Rate Interface* (PRI) ISDN provides 23 "B" channels of 64kb/s each, plus one 64kb/s "D" channel. ISDN PRI can handle IMUXed bit rates up to 1.47Mb/s, and can provide high-end "viewphone" services at 30fps or real-time M-JPEG for production and post, as well as MPEG-1 for multimedia production.

Responding to demands by PC users for faster Internet access, most local telcos offer ISDN lines. ISDN is a switched service, meaning that it can be

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Understanding digital telecom services

"dialed-up" and connected to any other location on the worldwide ISDN network if compatible equipment exists at both ends whenever a circuit is required. Point-to-multipoint bridging can be established with ISDN, as well. DS circuits, on the other hand, are fixed, permanent lines between two dedicated locations, similar to telco's traditional analog program loops.

Digital telecom services appear affordable. ISDN BRI service runs from $25 to $100 per month. Primary-rate ISDN may range from $600 to $1,200 per month or more. DS1 (T1) lines go for $400 to $1,000 per month. Monthly DS3 service starts at $2,000 and goes up to $10,000.

Before you pencil a budget, add to your calculations the per-minute charges for some ISDN services on top of the monthly rate. If any long-distance ISDN transport is used, the LD carrier's charges are incurred atop any local carriage costs. The biggest hit can come from installation charges, depending on location.

Digital subscriber lines

Like ISDN, *digital subscriber lines* use the existing POTS wiring network. Various forms of digital subscriber lines (xDSL) include *asymmetric* (ADSL), *single* (SDLS), *high data-rate* (HDSL) and *very high data-rate* (VDSL). DSL's biggest hurdle is the high cost of terminal hardware, which becomes a problem when telcos consider the deployment of thousands of set-top boxes.

Of available digital subscriber lines, ADSL seems the best-suited for video applications because most of the bandwidth is devoted to the "downstream" traffic. ADSL offers just enough upstream bandwidth for sending instructions on what to send downstream. ADSL downstream capacity yields at least VHS-quality video at 30fps, which may be deemed approval quality for some production and post applications.

VDSL, while still a young technology, may rapidly grow up to handle MPEG-2 for HDTV.

An ADSL circuit on a twisted pair uses frequency division multiplexing and echo cancellation to create three asymmetric channels for downstream, upstream and POTS traffic. The downstream channel handles 1.5Mb/s for circuits up to 18,000 feet. On shorter distances, ADSL can carry up to 6.1Mb/s on paths of 9,00 to 12,000 feet. Most recently, ADSL service has upgraded to 9Mb/s downstream. The upstream duplex channel handles 16kb/s to 640kb/s over the same distances, with shorter circuits yielding faster carriage. ADSL circuits also include one 64kb/s POTS channel.

As telco infrastructure matures, ADSL modems will accommodate ATM transport for MPEG-2. Applications then may expand beyond Internet access to include interactive multimedia, video-on demand, interactive games, electronic commerce, and other services.

As DSL matures, expect broadcast

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applications to increase. For instance, VDSL7 at 13Mb/s to 52Mb/s can transport NTSC and HDTV. For local stations wanting to offer wide-screen digital television, the use of existing copper networks to homes might help lower implementation costs. VDSL circuits then could be modified for asymmetric upstream traffic, which would support interactive HDTV.

Fiber services

Where operating budgets allow, the best video transport choice is an optical fiber line. High-bandwidth fiber-optic paths provide unsurpassed signal integrity and video resolution.

A widely adopted, open standard for fiber network operation is called *Synchronous Optical NETwork* (SONET). SONET permits compliant devices from competing manufacturers to communicate. Users of one encoder, for instance, need not worry about optical "mid-span meet" mishaps when the signal reaches another vendor's lightwave decoder at the other end of the line. Standardizing the optical signal's characteristics allows SONET to support "multivendor interworking."

One SONET synchronous transport signal (STS-1, or its optical equivalent, OC-1) has a rate of 51.48Mb/s. SONET, therefore, begins at about 5Mb/s faster than DS3, and at roughly the same speed as today's best VDSL performance. A compressed HDTV signal needs about 50Mb/s, so each OC-1 channel has the capacity for one "ATV channel." Higher multiples of OC service increase the available bit rate. Imagine multichannel service to the consumer on OC-3 at 155Mb/s.

Here's where synchronicity enters the scene. Telecommunications companies often lay fiber in anticipation of demand. Sometimes, unused fiber exists between where you are and where you need your signal to be. Any unlit optical link is called a "dark fiber," and dark fiber produces no revenues. Telcos and other telecom service providers with dark fiber may be willing to make deals to light up their lines.

Completing the circuit

For applications where lower speeds suffice, Basic- and Primary-rate ISDN can work wonders for multimedia and even low-end TV production. DS1 and DS3 can do the job when digital signal acquisition, production and distribution demands higher bandwidths between fixed locations. For future HDTV TV applications, VDSL may serve where bundled DS3 and DS4 have not yet been supplanted by fiber.

Meanwhile, strands of optical fiber increasingly are available to meet the TV industry's existing and anticipated demands for digital telecom services. As fiber interlinks our facilities, more broadcasters will begin to see the light. ■

Ken Freed is a technical writer specializing in cable and interactive television, and is based in Denver.

Acknowledgment: Thanks to EDnet, Inc. and the ADSL Forum for help with data used in the table included in this article.

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SYSTEMS INTEGRATION

Remote truck audio

Don't forget the audio when building a remote vehicle.

By Peter A. Douglas

THE BOTTOM LINE:
A recently completed production truck intended primarily for entertainment events includes some unique aspects in its audio design. This case study reveals the thinking behind the design and how it was implemented. $

It was a cold day in December 1985 when I temporarily inherited responsibility for my station's two remote trucks — "just until we can hire someone full-time" (which had a ring of "the check is in the mail" to it). Although one unit was fairly modern and did not require much special understanding, the other was an older unit with about 10 different generations of wiring and equipment.

In an attempt to understand the audio flow of this unit, I made the mistake of disassembling some of the racks to see what was inside. I received quite an education from that process. After recovering from the shock of discovering cotton-insulated wire, I encountered the truck's unique DA system. The program audio distribution system DA consisted of an old 10W audio amp with quite literally a ball of resistors on the output, feeding various points in the remote truck unit that required program audio. (I later came to understand that this was not so unusual for the period.) I still remember that experience and other

Photo: The smaller of the NDTC truck's two audio mixers, generally used for music submixing.

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Remote truck audio

similar ones, and vowed that if I ever built a remote unit I would do it "right."

Fast forward

Eleven years later, I found myself in a planning meeting with my production manager at the National Digital Television Center (NDTC), working on designs for a remote unit. I still had visions of cotton-insulated wire, no DAs, intercoms that produced more feedback than communication, and lots and lots of hum. Here was my chance to do that remote vehicle "right," working with an experienced integration team from Shook Electronics USA.

It was to be a large remote unit, designed to specialize in entertainment events. The audio would be its crowning glory, with a system unlike any other remote unit on the road. This would help create some unique opportunities for the vehicle while solving some traditional audio problems in remote units.

Some of our requirements included enough inputs to handle live music in a TV environment, room for at least four operators, a place for modular digital multitrack (MDM) decks, quick setup of complex ISO situations, ability to split microphones into different mixers and interconnect to stage sound systems without audio degradation, enough processing to accommodate large musical events, a comprehensive patchbay and a large matrix-type intercom with 12 wireless channels.

The design called for a truck 51 feet long with a 40-foot-long expansion to the side and a smaller expansion to the rear. It would contain 14 dual aspect ratio cameras, 18 digital tape machines, two digital production switchers, three routing switchers, a full edit package, four channels of still-store, and enough audio to support musical awards shows, talk shows, concerts and the like.

The basic building blocks for the audio in this unit consisted of two Amek Recall mixers, two Mackie Designs sound reinforcement mixers, a Datatek 256x128 analog audio router, a Telecast fiber-optic transport and splitter system, and a large assortment of processing and storage devices.

With the rear expansion unit on the truck, we were able to produce an audio compartment nine feet wide and 15 feet deep. The physical configuration places one 56-input Amek mixer facing the front of the truck and looking through a window into the main production control room, plus a second 40-input Amek mixer facing the back of the truck. Processing and source machines are above each mixer and contained in a special cabinet to the left of the main mixer console. There are two racks of ancillary equipment and patching to the left of the second mixer. Between the two mixers there is eight feet of floor space.

The main audio mix position of the NDTC remote truck places processing gear, recorders and communications all within easy reach.

Operationally, one mixer can be used for the primary broadcast mix while the other is used for live music submix. The design also accommodates direct-out feeds to ADAT recording equipment without affecting the live broadcast mix. Another requirement was the ability to quickly set up complex ISO situations with up to 18 tape machines.

Audio operations

Each Amek mixer has the ability to take a "snapshot" of the configuration and settings on the mixer. This enables us to return quickly to preset conditions. The line-by-line automation is also handy when multiple rehearsals are required prior to performance. All of the direct outputs of the console appear as sources on the 256x128 router. This allows any tape machine to grab any direct input, as well as any mix bus output. Stereo line inputs on the main console are also connected to the router, both as direct-out sources and input destinations. Because the router has salvo capability, the entire setup of mixer and routing can be recalled with simple commands.

Effects sends and returns are all patchable. A 60-position Aphex rack frame contains the majority of the processing equipment, including 12 parametric EQs, 12 Expressors, 12 expander/gates, 12 aural exciters, four Compellors and four Dominator IIs. Other outboard processing includes two Lexicon 480L digital effects systems, four Drawmer M500 dynamic processors, two Dolby Cat 43 ambient room noise suppressers and two Roland SN550 digital noise suppressers. Patching and additional rack space can accommodate more processing equipment (there's never enough).

Recording and playback

To accommodate the varying needs of different events, we equipped the truck with a variety of storage devices. These include two Sony PCM7010 DAT recorders with full SMPTE time-code capability, one 360 Systems Digicart II (for storage of locally produced material and input of customer-supplied material), a 360 Systems Instant Replay (networked to the Digicart II), a Studer D731 CD player and Tascam 122 MKII audio cassette machine.

For cost-effectiveness and convenience, most of the truck's audio paths are analog, including feeds to and from recorders that offered AES3 (like the truck's Digital Betacam VTRs). With AES3, the two channels of each stereo pair are tied together and, although

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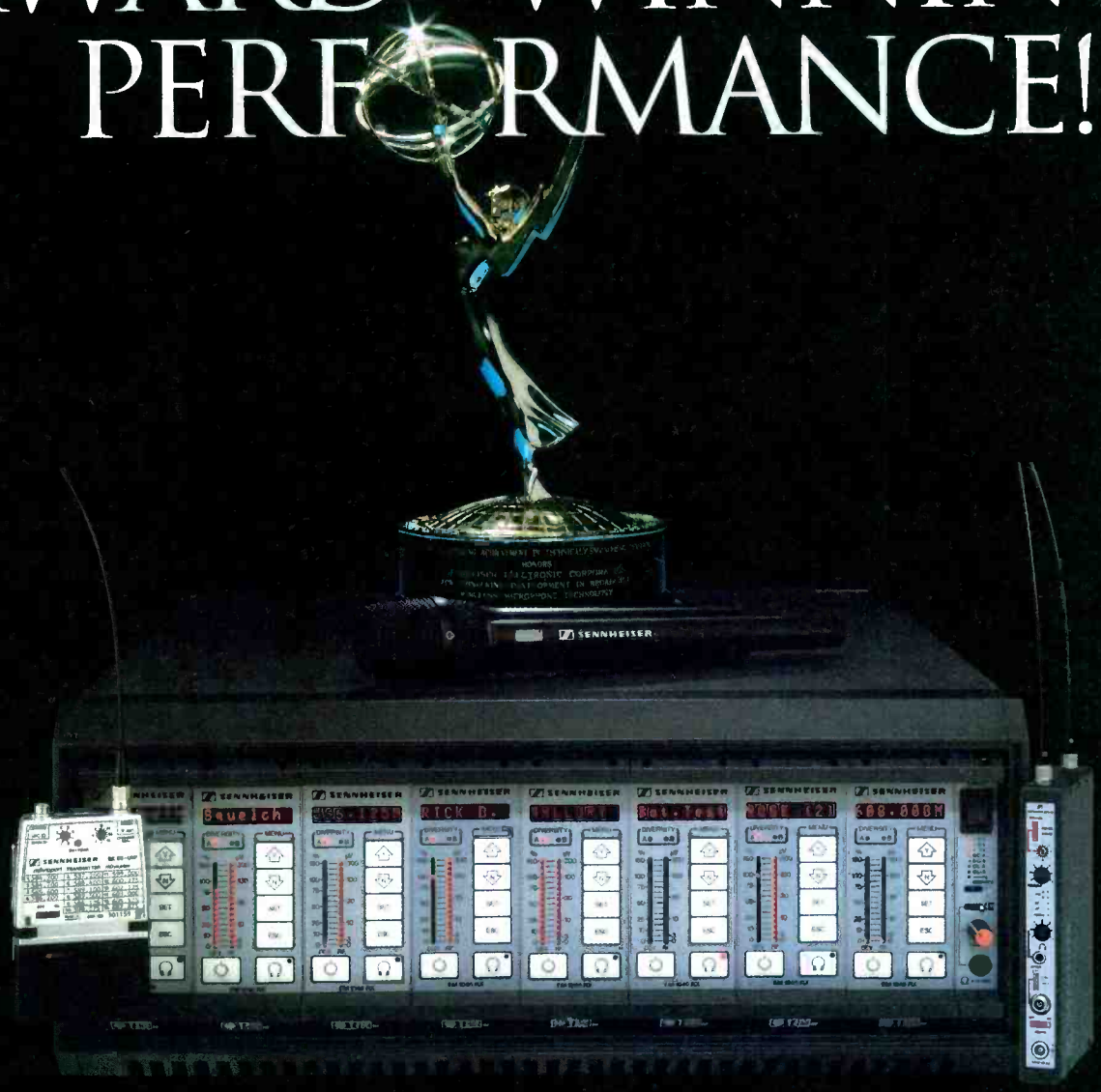

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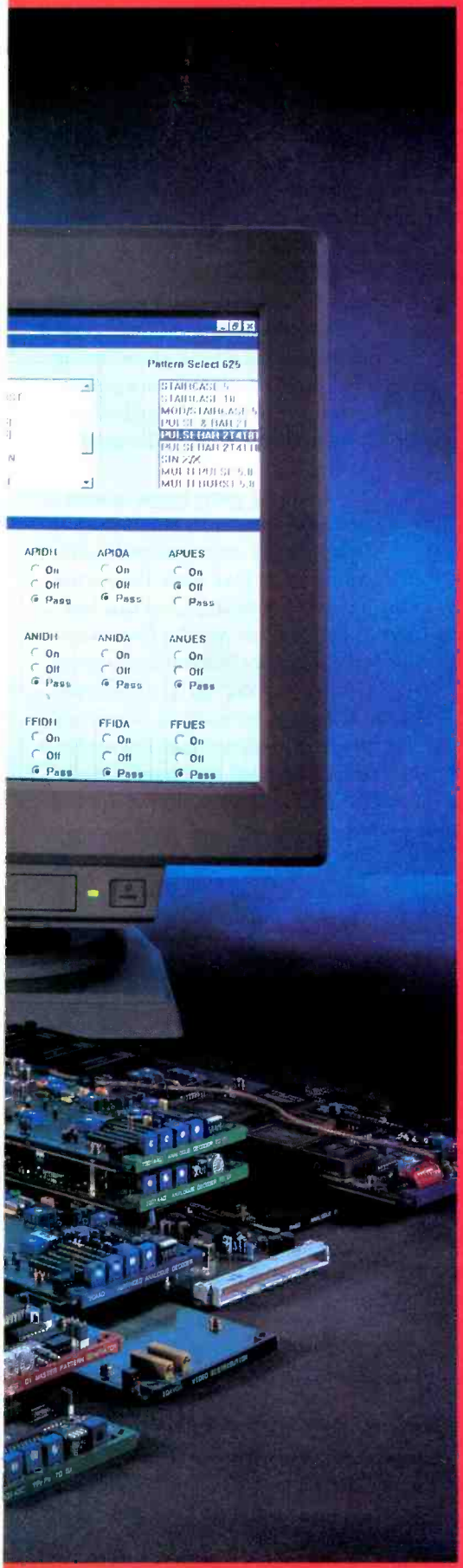

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Remote truck audio

possible, routing in this format can get a little tricky. The only exception to this is the use of AES3 outputs to feed a Graham-Patten DSAM 820 editing mixer. This gives us digital audio in post where it is more likely to suffer from multiple generation loss.

Microphones

The truck stocks a common assortment of Sennheiser MKH416, ME67 and ME66 shotgun mics along with the usual Shure SM58s, Electro-Voice 635As and Sony ECM77Bs. For most events that use this truck, someone from the production crew will specify mics. We rent anything else that the client needs.

For interconnection of mic signals between the stage and truck, we decided on a fiber-optic system made by Telecast, after evaluating its reliability and durability. The system has 1:1 backup on all power supplies, and we purchased enough fiber to run separate jackets for main and backup (even though the basic fiber contains two fibers in the same jacket). The fiber proved to be resistant to physical abuse and is field repairable.

The fiber system consists of six 48-input/output stage boxes and the fiber to interconnect them. Each box contains XLR connectors and redundant optronics and power supplies. Channels can be used for mic or line level, and can be operated in either direction. The main connection panel on the truck has multiple fiber jacks that connect to the truck's distribution system, where all circuits are routed through patch panels and normalled into mixer inputs. The truck carries 8,000 feet of fiber on board. One added bonus of the fiber system is the reduced weight of the fiber vs. traditional copper snakes.

> The truck has already received numerous compliments, and its audio is the most often-mentioned feature.

Entertainment events often require mic splitting. Typically in a large musical event, or even a talk show that includes a band, you will need to split mics between broadcast music mix, stage monitor mix and house (PA) mix. We designed this system with the help of Telecast to include a five-way passive optical splitter. This splitter allows us to run separate fibers to up to four locations at the event (in addition to the truck, which is the fifth port), with all mixers getting the same audio quality and level.

If a third-party house or monitor mix system is employed (as might be encountered with high-profile acts that have their own touring sound company), we can connect to their splitter via the fiber without any danger of electrical interaction — in other words, no ground-loop buzz. The large number of inputs on our system also allows multiple stages to be interconnected simultaneously in this fashion, for large multi-act shows.

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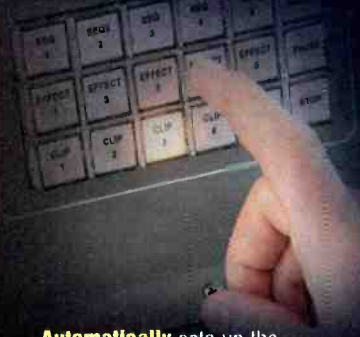

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Remote truck audio

Communications

The item most blessed, cursed and misrepresented in virtually all remote trucks is the key to the operation: the intercom. As with any remote truck project, the designers vowed that this time the intercom would be adequate for every project the unit will encounter. Unfortunately, intercoms are like closets — the more you have, the more you fill up.

Our best shot at intercom competency starts with a 96x96 RTS ADAM system. The beauty of modern digital matrix intercoms is that while the wiring is greatly simplified, the operation is incredibly flexible. All programming including sources, destinations and even labeling for the displays can be done off-line on a PC. If you are repeating events you can store the files and recall the configuration at will. Another added advantage is that any station or circuit can operate as either point-to-point or PL. We added four Clearcom-to-RTS interfaces to accommodate tie-in to stage PL systems.

Every position in the production area has at least one 16-button master intercom panel. Several locations, such as the director and AD positions, have *paired* 16-button panels to accommodate IFB control. The six tape operator positions have eight-button panels and the tape coordinator position has a 16-button panel. Both audio-mix positions have paired 16-button panels. The system also includes a 12-channel wireless PL system made by Vega.

The IFB is a 16-channel system fed by a router for greatest flexibility. IFB control is built into the normal intercom panels so that any intercom control position can have either full or limited IFB control. With the matrix system, camera ISO is not a problem.

Rounding out the communications package is not one but two 900MHz base stations and eight portable radios. Telephones in the truck consist of an AT&T 10-line system. There are four auto-answer Gentner telephone interfaces and eight Telos telephone interfaces installed in the audio room. The RTS is interfaced to the telephone system with a four-channel digital auto-nulling adapter.

Monitoring

Audio monitoring within the truck is expansive. The production area has the normal high-quality monitoring system featuring 200W Bryston amps feeding Tannoy monitor speakers. The production monitors are fed by a separate monitor strip on the main mix console.

The main production control room of the NDTC truck.

A second monitor strip on the main mix console feeds the monitors in the audio room. We use near-field Tannoy monitor speakers for both console positions. These monitors are fed by 100W Bryston amps.

Scattered throughout the truck, especially in production, audio and tape, are RTS switchable monitors. These monitors allow for custom setup and monitoring of virtually any audio in the truck. Each VTR has its own audio monitor panel from Wohler Technologies, which includes phase and level indicators.

Shore connections

The last step in the process is getting the audio out of the truck. This is done with a set of 10 Leitch ARG-880 remote gain line amps feeding the side panels of the truck. AES3 audio from the DSAM mixer is also available as a line feed. There are B&B Systems phase scopes located in both audio mix positions and the side panel connector area of the truck.

Noise-generating light dimmers and the transformers and stabilines are fully shielded and grounded. All construction uses punch blocks, bantam self-normalizing patch panels and a "star" grounding method.

The truck now has several gigs under its belt. We recently completed a three-day shoot for the Los Angeles Philharmonic where the audio system was used to its fullest extent, including a multitrack ADAT recording for an upcoming CD. The truck's other recent events include the Yanni world tour and Golden Eagle award show.

One last little feature is our use of remote-controlled CCD cameras as "audio spotters." After some success with this idea in studio projects, NDTC engineers reasoned that it would be even more helpful for remotes. The cameras allow the audio operator to set up a personalized view of what is happening on the set or stage, and thereby better predict microphone usage and ambient conditions during the show. This is useful on talk shows with live audiences and unscripted interviews.

The truck has already received numerous compliments, and its audio is the most often-mentioned feature. Certainly, it is one of the elements that sets this truck apart from most others. Of course, running a truck like this is always a challenge, but most of the challenges fall to the director. These include issues like "How do I use all four DVE channels?" or "How can I create a log jam of graphics even with a four-channel still-store?" and the "What? Only 14 cameras and 96 mic inputs!" crisis. But my favorite is the operator who asked, "Do you have any white tape to cover up all those annoying undermonitor LED tally displays, so I can write on them with my Sharpie?" ■

Peter Douglas is vice president at the National Digital Television Center, a division of TCI, in Denver.

Photos by Bud Shannon Photo, Inc.

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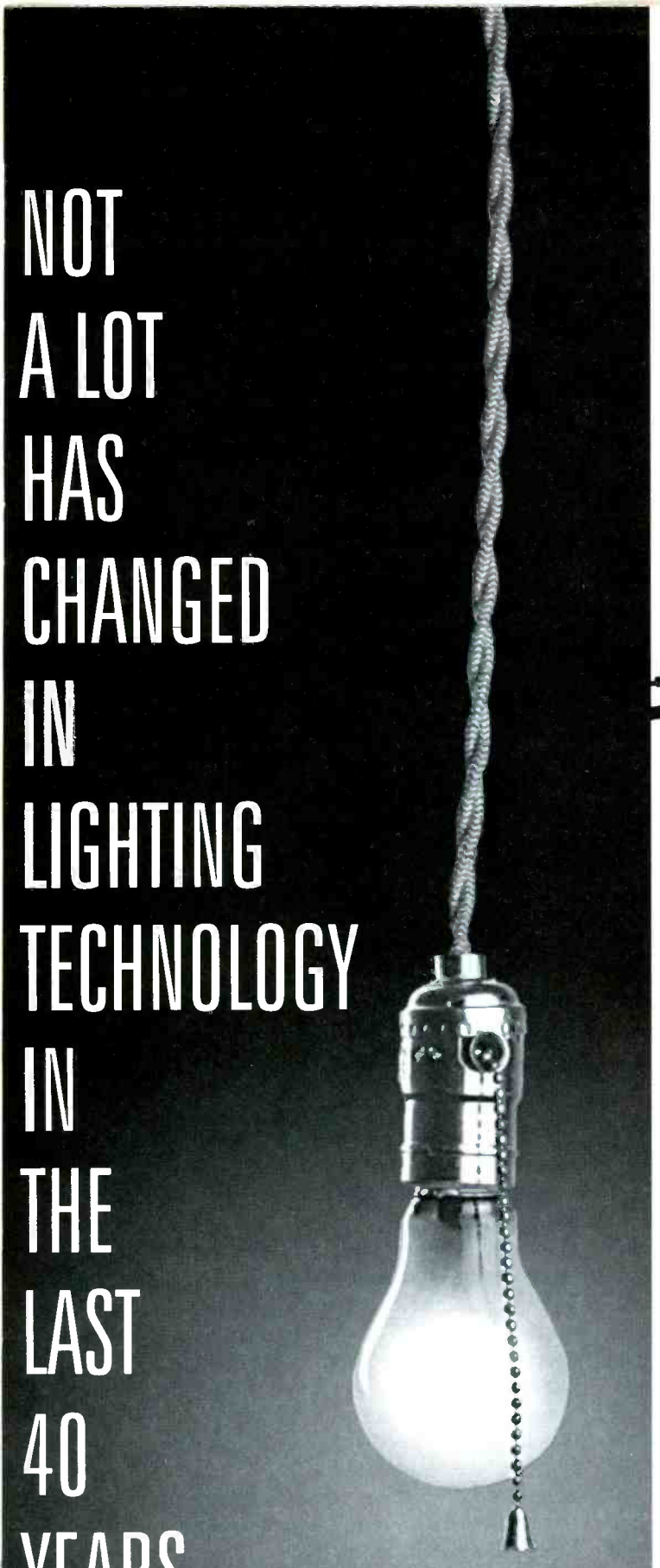

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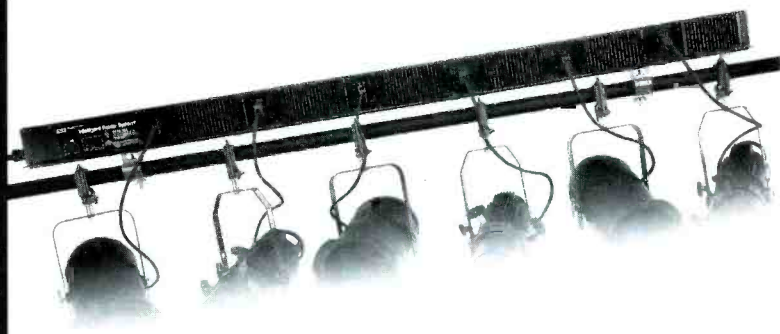

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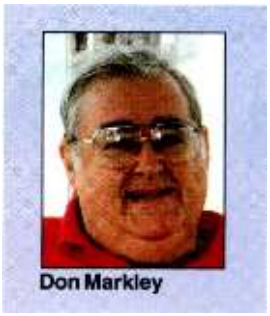
By Don Markley

Maintaining transmission lines

Many times, a transmission line is treated like a log chain on a farm. It is left hanging somewhere, sometimes with a load on it, ignored and yet expected to work well in any situation. If the chain develops a problem, it is assumed that it was a lousy chain in the first place, not that it wasn't taken care of.

In the case of transmission lines, the maintenance required varies with type and use. For example, a buried coaxial cable is really left on its own. No one is going to dig up a cable to check its appearance. If it hasn't been properly installed, there isn't much you can do about it. For these types of cable, the installation can be important and can add significantly to the cable life.


Don Markley

For small cables, direct burial can be accomplished by simply plowing them in, especially in those cases where the cable is not critical. For larger cables, certainly those with air dielectric, they should be placed in a ditch in a protective bed. A healthy layer of sand below and above the cable will protect it from abrasion as the ground freezes or shifts from vehicles driving over the ground.

Keeping up the pressure

The transmission lines that require the most maintenance are those that are tower mounted with air dielectrics. The obvious problem is that of pressurization. For some reason, there is still a group out there who doesn't believe that a line must be pressurized if it doesn't leak. That's right up there with "they won't sting you if you stand still." No matter how airtight you may believe a line to be, it must be pressurized. As the line is heated and cooled by the combination of signal power and natural forces, water molecules will be drawn into the line in the absence of pressure. That's right, the primary purpose of pressure is simply to be sure that dry air goes out of any leak, no matter how small, instead of wet air coming in.

Pressurization with exotic gases can also be used to increase the power-handling capability of cable. That is a separate issue from simple pressurization to keep the cable dry. Lines will normally be pressurized with either air or dry nitrogen. Now here is an important point to remember: pressurization is to keep moisture out of the line, not to attempt to send the line into low earth orbit. Using the theory of "if a little is good, a lot is better," some technicians have been known to pressurize lines to unreal levels. I am aware of one TV station where $6^{1}/_{8}$-inch line was pressurized to 65psi with dry nitrogen. The CE decided that the line was arcing (it wasn't, at least not in the way he thought) and tried to cure it with pressure. All that is needed is 3psi to 5psi to ensure that dry air (or gas) is lost rather than wet air being gained.

Dry air requires a dehydrator of some type. This must be properly maintained or it will eventually start putting moisture into the line. The manufacturer's instruction manual will guide you in the proper maintenance for your particular unit. If in doubt, install a desiccant cylinder in the line between the dehydrator and the transmission line. When the color changes, replace or dry the desiccant.

An alternative is to use dry nitrogen gas or a nitrogen generator. Dry nitrogen is available from commercial sources at a reasonable price. Low-pressure regulators are inexpensive and readily available from transmission line manufacturers. One source of nitrogen generators is Litton Industries through its commercial products division in Davenport, IA. These are excellent if you need a larger amount of gas, as in the case of several or large transmission lines.

Keep an eye on the connections

Next, the biggest need for transmission line maintenance is the connector between sections of rigid transmission line. If sliding connections are used, they will eventually be worn down, with the residue building up around the center conductors. This problem has been eliminated in some newer lines by having the expansion and contraction of the center conductors absorbed by expansion sections in the center conductor or by having a semiflexible center conductor with the joints being bolted together. Others use lubricated connectors or "watch-band springs." These get their names from watch bands that were popular in the '40s and that had a unique ability to rip all hair from the wearer's wrist. As jewelers got rid of the watch bands, someone got the idea that they would make great sliding connectors because copper does not normally have hair nor does it complain.

These spiral bands work well for some time until they start to lose their tension and deform from heat. The solution is to replace them regularly with new bands. This requires opening the line at each joint. In turn, the "O-ring" seal between line sections should be replaced at the same time. When a seal has been in place, under pressure for several years, it will not reseal properly

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Lotus Communications
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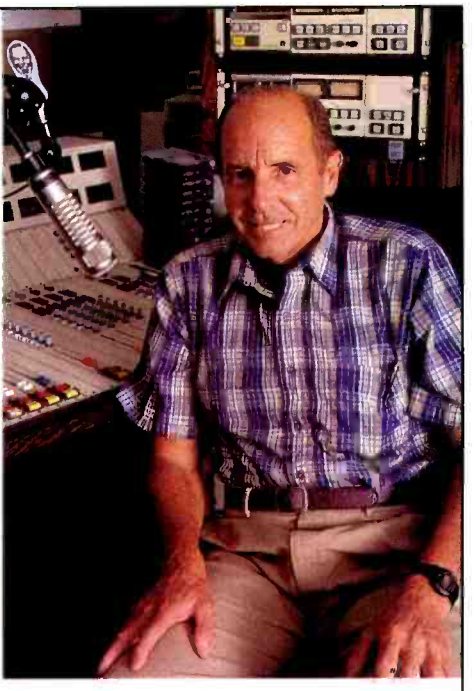

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when removed and replaced. The ring material ages and simply loses its ability to deform properly to recreate the seal. As to timing, around seven years is a good time to replace the watch bands.

Riggers: Proper care and feeding

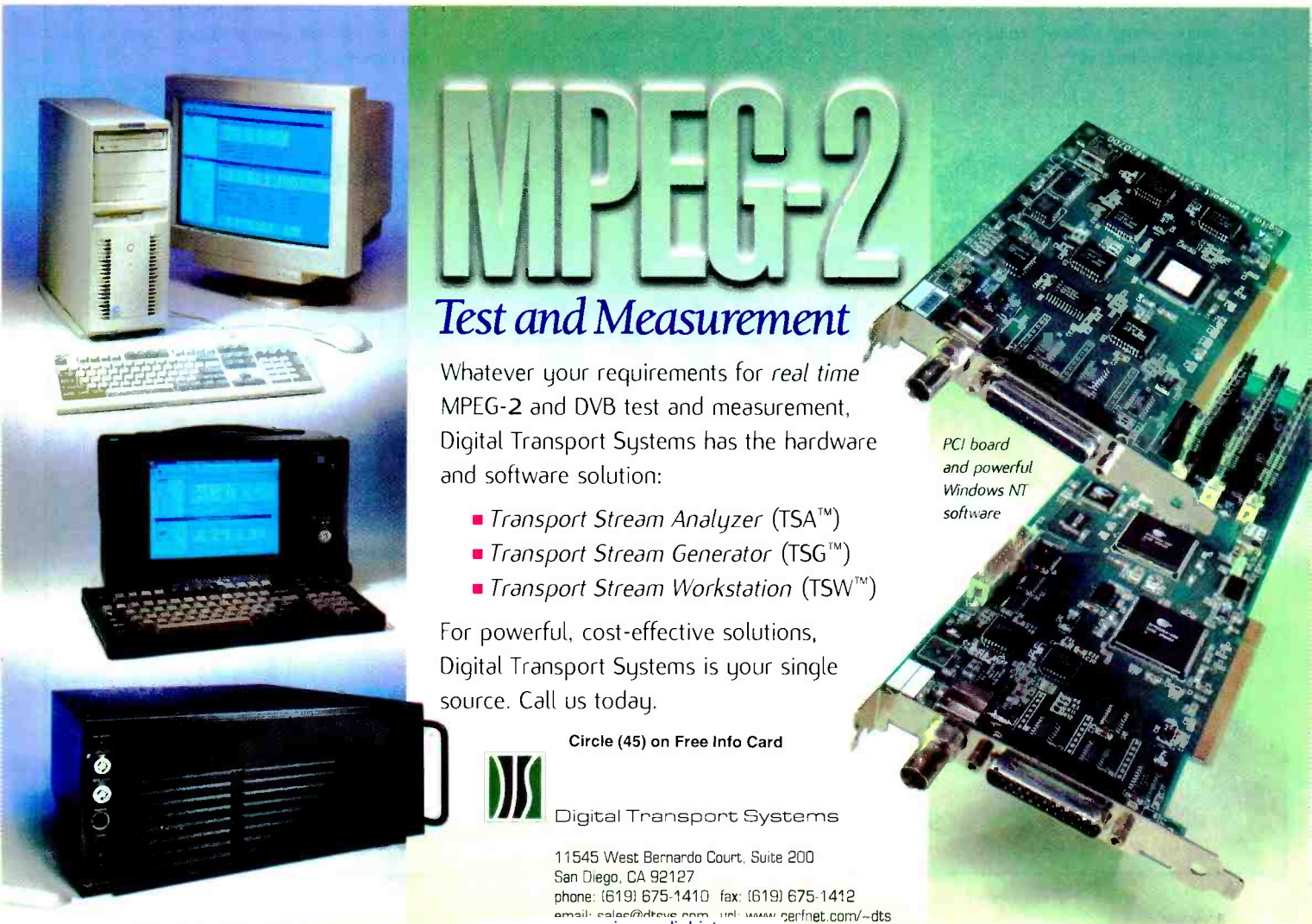
A point to remember is that your rigger is your hands and eyes on the tower. Find a tower contractor who is knowledgeable about RF, not just steel. A good rigger will keep your lines properly suspended and braced and can perform the necessary repairs to the line in a manner that will maintain its electrical characteristics. It is your rigger who ultimately is responsible for keeping your lines in good condition.

With respect to semiflexible lines, the biggest requirement is to see that the line is properly installed. It cannot be lifted by the end connector. All manufacturers make hoisting grips, which are the only way to safely install a cable. After the line is lifted into place, the hoisting grip(s) should be left on the cable to hold the cable weight. Cable clamps should then be installed to keep the cable in place. Remember, these clamps simply keep the cable from moving around and are not to support the cable weight.

Rigid lines and waveguides are suspended with spring and rigid hangers. The problem is that the steel tower does not expand at the same rate as the copper coaxial cable or the aluminum waveguide. Normally, these systems use a rigid hanger at the top and at the building entrance. The line or waveguide is then allowed to expand or contract as necessary between those two fixed points. This calls for hangers to use springs to absorb the length change without breaking anything. The tension on the springs is normally set so that a light upward force results on the top. The springs on each section are simply to hold that individual section up, not to launch the whole system like a javelin through the tower top. Again, your tower contractor will check the hangers and replace them as needed.

Transmission line maintenance is simple and comes down to simple issues. For air-dielectric lines or waveguides, maintain pressure at the proper levels all of the time. For rigid lines, replace sliding connectors when needed along with seals, as necessary. For all systems, keep the support systems in good mechanical condition by using a good tower contractor often enough for him to keep you out of trouble. Finally, reward the contractor's crews with good beef and appropriate beverages. ■

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



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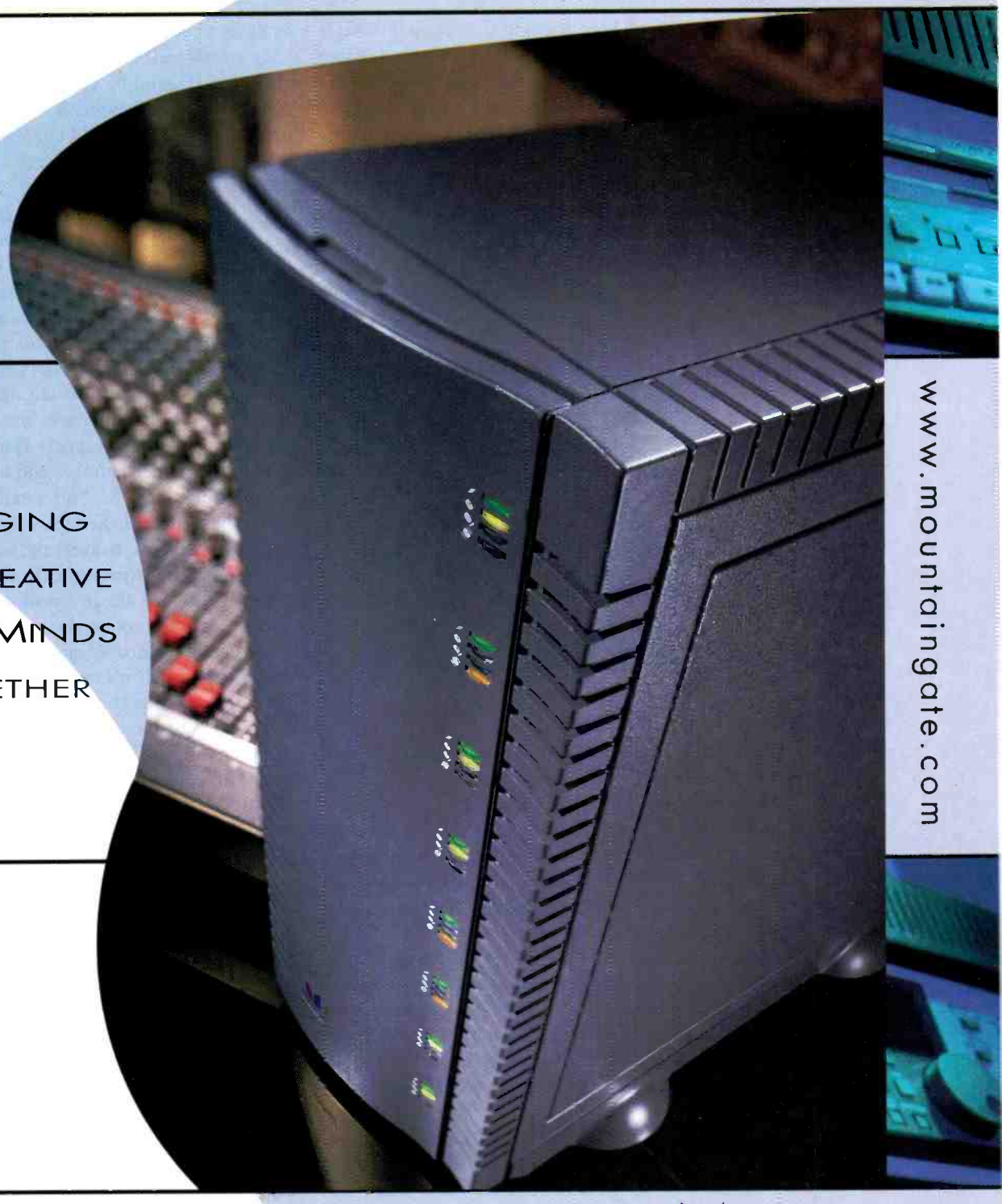

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By Denis Roche

JVC Digital-S

Ethnic American Broadcasting Company (EABC) is a spin-off of the Russian American Broadcasting Company. Three years ago, it broadcast only five hours of television a night, but it has grown to 24 hours of broadcasting on Satellite SBS 5, picked up mostly by multiple dwelling units where Russians tend to congregate. EABC also reaches single-family and condo subscribers via a dish and there are plans of going to a digital platform shortly.

Performance at a glance

- Mild compression
- 4:2:2 recording
- S-VHS compatability
- Industry standard compression using dual DV chip set.

The author with EABC's Digital-S recorder.

About 80% of the network's schedule is recordings of programs from Russia. Some are recorded here via satellite, and others are recorded in Russia and then sent to EABC. For the rest, EABC does the nightly news with stories from the United States and Russia, and it has several call-in talk shows.

EABC is making a move to JVC Digital-S from Betacam SP. Why? The main reason is that 90-minute SP tapes cost $45 each, and the company was spending $14,000 in tapes every month. We have worked with Beta SP for a long time, and have been happy with it, but the price of complete conversion to Digital Betacam was out of reach.

JVC's Digital-S was appealing because of the size of the tape. DVCPRO was also considered, but its big selling point is how small it is and that small size suggested problems with misplacing tapes. You're not as likely to stuff a Digital-S tape in your back pocket.

We considered both formats and liked the serviceability of Digital-S. Costs were another important consideration; a Beta head would cost us a minimum of $1,200, but we could change the whole Digital-S head assembly for about $800. That was appealing.

The frequency of replacement is one of the unknowns, but we have more than 1,000 hours on most of our machines and have not encountered significant problems. Also, the 104-minute length of the Digital-S tape allows us some leeway in recording non-standard-length Russian shows and movies.

EABC is in the process of condensing its library of 90-minute Betacam tapes to Digital-S, averaging two Betacam to one Digital-S, and recycling the Betacam tapes back into the "off satellite" record process. This has lowered the tape bill by about $10,000 a month, while we convert the whole facility to Digital-S, effectively offsetting the cost of becoming "digital." EABC has already recouped half the cost of the first part of our conversion in tape costs alone. When you see an improved picture to go with that, you understand that it's not just about tape savings.

We've sent one Digital-S machine to Russia with a standards converter so that they could start sending us quality tapes. The difference in the digital audio is noticeable, and the Digital-S format easily supports cutting out the Russian commercials and inserting our own. The network is still about 60% Beta on the air, but in the next few months, the use of Digital-S is going up to about 60%. By the end of this year, EABC should have just two Betacam machines left out of the 27 that we have now. We're a little cramped in the current facility and are in the process of setting specs for a new facility with its own uplink. Digital-S fits like a glove everywhere in the designs. Because the Digital-S tapes take up less space than the SP tapes, the tape library can be smaller.

EABC is making a move to JVC Digital-S from Betacam SP.

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Down by the Bitstream

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On the maintenance side, my assistant and I recently attended a Digital-S class. The course was laid out intelligently and I was pleased with the documentation. In addition, there are self-diagnostics embedded in the equipment itself. We also have the ability to go on-line with JVC for troubleshooting. Eventually, we'll install a modem at our service desk for both maintenance and on-line parts ordering with a simple point-and-click interface.

I also want to note that JVC's support staff is great. They are always willing to come over and see if there is anything they can do to help us. I think they would have helped us install the equipment if we had asked, but we are usually pretty good at that on our own.

I am pleased with the prospect of using the JVC Digital-S equipment over the long term, and I believe the Digital-S format is here to stay. There are many smaller stations around the country that are just moving out of a high-band three-quarter format, and they cannot afford to go with something like Digital Betacam. In such cases, Digital-S is a more cost-effective solution.

You might argue that there is a quality difference between Digital-S and Digital Betacam. But if you compare picture quality on side-by-side monitors, it's hard to tell them apart. And when that lower price (one-third that of Digital Betacam) is added to the comparison, I think that Digital-S is a winner. ■

Denis Roche is director of engineering and broadcast support for the Ethnic American Broadcasting Company, Ft. Lee, NJ.

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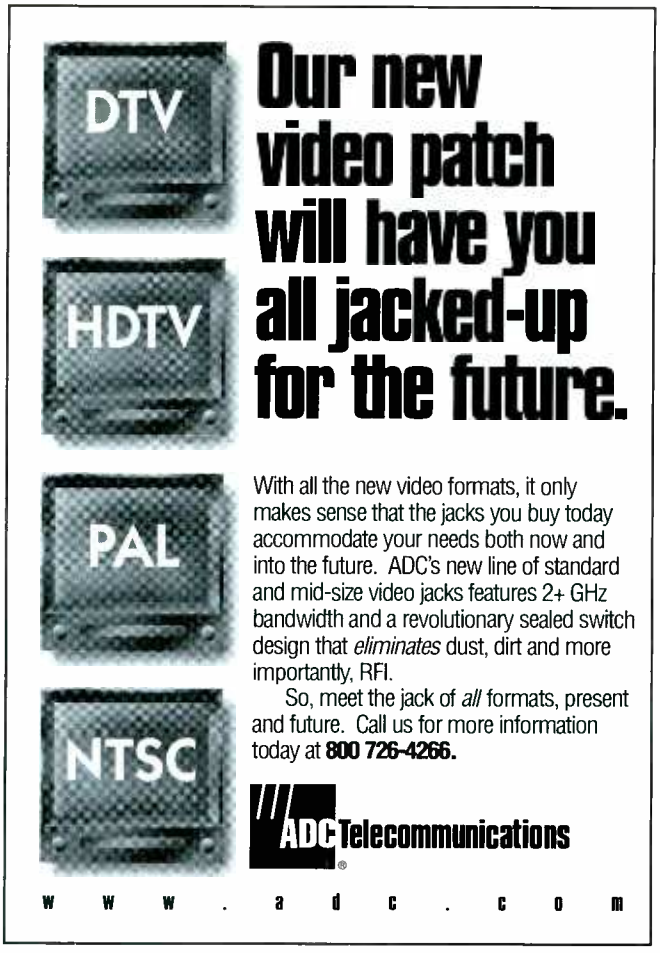

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By Carl Fergusson

News Digital Systems

With ever-increasing demands for fast, cheap information and limited satellite capacity, new digital compression equipment allows broadcasters to exploit the trade-off in acceptable picture quality for commercial and operational benefits, translating it into a win-win situation.

As broadcasters migrate from analog to end-to-end digital broadcasting systems, they are recognizing that MPEG-2 and DVB digital compression standards provide a host of performance and cost advantages.

Digital Satellite News Gathering (DSNG) is an area where the application of digital compression technologies is making a large impact. The mandate to quickly and efficiently transmit news from around the globe over satellite is driving the adoption of the new approach. DSNG equipment, which combines MPEG-2 video, audio and data encoding with multiplexing and modulating functions, enables broadcasters to reduce their cost of ownership with smaller bandwidth and power requirements — leading to lower operational costs.

MPEG-2 powerful flexibility

Historically, ETSI-based codec systems have been used to compress news feeds. But times are changing. Increasingly, the more efficient and flexible compression technology offered by the MPEG-2 DVB standard has led to MPEG-2 becoming the compression method of choice for DSNG.

With any digital compression system, there are bandwidth savings. MPEG-2 is far more flexible in its use of bit rate and, therefore, bandwidth than ETSI, which is fixed to telecommunication line speeds at either 8Mb/s, 34Mb/s or 45Mb/s. Conversely, MPEG-2 Main Profile at Main Level (MP@ML) encoding will do 1Mb/s to 15Mb/s for video.

The resulting flexibility in the occupied bandwidth not only allows broadcasters to take advantage of reduced satellite space segment tariffs when space segment requirements can be planned, but also allows them to whatever space segment is available in times of crisis. This is particularly important in cases where large numbers of broadcasters are rushing to cover a breaking event somewhere in the world. With reduced bandwidth requirements, broadcasters are more certain to get crucial space on a satellite, ensuring that their news gets on air.

While the nature of the material being encoded (e.g. fast-moving action or talking heads) influences the picture quality for a given bit rate, picture quality equates to the bit rate used in a non-linear fashion. The flexibility in source and channel coding offered by MPEG-2 allows the DSNG operator to make commercial savings by exploiting this relationship to obtain an acceptable picture quality within minimum bandwidth. As broadcasters can appreciate, picture quality is a subjective and emotive subject. For those willing to answer the question "What is an agreeable picture quality for my service?" the benefits await.

Smaller, lighter systems

A key advantage of DSNG is that the system requires

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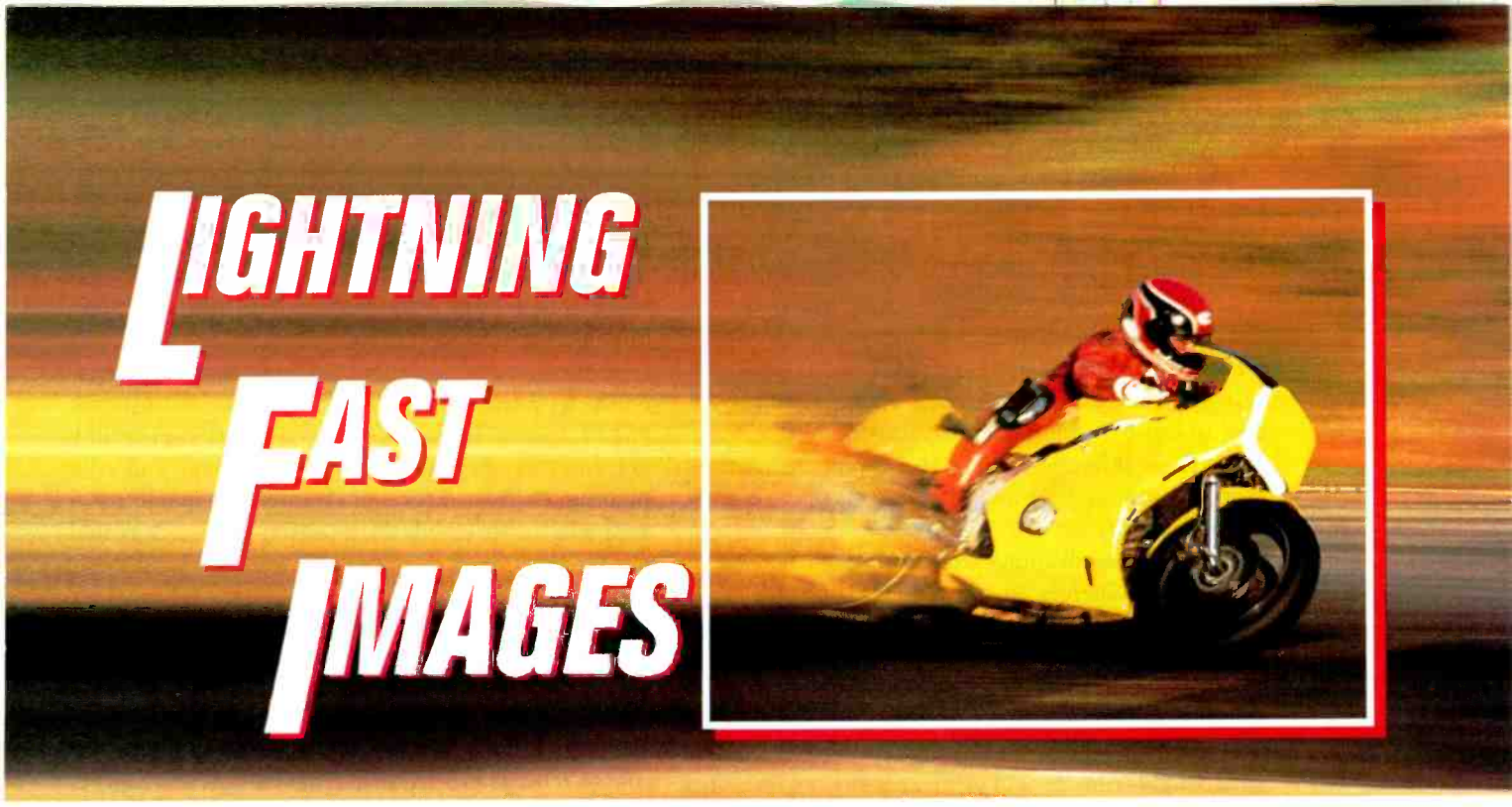

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less transmission energy, so broadcasters can use smaller high-power amplifiers (HPAs) and smaller transmission dishes. The trend for smaller, lighter DSNG systems, such as DMV's DSNG Codec, enables individual reporters and operators to personally transport the system, while greatly reducing transportation costs.

There are other advantages to MPEG-2 DVB DSNG systems. They provide enhanced transmission robustness to noise by employing interleaving and concatenated Reed-Solomon coding. This is especially important to ensure that the final broadcast is of the highest possible quality.

There are also advantages to reducing timely processing delays. Whereas in any compression encoding, MPEG or ETSI based, there is a phenomenon known as processing delay. This primarily affects live two-way news gathering scenarios. With sophisticated DSNG equipment, broadcasters can address this annoying problem by using lower-delay encoding configurations where slight reductions in picture quality can be traded for reduced processing delay.

Interoperability for DSNG

Recently, participating encoder and decoder manufacturers have been attempting to demonstrate secure interoperability of MPEG-2 DVB systems at the ISOG/Intelsat interoperability trials. The aim is to have open systems so that transmissions sent from different uplink equipment is receivable by as many manufacturers as possible. Interoperability trials are ongoing and manufacturers are truly working together to achieve this open systems objective.

For the operator, interoperability allows greater flexibility to purchase from a wide choice of different manufacturers equipment. However, interoperability also increases the chance of eavesdropping, and even pirating, so the inclusion of scrambling capabilities in your selection of DSNG transmission equipment should not be overlooked.

Choosing the right equipment

The adoption of digital technology need not be an operational nightmare. There are a number of features that a DSNG system should include so that you don't run into basic logistical or location problems. Of course, it needs to be compact, lightweight and rugged. For international news-gathering equipment, it should also have a broad operating temperature range.

DSNG equipment needs to be rapidly deployed and used. The flexibility of the MPEG-2 and DVB standards can be somewhat daunting to the unfamiliar operator, or time consuming to set-up. However, features such as user configurable preset configurations or automatic encoder configuration can be used to get the system operational quickly and minimize operator training.

Integral receivers should not only be capable of monitoring at points within the transmission system, but also capable of being tuned to allow monitoring off satellite for the ultimate confidence test. Self-test and diagnostic features help get you out of trouble, and audio tone and video test pattern generation help with diagnosis or transmission testing.

The introduction of MPEG-2 compression into the news gathering market is driving the acceptance of digital technology in this sector. Digital satellite technology is also changing the face of all outside broadcasting and broadening the application base. For instance, the bandwidth efficiency allows multicamera sports events to be transmitted to the main permanent studio for production in the same satellite space segment as one analog channel, negating the need for an on-location studio. ■

Carl Fergusson is DMV DSNG Codec product marketing manager for News Digital Systems, Middlesex, England.

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By Wes Simpson

ADC Broadband Communications' DV6000

Competition from direct satellite television, increasing business costs and the threat that telcos may enter their market are forcing cable TV operators to seek new ways of improving service and advertising revenue.

One stumbling block to increased revenues has been the inability of cable systems to cost-effectively deliver real-time advertising messages. As a result, national and regional advertisers have focused on national TV spot advertising, avoiding the complexities involved with spot advertising on cable systems. For some time, cable operators in large metropolitan areas have sought a way to overcome this limitation. Now, there is a way that will allow cable operators to offer the immediacy of spot advertising, in addition to the demographic and geographic specificity of local cable systems.

ADC Video Systems' DV6000.

In Chicago, cable operators have joined together to form a multiple cable system cooperative that has changed the environment for spot cable advertising. Continental Cablevision, Jones Intercable, Inc., Time Warner Cable, Multimedia Cablevision, Post-Newsweek Cable, Prime Cable of Chicago, Prime Time Cable Ads, Telecommunications, Inc. and US Cable have formed the Chicago Cable Interconnect (CCI).

The CCI is the first-in-the-world hard-wired digital system for distributing ads to member cable companies. It serves as a one-stop cable-TV buying outlet for advertisers, providing real-time, single-point ad insertion so that ads can be run simultaneously across the entire dominant market area (DMA) or in specific market zones.

CCI uses the latest technology to store, insert and transport spot advertising into the local cable systems. A system from ADC Video Systems was selected for the real-time transmission of advertising spots to cable company head-ends for delivery to subscribers. The use of uncompressed digital video technology maximizes signal quality and eliminates costly and error-prone analog insertion processes.

For the first time, national and regional advertising can be stored and accurately distributed to multiple cable systems in large metropolitan areas. Additionally, the real-time nature of the insertion process, a 24-hour turnaround time, allows member system operators to take advantage of time-sensitive regional and local advertising opportunities.

Single head-end storage

The CCI is a centralized system for the warehousing and on-demand broadcasting on spot advertisement from national and regional advertisers. Using Interconnect facilities, ads can be run across the entire DMA or targeted to specific demographic zones with the DMA. CCI has engaged National Cable Communications (NCC), 50% owned by the Katz Media Group, to represent and operate the Interconnect for the cable partners.

NCC has established and operates the head-end facility that will receive ads from regional and national advertisers and broadcasts them as required for the eight-member cable operators. The backbone of the

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head-end site is a fiber-optic transmission system that provides 16 channels of MPEG-2 digital insertion to 54 head-ends via 24 switch points. Additionally, 16 channels of digital insertion will be provided to a configuration of head-ends that will create five additional demographic zones.

Once the ads are received by NCC, they will be stored in a video server. When a queuing signal is received from the cable system, the server feeds the ads to the digital transport system that transmits the ads through a video switch to a fiber-optic delivery system. The signal is received at each head-end and switched into the cable operators audio/video stream prior to the channel modulator.

ADC Video Systems' DV6000 system was chosen as the transport system by CCI because of its flexibility and ability to deliver a clean video signal.

ADC Video Systems' DV6000 system was chosen as the transport system by CCI because of its flexibility and ability to deliver a clean video signal. The system is a 16-channel, high-resolution, 2.4Gb/s fiber-optic transmission system that encodes signals in an uncompressed digital format to achieve higher quality imagery. The flexible architecture supports diverse network configurations and multiple formats allow the transport platform to meet individual cable system requirements of all eight cable operators.

New paradigms

This system has changed the environment for spot cable advertising in the Chicago DMA, providing the backbone for a digital insertion system that has created a new paradigm for cable advertising insertion and distribution systems throughout the United States. Dan Lawlor, CCI general manager, says, "The CCI provides the impact and reach of television, plus much more. We target like print, but with the accuracy of direct mail. We also offer the frequency and creative versatility of radio. We are capable of 24-hour turnaround, and best of all, this is now accomplished with one order, one contract and one set of invoices."

With the use of the NCC service, individual cable systems avoid the labor costs associated with the storage and scheduling of each ad while benefiting from reduced equipment requirements and the convenience of centralized billing. Cable advertising has become a viable medium for national and regional advertisers. Now when an advertiser buys cable spots in the Chicago metropolitan area, instead of receiving up to 54 affidavits, there will be only one affidavit and one contract.

Equally significant, however, is that cable systems gain a new capability for demographic programming and can offer advertisers the same geographic configuration as newspapers. For the first time, national advertisers will be able to select those geographic zones of metropolitan Chicago in which they want their ads to appear.

Kevin Dowels, chairman of the CCI governing board said, "The CCI system will guarantee that spots will be aired instantaneously, securing the correct market area distribution, and increasing the attractiveness of cable television to national advertisers. I expect that national bookings in the Chicago area will increase significantly with this new, digital interconnect." ■

Wes Simpson is DV6000 product manager for ADC Broadband Communications, Meriden, CT.

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industry briefs

Business

Thomson Broadcast announced the opening of two offices. Atlanta: 3101 Roswell Road, Marietta, GA 30062. Chicago: 6126 Lincoln Ave., Morton Grove, IL 60053.

Matsushita Electric Industrial, Osaka, Japan, has been selected as the official broadcast equipment supplier and systems integrator/prime contractor by the Nagano Olympic Committee for the XVIII Olympic Games in Nagano, Japan in 1998.

Anton/Bauer, Shelton, CT, has been acquired by the UK-based Vitec Group, plc. Anton/Bauer will continue its operations in Connecticut and will retain all key management under the same name.

Pinnacle Systems, Mountain View, CA, has acquired the Deko titling systems product line and technology from Digital Graphix, Inc., Bloomfield, CT. Pinnacle expects to pay Digital Graphix $5 million in cash and assume liabilities of approximately $1 million.

Harris Corporation, Quincy, IL, has been awarded contracts valued at nearly $30 million to provide digital broadcast equipment for Georgia Public Broadcasting, Atlanta, and Discovery Communications' Latin America Television Center, Miami.

Acrodyne Industries, Blue Bell, PA, has been awarded a $1.6 million contract for the manufacture, delivery and installation of two 60kW UHF TV transmitters for use in the statewide Wisconsin Educational Communications public TV system.

Panasonic, Secaucus, NJ, and NBC, have teamed up to present the NBC Astrovision by Panasonic overlooking Times Square in New York City. The display will operate from 7 a.m. to 1 a.m. daily and will feature varied programming from NBC.

Quantel, Newbury, UK, announced the sale of its Editbox 4020 editing system to Burbank, CA-based post house Suite 16. Quantel also announced the sale of its Hal Express on-air graphics system to local station KARE, in Minneapolis.

Avid Technology, Tewksbury, MA, announced a strategic alliance with Intel Corporation, Santa Clara, CA, in support of Avid's plans to offer video and audio editing products on the Intel architecture. Under terms of the agreement, Avid will develop digital content creation products for Intel's architecture, and Intel will purchase 1.5 million newly issued shares of Avid common stock.

Telex, Minneapolis, has entered into a recapitalization agreement and plan of merger with Greenwich II LLC and GST Acquisition Corporation, affiliates of Greenwich Street Capital Partners, Inc., a New York-based private equity fund.

Lodestar Towers, Inc., Los Angeles, will install two DTV towers atop Mt. Harvard in Los Angeles County. The towers will feature fiber-optic cabling and are slated for completion late this summer.

Dielectric Communications, Raymond, ME, has developed an adjacent-channel, slot-type antenna for WETA in Washington, DC. The antenna will be used for DTV field tests at the station.

People

Navroze Mehta has been appointed president and CEO of Comark Corporation, Southwick, MA.

Kent Porter and **Jim Lein** have been named product managers for Videotek, Inc., Pottstown, PA.

James C. Collins has been named director of sales and marketing for MountainGate, Reno, NV.

Rob Van Oostenbrugge has been appointed business unit manager for Philips BTS, Simi Valley, CA.

Rick Sawyer has been hired as North American sales manager for Orban, San Leandro, CA.

Charles R. Hoeg is director of engineering for Fiber Options, Bohemia, NY.

Tekniche, Northvale, NJ, announced the additions of **Thomas E. Neumann** as operations manager and **Jorge Paredas** as service engineer.

Tony Pierson has been appointed group product manager of transmission products for Philips Broadband Networks, Manlius, NY.

Don Peebles has joined Solid State Logic, New York, as vice president of broadcast and post-production. ■

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new products

By Deanna Rood

Demodulators
Videotek

• Agile demodulator series: Videotek has cut the price of the DM-154 agile video demodulator 22%; this high-performance TV tuner/demodulator can be used for FCC compliance testing, as well as in testing applications and in locations where computer control is required; the DM-192 is a cable-ready agile demodulator that lends itself to broadcast and cable TV video services and testing due to selectable synchronous or envelope detection mode, zero carrier chopper mode, Quadrature output, IF loop capability and composite audio out for stereo testing or remodulation; the family of demodulators also includes the DM-141A and the DM-145.

Videotek, 243 Shoemaker Rd., Pottstown, PA 19464-6433; 610-327-2292; fax 610-327-9295
Circle (257) on Free Info Card

Digital production switcher
Sony Electronics

• DVS-7200: this mid-range digital switcher is a post-production version of Sony's DVS-7000 that provides a wide variety of visual effects and operational flexibility; like the DVS-7000, it can be used at component or composite stations; the DVS-7200 features two mix/effects banks, each with two full-function keys.

Sony Electronics, Sony Dr., Park Ridge, NJ 07656; 800-635-SONY; fax 201-358-4058; www.sony.com
Circle (250) on Free Info Card

Rack-mount receiver
Harmonic Lightwaves

• HRM 3810: a rack-mount receiver for broadband networks that offers an RF power detector and alarm that enables detection of system problems before signals reach the optical link; in addition, the HRM 3810 supports a broad range of optical input levels from -6 to +3dBm; state-of-the-art GaAs amplifiers allow excellent receiver performance, flatness and low distortion.

Harmonic Lightwaves, 549 Baltic Way, Sunnyvale, CA 94089; 408-542-2500; fax 408-542-2511
Circle (259) on Free Info Card

ENG zoom lens
Fujinon

• A15X8 EVM/ERD: this hand-held ENG zoom lens combines lightweight, unmatched optical performance, Fujinon's proprietary Aspheric Technology and a new inner focusing system to produce unprecedented image quality; in addition to offering outstanding telephoto features to go along with its 15X zoom ratio, it also has excellent ramping characteristics, a variable zoom grip and selectable zoom speed, which creates the smoothest possible zoom from 8mm to 120mm.

Fujinon, 10 High Point Dr., Wayne, NJ 07470; 201-633-5600; fax 201-533-5216
Circle (261) on Free Info Card

Serial digital matrix routing switchers
Videotek

• SDR-800 & SDR-800A: matrix routers for serial digital video and AES/EBU audio; the units are 8x8 in a 1RU frame and can be expanded to 16x16 by adding the SDR-EX expansion frame for video or the SDR-EXA for audio; each unit includes a front-mounted control panel with an optical rotary encoder for accurate data entry, RS-232, RS-422 and RS-485 serial interfaces, GPI port and an LCD display for matrix status, crosspoint selection and salvos.

Videotek, 243 Shoemaker Rd., Pottstown, PA 19464-6433; 610-327-2292; fax 610-327-9295
Circle (276) on Free Info Card

Fluid heads for digital cameras
Sachtler AG

• System DV 2 & System DV 4: tripod kits that consist of a digital video fluid head, aluminum tripod and ground spreader; both systems feature the leakproof, two-step (0+1) Sachtler fluid system that works reliably and independently of temperature, whether you are shooting in a hot or cold environment; the fluid heads come with a single pan arm and the Sachtler Touch & Go quick camera locking system.

Sachtler AG, GutenbergstraBe 5, D-85716 UnterschleiBheim, (0 89) 3 21 58-2 00; fax (0 89) 3 21 58-2 27
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Battery charger/discharger
Aspen Electronics

• ROQ-4 series: a battery maintenance system that features a serial 232 output and a four-channel analyzer option in the form of a Microsoft Windows-based software program; the series is NP and BP compatible for Ni-Cd batteries, and includes fast charge and discharge multitasking, selective discharge with sequence memorization; it is compatible with all international AC power input voltages.

Aspen Electronics, 15131 Triton Lane, Suite 107, Huntington Beach, CA 92649; 714-379-2515; fax 714-379-2517
Circle (275) on Free Info Card

Mobile camera link video enhancer
Studio Systems Electronics

• RANGER: a mobile camera microwave link video enhancer that processes the received video signal from the microwave link and maximizes picture quality; the video is enhanced by stabilizing the chrominance, locking-on to the video signal, and enabling all the video action to be captured, even from difficult remote mobile cameras, where multipath reception can be a problem.

SSE, Unite 10 Falcon Business Park, Ivanhoe Rd., Finchampstead, Wokingham, Berkshire, England, RG40 4QQ; +44 (0)1189 731737; fax +44(0) 1189734 734679; 106600.475@COMPUSERVE.COM
Circle (273) on Free Info Card

CD player
Denon Electronics

• DN-C680: a CD player designed for everything from broadcast studio to post-production to DJ use; it features a large jog dial and shuttle wheel for fast searching and precise cueing; the jog dial moves through a CD frame-by-frame or it can be adjusted to move in 10-frame increments; the CD's index can also be scrolled through in a single or 10-index increments; up to 25 tracks can be sequentially programmed for track-by-track or continuous play.

Denon, 222 New Rd., Parsippany, NJ 07054; 201-575-7810; fax 201-808-1608
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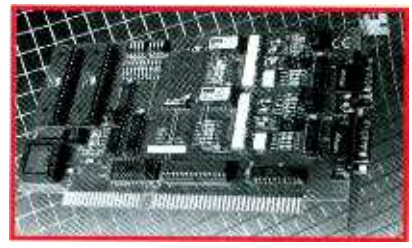
Automatic RS-485/422 card
Sealevel



• ULTRA-SIO: a two-channel serial I/O adapter for the PC and compatibles; it provides two RS-485/422 DOS, Windows 3.X/95/NT, and OS/2 compatible serial ports allowing connection of up to 32 RS-485 devices to each port; each port provides true optical isolation eliminating the effects of ground loop current and other transient spikes; the ULTRA-SIO allows the RS-485 line to be managed transparently without user or software intervention and eliminates RS-485 network contention.

Sealevel, P.O. Box 830, Liberty, SC 29657; 864-843-4343; fax 864-843-3067
Circle (270) on Free Info Card

Portable MPEG-2/DVB encoder and satellite uplink
Philips Digital Videocommunications Systems

• QuickSat: a complete encoder and satellite uplink system in one compact enclosure; QuickSat comprises the key elements of a digital MPEG-2/DVB-compliant SCPC uplink; it supports a range of data rates and satellite bandwidths for a variety of video, sound and data applications while optimizing the use of available transponder bandwidth; QuickSat is ideal for digital satellite news gathering and broadcasting to closed user groups; its compact size, low weight and robust construction allow for ease of transportation and installation where space is critical.

Philips DVS, +31-40-273-3615; fax +31-40-273-2715
Circle (274) on Free Info Card

Hand-held digital multimeters
Tektronix

• DMM800 series: a family of hand-held true rms digital multimeters that provide up to twice the accuracy and up to 10 times the resolution of competing hand-held DMMs; the series offers a full range of features including voltage, current, resistance, capacitance, frequency and temperature; the series includes the entry-level DMM830, the mid-range DMM850 and the high-end DMM870.

Tektronix Measurement Business, Literature Distribution Center, P.O. Box 1520, Pittsfield, MA 01202; 800-479-4490 (action code 715)
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Multichannel MPEG-2 transmission solution
ADC Telecommunications

• CDV3000 system: developed as a joint effort between ADC Telecommunications and NUKO Information Systems, this universal MPEG-2 transmission system has the ability to transport multiple real-time MPEG-2 channels over a variety of standards-based networks through an open, scalable and modular architecture; the CDV3000 platform provides flexible encoding, multiplexing and transport of up to eight video channels on a single DS3 circuit; the DS3 output from the CDV3000 can be routed into and transported over a DV6000 backbone network or over any standard DS3 network for trunking and distribution.

ADC Telecommunications, 999 Research Parkway, Meriden, CT 06450; 203-630-5700; fax 203-630-5701
Circle (251) on Free Info Card

Integrated applications for Profile PDRs
Tektronix

• Profile Tool Box 1.0: a set of integrated applications that allows users of Profile professional disk recorders to easily manage digitized media, perform basic cuts-only editing, build and execute lists of events and configure hardware and system resources; all digital audio and video can be managed and viewed from a single console whether the material is on one Profile PDR or a network of Profile PDRs; the Profile Tool Box consists of the Tool Box framework, a media manager and three applets (Tool Box Editor, List Manager and Configuration Manager).

Tektronix, P.O. Box 500, Beaverton, OR 97077-0001; 800-547-8949; fax 503-627-7275; tekxpress@vnd.tek.com; www.tek.com/vnd
Circle (258) on Free Info Card

Production switchers for Windows NT
ECHOlab

• ECHOlab 5000 switchers: a family of digital video production switchers that run Windows NT; the three new 5000 models have full-function control panels for live or post-production environments and the open architecture design, with an integrated, built-in mini-server, can run a variety of video devices from the leading companies embracing Microsoft's Windows NT; the 5000 family runs 10-bit CCIR-601 component digital and handles up to 38 inputs and 16 outputs.

ECHOlab, 175 Bedford St., Burlington, MA 01803; 617-273-1512; fax 617-273-3275; www.echolab.com
Circle (252) on Free Info Card

Multichannel decoder
Vela Research

• MPEG-2 four-channel decoder: a low-cost-per-channel solution for digital ad insertion applications; the decoder is designed with a gen-lock input to allow the video output to an external video source; a 2x1 video/audio switch for passing the gen-lock video and stereo inputs to the output provides a low-cost switch for environments that require passing a network feed; the decoder accepts MPEG-2 data and device control commands from a SCSI-2 fast/wide interface; each playback channel is addressable via a SCSI Target ID and logical unit number and images can be decoded from SIF to ITU-R-601 (CCIR-601) with NTSC or PAL outputs.

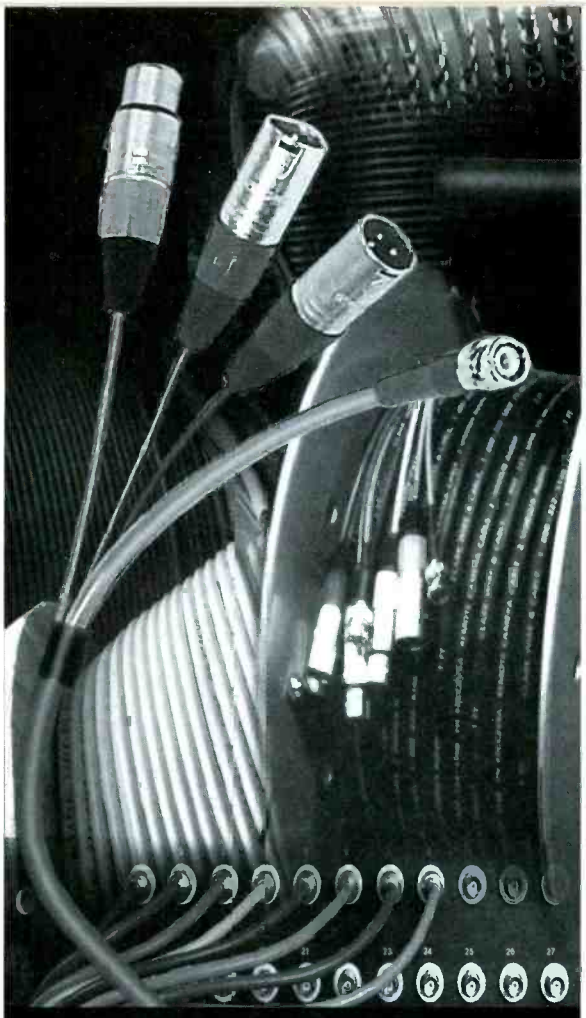
Vela Research, 2501 118th Ave. North, St. Petersburg, FL 33716; 813-572-1230; fax 813-573-2508
Circle (253) on Free Info Card

Video/audio/data multiplexer
Opticomm

• FMX-48000: a frequency modulated, LED or laser-based NTSC, PAL and SECAM compatible video multiplexer, with optional combinations of simplex audio and data; it combines 4-8-16 channels of video, audio and data in one multiplexer system operation over one fiber-optic cable; the FMX-48000 allows local area network communication between buildings in the 5 to 35km range; units are available as a stand-alone or in the card version.

Opticomm, 6046 Cornerstone Court West, Suite 209, San Diego, CA 92121; 619-450-0143; fax 619-450-0155
Circle (272) on Free Info Card

www.americanradiohistory.com



After you buy this year's hottest new equipment, you're going to need to connect it.

And after you've made the investment to be the best of the best, you're going to insist on quality cabling.

At Clark, quality is our number one concern, along with stocking the products you need. All standard cables and accessories are on hand, including a wide range of Composite Cables to eliminate multiple cable runs. And we specialize in digital products - like audio and video digital cabling, complete digital assemblies and digital patchbay systems.

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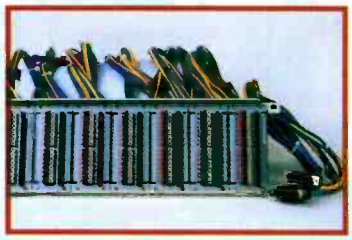
new products

Punch-block interfaces

Leitch



• ADC punch-block interfaces: interfaces for audio routers and audio distribution amplifiers for quick interconnnection for a variety of system configurations; the interfaces come prewired with umbilical cord and D25 connectors for plug-in to equipment frames; the audio router interfaces each provide 16 input or output connections, and up to eight interface modules will fit in a three-rack unit supplying as much as a 32x32 routing system; the audio DA interfaces each provide inputs and outputs for one DA and up to 10 interface modules will fit in a two-rack frame; the modules are compatible with Leitch's series 883 and 884 mounting frames.

Leitch, 920 Corporate Lane, Chesapeake, VA 23320; 800-231-9673; fax 757-548-4088
www.leitch.com
Circle (277) on Free Info Card

AES/EBU digital interface

Intraplex

• Line of high fidelity audio modules with AES/EBU digital transport capability: these modules can feed AES/EBU digital audio over Intraplex's TDM-160 T1 multiplexer systems and TDM-260 2Mb/s multiplexer systems and stay all digital end to end; the AES/EBU provides transmission of audio sampled at 32, 44.1 or 48kHz providing interface support to all common digital studio and transmitter equipment; a sophisticated sample rate converter, combined with digital signal processing technology, provides a smooth interface between the timing characteristics of the AES/EBU interface and the digital transmission circuit.

Intraplex, 3 Lyberty Way, Westford, MA 01886-3656; 508-692-9000; fax 508-692-2200
Circle (254) on Free Info Card

Lenses

Canon

• Optical Image Stabilizer lenses: these lenses incorporate Canon's Vari-Angle Prism(VAP) technology and eliminate image shaking commonly associated with shooting from a moving vehicle or in high wind conditions; a full line of VAP lenses are available including the J14aX17B KRS-V telephoto range zoom, the J13aX9B KRS-V, which features a wider angle and the IS-20B adapter, which is designed for front mounting on Canon's J20aX8B/H20aX6B ENG/EFP lenses.

Canon U.S.A., One Canon Plaza, Lake Success, NY 11042; 800-321-4388
Circle (260) on Free Info Card

UHF wireless microphone

AKG Acoustics

• WMS 300: a UHF-based wireless microphone system that offers 10 different microphone combinations and up to 16 different frequency options within 20MHz bandwidth; with the WMS 300 system, up to eight different WMS 300 units can be operated at the same time — safely and without cross interference — if interference should occur, you can switch the receiver and transmitter to another frequency channel.

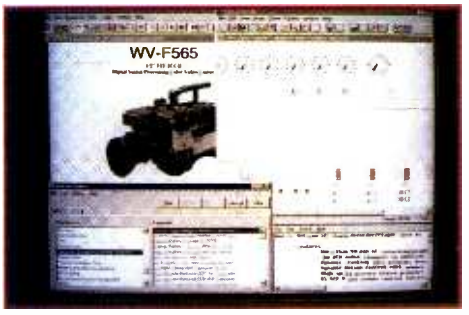
AKG Acoustics, 1449 Donelson Pike Suite 12, Nashville, TN 37217; 615-399-2199; fax 615-367-9046
Circle (256) on Free Info Card

www.americanradiohistory.com

Video furniture catalog
Winsted

• 1997 Winsted Catalog: a free colorful, 148-page catalog featuring hundreds of broadcast and video workstations in both desk and console configurations supported by a full complement of accessories; a complete line of modular consoles, AV and distance learning carts, vertical equipment racks, rack slide kits and Winsted's extensive variety of tape storage systems round out the offering.

Winsted, 10901 Hampshire Ave. So., Minneapolis, MN 55438; 800-559-6691
Circle (263) on Free Info Card



Audio, video and multimedia catalog on CD ROM
VidCad Documentation Programs

• VidCAD Specs: a CD ROM catalog that contains the specification information on thousands of products from hundreds of manufacturers; the CDs are updated quarterly and updates are posted weekly on the web; information provided includes product descriptions, technical specifications, options lists, high-resolution photographs and detailed front-panel line drawings.

VDP, 749 Carver Rd., Suite 2, Las Cruces, NM 88005; 800-949-SPEC; 505-524-8959; fax 505-524-9669; www.vidcad.com
Circle (267) on Free Info Card

ENG broadcast lens
Fujinon

• A10X4.8EVM/ERD: a wide-angle lens that provides 85° horizontal range of view; featuring Fujinon's Aspheric Technology, Electron Beam Coating and a new internal focusing system, it can be used in extremely tight settings; the internal focusing system eliminates pumping effects, providing the camera operator with a constant picture size during focusing; the lens is also equipped with an extra-large focusing ring and an ergonomically designed, adjustable hand grip to suit individual preferences.

Fujinon, 10 High Point Dr., Wayne, NJ 07470; 201-633-5600; fax 201-533-5216
Circle (262) on Free Info Card

Switcher series for RGBHV video/audio signal routing
Extron

• HV CrossPoint Series: HV versions of the CrossPoint matrix switcher series for RGBHV video and audio signal routing; the HV switchers can switch separate horizontal and vertical sync to ensure proper sync polarity and a more stable image; the HV series switch the separate horizontal and vertical sync as required by LCD, DLP and some CRT technology displays for proper sync "lock-up" and a jitter-free output; the series includes four models — 84HV, 84HVA, 128HV and 128HVA.

Extron, 1230 S. Lewis St., Anaheim, CA 92805; 800-633-9876; 714-491-1500; fax 714-491-1517
Circle (268) on Free Info Card

Platform-independent programming language
Quantel

• Java: Quantel is opening its application-specific hardware to external programmers, and software developers writing the Java language will be able to write applications for the entire family of Quantel products; Java is a platform-independent programming language, and users will have the freedom to integrate limitless Java applications with the functionality and ergonomics of their Quantel systems offering unprecedented access to external creative sources.

Quantel, 28 Thorndal Circle, Darien, CT 06820; 203-656-3100; fax 203-656-3459
Circle (264) on Free Info Card

Multipair audio cable
Gepco

• 4200 series: working with CommScope Inc., Gepco has improved its 618 series to produce a new multipair audio cable; the 4200 series features 22-gauge stranded, tinned copper conductors; using tight lay stranding on the conductors and drain wire provides flexibility, while reducing strand fraying; each pair is individually shielded and jacketed to virtually eliminate crosstalk and ground loops by isolating the ground contacts with adjacent shields.

Gepco, 2225 W. Hubbard, Chicago, IL 60612; 312-733-9555; fax 312-733-6416
Circle (269) on Free Info Card

DTV solid-state UHF transmitters
ITS Corporation

• ITS-8800 series: solid-state digital UHF transmitters that combine DTV performance and operational features; while offering solid-state power levels up to 5kW average power, the series provides DTV coverage solutions for digital or analog applications; a user-friendly control panel and operator interface include push-button access, front-panel LEDs and software metering.

ITS, 375 Valley Brook Rd., McMurray, PA 15317; 412-941-1500 ext 150; fax 412-941-4603; www.itscorp.com
Circle (266) on Free Info Card

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MILLER

QUICK DIAL 72

Fluid Heads and Tripods

The silky, smooth action of each Miller Fluid Head is the product of the finest quality cast and machined parts functioning together in a fluid environment. They are engineering masterpieces, built to operate under extreme conditions. They're engineered to exceptionally fine tolerances and their mechanisms are protected effectively against ambient moisture and dust.

Miller 20 -Series II Fluid Head

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

Miller 25-Series II Fluid Head

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

#601-Lightweight Tripod

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

#649-2-Stage Tripod

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

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

Vinten

Vision SD 12

Pan and Tilt Head with Serial Drag

The Vision SD 12 head features "Serial Drag" pan and tilt system. System consists of a unique, permanently-sealed fluid drag and an advanced lubricated friction drag. You achieve the smoothest pans and tilts regardless of speed, drag setting and ambient temperature.

- Patented spring-assisted counter-balance system permits perfect "hands-off" camera balance over full 180° of tilt.
- Instant drag system breakaway and recovery overcome inertia and friction for excellent "whip pans".
- Consistent drag levels in both pan and tilt axis.
- Flick on, flick off pan and tilt caliper disc brakes.
- Greater control, precision, flexibility and "touch"
- Touch activated, time delayed illuminated level bubble.
- Working conditions from as low as -40° up to +60°C.
- SD 12 weighs 6.6 lbs and supports up to 35 lbs.

Vision Two Stage ENG and LT Carbon Fibre ENG Tripods

The ultimate in lightweight and innovative tripods, they are available with durable tubular alloy (Model #3513) or the stronger and lighter, axially & spirally wound carbon fiber construction (Model #3523). They incorporate torque safe clamps to provide fast, safe & self-adjusting leg clamps

- "Torque Safe" requires no adjustment. Its unique design adjusts itself when required, eliminating manual adjustment and maintenance and making for a much more reliable clamping system.
- New hip joint eliminates play and adds rigidity.
- They both feature 100mm levelling bowl, fold down to a compact 28", and support 45 lbs.
- #3513 weighs 6.5 lbs - #3523 CF (Carbon Fibre) weighs 5.2 lbs.

Vision 12 Systems

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

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

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

VIN-5ST and VIN-10ST

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

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

JVC DIGITAL S BR-D80/BR-D85

QUICK DIAL 72

Digital Editing Recorder / Digital Editing Recorder with Pre-Read

Affordable, broadcast quality digital video is here. Digital-S reproduces images that not only are superior to any analog or digital 4:1:1 format but rival even the highest priced digital systems. It combines the robustness and reliability of a 1/2-inch format with 4:2:2 component processing and very mild compression to achieve and sustain excellent quality through multi-generation dubbing.

Broadcast Quality Digital Video

- 4:2:2 digital component processing adds richness and warmth unobtainable with lesser systems. Plus, only 4:2:2 stands up to the rigors of sophisticated chroma-keying, multi-generational editing, special effects, blue-screen compositing, matting, ATV up/down conversion, and multiple transconversion between compression systems.
- Mild 3.3:1 compression reproduces the finest colored details while minimizing artifacts. Digital S pumps out horizontal resolution of 540 TV lines. S/N ratio is 55dB.
- Audio is recorded by 2-channel, 16-bit PCM signals with a sampling frequency of 48kHz. PCM audio channels can be edited independently.
- Standard analog inputs/outputs provide outstanding performance for most applications. When virtually perfect dubs are required, the BR-D85 offers a serial digital interface. The one true digital video standard today, SMPTE 259M permits long cable runs and is used for direct connection to digital switchers, disk-based recorders and digital tape recorders. (Optional with the BR-D80).

Robust 1/2-inch Format

- They achieve super-high image quality using a robust, 1/2-inch metal particle cassette tape. The cassette housing has a dust-proof structure to increases tape life as well as your images. 1/2-inch format also offers an extra wide track-width of 20 microns for improved stability and reliability.
- Has powerful error correction circuitry that not only replaces data in the unlikely event of a tape dropout but continues to play back a picture even with a clogged head.

Digital Editing

- Equipped with variable slow motion which can be accessed by standard editing commands. Smooth and noiseless, the image quality of slow motion is equal to regular playback and is available within a range of ±1/3X.
- Longitudinal tracks include two auxiliary audio (cue) tracks and a control track for tracking purposes. Cue tracks provide easy location of edit points which can be heard at any tape speed.
- Because of its linear control track, Digital-S has a short lock-up time which eliminates long pre-rolls. This feature achieves a stable picture faster, saving precious editing time.
- Auxiliary video (sub-code) area stores two selectable uncompressed lines of video. Suitable for recording closed caption or other information located in the vertical blanking interval.

PRE-READ EDITING (BR-D85 Only) Previously an exclusive feature of very high-end digital systems, video pre-read enables the recorder to first play back the digital signal on the tape, before recording a new signal in its place. Operable with either digital or analog signals, pre-read lets you perform layering and A/B roll editing with only two VCRs, instead of three.

GY-X2B 3-CCD S-VHS Camcorder

QUICK DIAL 74

- 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

KY-27C 3-CCD Color Video Camera

- New 2/3-inch broadcast-quality 380,000 pixel CCDs with advanced electronics deliver resolution of 800 horizontal lines and reduced smear.
- High sensitivity of F9.0 at 2000 lux allows a truly usable minimum illumination of 1 lux with JVC's exclusive LoLux dual pixel readout sampling technique.
- LoLux mode allows shooting scenes that were previously impossible due to insufficient lighting. CCDs are maximized for low light sensitivity equivalent to an electronic gain of 24dB, then the dual pixel readout system is added which provides an additional 6dB. Together they provide +30dB without the noise and picture degradation normally associated with this much gain.
- Signal-to-Noise ratio of 63dB assures virtually "noise free" images.
- Auto knee circuitry extends a scene's light to dark dynamic range reproduction by up to five times without overexposure.
- Has large 1.5-inch viewfinder with 600 lines of resolution and SMPTE color bars. Status system provides audio levels, accumulated or remaining recording time, VTR operation, battery voltage and camera setup. Zebra pattern indication and safety zones with a center marker are also provided.
- Variable scan function enables a precise shutter speed from 1/60.2 to 1/196.7 of a second in 256 increments to be set, matching a computers scan rate. Almost any computer display can be clearly recorded.
- Camera head allows direct input of genlock signal and timing adjustment. A wide range optional remote controls, RS-232 interface, multicore and triax CCU's are available.
- Docks directly to the JVC BR-S422U, BR-S411UB and BR-S420CU professional S-VHS recorders. Optional adapters for docking to Hi-8 and Betacam SP are also available.

Panasonic

Broadcast & Television Systems

AG-DP800H SUPERCAM

S-VHS 3-CCD Digital Signal Processing Camcorder

- Three high-density 380,000 pixel CCDs with half-pitch pixel offset achieves over 750 lines of horizontal resolution, a S/N ratio of 60dB and remarkable sensitivity of f8 at 2000 lux. Additionally the Frame Interline Transfer (FIT) CCDs minimize vertical smear, so you maintain impressive picture quality even in very bright illumination.
- Digital Signal Processing circuitry provides four valuable benefits
  1) Consistently reliable up-to-spec performance.
  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.
- 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.

DP-800H "LS" Package:
- DP-800H Supercam 3-CCD camera head with 1.5" electronic viewfinder and Anton Bauer Gold Mount battery
- Fujinon S14x7.5 BRM 14:1 servo zoom lens
- CC-S800 soft carrying case
- WV-QT700 tripod mounting plate

DP-800H "XL" Package:
- DP-800H Supercam 3-CCD camera head with 1.5" electronic viewfinder and Anton Bauer Gold Mount battery
- Fujinon S14x7.5 BRM 14:1 servo zoom lens
- CC-H800 Thermodyne hard shell carrying case
- WV-QT700 tripod mounting plate
- Two Anton Bauer Digital Trimpack 14 batteries
- Anton Bauer 2-position quick charger

sachtler

QUICK DIAL 72

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.

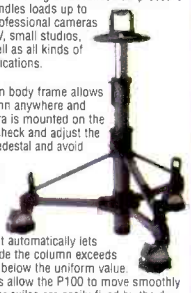
CAD 01 Single-Stage ENG Carbon Fiber System:
- CADDY Fluid Head • ENG Single-Stage Carbon Fiber Tripod
- SP 100 Lightweight Spreader • Transport Cover 100

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

Libec MATTHEWS

P100 Portable Pneumatic Pedestal

The P100 is a small size pedestal that offers great flexibility without taking up too much space. Featuring an advanced air pressure system, the P100 smoothly handles loads up to 66lbs., easily accomodating professional cameras used in a studio. Ideal for CATV, small studios, event and wedding video as well as all kinds of industrial and institutional applications.



Air Pressure System:
- Air pump attached to the main body frame allows air to be pumped into a column anywhere and anytime – even while a camera is mounted on the pedestal. This allows you to check and adjust the air pressure while using the pedestal and avoid over-filling of air.
- Air pressure can be gradually adjusted by discharging air through a bleed valve when too much air has been pumped into the column. There is also a relief valve that automatically lets air out when air pressure inside the column exceeds the uniform value, bringing it below the uniform value.
- Large double wheel 5" casters allow the P100 to move smoothly and quickly. Wheels and caster axiles are easily fixed by the double stopper system.
- A track lock mechanism locks the wheels of the pedestal so that it only moves in a desired position.
- Cable guards prevent the casters from rolling over and becoming tangled in camera cables when the tripod is moved around in a studio.
- Large steering wheel affords greater ease in handling when shifting columns up and down or when moving the pedestal.
- Maximum and minimum height is 31" to 61". By attaching the optional LA-100 Low Angle Adapter to the dolly for shooting at low angles. (Height from the ground to mount is only 10").
- The column and dolly can be quickly disassembled for convenient transport. The column weighs 18 lbs. and the dolly 16 lbs.

H80 Professional Fluid Head

A premium fluid head, the H80 incorporates a patented drag control system that provides the smoothest pan and tilt available.
- Unlike conventional drag systems that have click stops at predetermined points, Libec's Continuous Drag Control System provides infinite control of drag tension allowing smooth, rapid movements as well as very slow movements.
- Continuous Counter Balance Control System provides optimum camera balance with tilt angles of + 90° or -90°.
- Designed to withstand the most demanding environments, the H80 is fully operational even in temperatures as low as -22°F.
- H80 supports up to 37 lbs. and has a 100mm claw-ball to simplify camera leveling.

H70 Professional Fluid Head

The H70's patented counter balance mechanism supports various operating configurations including stand-alone cameras, camcorders and studio cameras with large viewfinders. Perfect balance can be obtained with settings from 0 to 3, depending on camera weight (from 15 to 33 lbs.) and tilt angle.
- Sliding balance plate features a locking mechanism and allow a total of 4" (100mm) of travel for camera balance. Has a 100mm claw ball.

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QUICK DIAL 74

NRG

POWER VEST SYSTEM

The Power Vest combines the comfort and convenience of a photo-journalist style vest with the power of NRG's highest capacity power belt. Available in two styles, the **Field** model is designed for use in a field production environment, while the **Event** model is for shooting events where style is everything. The Field model is ruggedly constructed from black high density weatherized ballistic nylon and has an open-cut style that makes it comfortable to wear in a variety of climates. Also has a highly adjustable design to fit almost any physical proportion.

- Internal and external pockets for blank tapes and accessories, a clear insert window for a press pass or business card, D-rings for cables and microphones, and an integral padded camera rest on the right shoulder.
- Cleverly concealed inside the vest is your choice of 12-volt 86 watt hour or 13.2-volt 95 watt hour nicad cell packs.
- A control box on the front features dual power outputs (dual cigarette, dual XLR or mixed).
- 7-stage "fuel-guage", charge status indication and auto-reset short/overload protection.

The **Event** model is very similiar to the **Field** except in place of rugged fabric and pockets it features shoulder to sternum black satin tux fabric. Worn under a suit coat, the **Event** model is indistinguishable from a formal dress vest and it still retains interior and low exterior pockets. Both vests include 300-series charger (12 hrs.) and can be used with the optional Intelliquick Fast Charger (2 hrs.).

POWER CAN SERIES

For powering single or multiple pieces of 12v DC equipment for extended periods of time, nothing beats the power and convenience of NRG's Power-Can Series. It integrates an ultra-high capacity, high-discharge-capable UPS type lead acid power cell, a world-wide fast charger, and computer-controlled monitoring system with display—in a single, rugged package. Connect up to four pieces of equipment simultaneously. From a midnight emergency scene to a wedding reception in the park, the Power-Can delivers ample power for extended running time.

- Recharge in 8-10 hours by simply plugging the Power-Can into any source of AC power (90-250v AC).
- LCD display shows discharge/charge status, voltage etc.
- An optional "Power Dolly" allows the Power-Can to be rolled for easy transport.
- Available in 18, 28 and 40 amp versions, each Power-Can has either four cigarette lighter connectors, four 4-pin XLR connec-

HORITA

BSG-50
Blackburst/Sync/Tone Generator

The BSG-50 provides an economical means for generating the most common RS-170A video timing signals used to operate various video switchers, effects generators, TBCs, VCRs, cameras and video edit controllers.

- 6 BNC video/pulse outputs
- Now available: 6 blackburst, 4 sync, 2 subcarrier
- Each sync output individually settable for composite sync, composite blanking, H-drive, or V-drive.
- Separate buffer for each output–maximum signal isolation
- 1KHz, 0dB sinewave audio tone output, locked to video
- Outputs can easily be configured to meet specific user and equipment needs. **$269**

CSG-50
Color Bar/Sync/ Tone Generator

- Generates full/SMPTE color bars, blackburst and composite sync signals.
- Built-in timer can automatically switch video output from color bars to color black after 30 or 60 seconds. Easy and convenient for producing tape leaders and striping tapes with color bars and black.
- Front panel selection of full-field or SMPTE color bar patterns or color/black (blackburst) video output.
- Includes crystal-controlled, 1KHz, 0dB audio tone output.
- Outputs: video, sync, ref frame, 1 KHz, 0dB
- Audio tone switches to silence and color bars change to black when using 30/60 second timer.
- Fully RS-170A SC/H phased and always correct. No adjustment required. **$349**

WE STOCK THE FULL LINE OF HORITA PRODUCTS INCLUDING:

WG-50 -	Window Dub Inserter
TG-50 -	Generator/Inserter
TRG-50 -	Generator/Inserter/Search Speed Reader
TRG-50PC -	Has all of the above plus RS-232 control.
VG-50 -	VITC Generator, LTC-VITC Translator
VLT-50 -	VITC-To-LTC Translator
VLT-50PC -	VITC-To-LTC Translator / RS-232 Control
RLT-50 -	Hi8 (EVO-9800/9850)TC to LTC Translator
TSG-50 -	NTSC Test Signal Generator
SCT-50 -	Serial Control Titler "Industrial" CG, Time-Date Stamp, Time Code Captioning
SAG-50 -	Safe Area, Convergence Pattern and Oscilloscope Line Trigger and Generator

QUICK DIAL 74

Canon

IF+ Series 1/2-inch and 2/3-inch Zoom Lenses

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

J15ax8B

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

J20ax8B IRS/IAS

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

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 NICAB 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 equioped 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)

InterActive 2000 Power/Chargers

A new generation of portable power systems, the InterActive 2000 Power/Charger series was designed from the ground up to offer unprecedented flexibility and economic expansion capabilities. Fully compatible with all current and future Gold Mount batteries, the InterActive 2000 Power/Chargers deliver all the advancements and proven reliability of interactive charging plus the ability to power a camera from AC mains. They also offer a unique, totally modular design that allows economical expansion to meet future needs. Starting with a base model, upgrades can be easily added at any time. With an unparalled combination of value and features, the InterActive 2000 Power/Charger system redefines the standard of power for video applications.

Standard Features on all InterActive 2000 Power/Chargers

- Two or four position models each with the full complement of InterActive technologies (see previous page) including: Automatic balance and rejuvenation, Lifesaver Maintenance, Cold battery safety and Power Loss Memory modes.
- They have a slim, lightweight design for easy portability. The 2702 and 2401 Quad Power/Chargers fit easily in a notebook computer carrying case and the 2701 and 2401 Dual Power/Chargers weigh just 2.3 pounds. Plus, they include power supplies, so you can leave your AC supply behind!
- Built in regulated DC power supply output powers cameras from AC mains worldwide. Wide range (90-264 volts AC, 50/60 Hz) input automatically adapts to any worldwide source.
- Standard serial output for printer and PC interface.
- Two power choices for optimized performance and economy.
- LCD automatically displays critical battery and charger data.
- Expanded communications with Digital Batteries and new charging protocols improve charge times and performance.
- Modular design allows addition or upgrades after purchase:
  - A charge position expansion port allows the addition of expansion charge modules to increase charge capability to four, six or eight batteries, including NP and BP-90 types.
  - Optional Diagnostic/discharge module featuring automatic calibration of digital batteries is available for each model. (standard on Quad 2702)
  - Power supply upgrade allows 40 Watt (2400 series) to be upgraded to 70 Watt (2700 series) capability.

QUAD 2702/2401
Four-Position Power/Chargers

The 2401 and 2702 are the lightest (and slimmest) full featured four position chargers ever available. Designed for the rigors of professional use, they can fast charge four Gold Mount batteries and can be expanded to charge up to eight. They also power any camera/camcorders from any AC main; all in a package the size of a notebook computer and weighing a mere 4 lbs (1.8 kg.)! The 40 watt (upgradeable to 70 watts) 2401 will charge ProPac batteries in two hours and TrimPac batteries in one hour. Add the Diagnostic/Discharge module and the QUAD 2401 becomes an all purpose power and test system with its standard LCD providing instant access to battery status. The 70 watt QUAD 2702 bundles the complete package of all the Power/Charger features in the ultimate professional power system.

Dual 2702/2401
Two-Position Power/Chargers

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

PROFESSIONAL VIDEO TAPE

QUICK DIAL 71

FUJI

Professional Grade VHS

PG-30	2.29	PG-60	2.49	PG-120	2.69

Superior Grade Double Coated VHS

SG-30	3.39	SG-60	3.99	SG-120	4.49

H471S S-VHS Double Coated

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

M221 Hi 8 Double Coated

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

M321SP Metal Betacam (Box)

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

DVCPRO

12M (Medium)	7.59	23M	9.19
33M	11.99	63M	20.49
64L (Large)	21.59	94L	32.49
123L			42.19

maxell

P/I PLUS Expitaxial VHS

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

HGX-PLUS Expitaxial VHS (Box)

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

BQ Broadcast Quality Expitaxial VHS (Box)

T-30 BQ	5.49	T-60 BQ	6.19	T-120 BQ	7.39

BQ Certified Professional S-VHS (In Box)

ST-31 BQ	7.19	ST-62 BQ	8.09
ST-126 BQ	8.39	ST-182 BQ	14.99

Betacam SP

B5MSP	15.75	B10MSP	17.75	B20MSP	19.75
B30MSP	20.50	B60MLSP	29.75	B90MLSP	46.49

Panasonic

Mini DV Tape

AY DVM-30	9.95	AY DVM-60	11.99

DVCPRO

AJ-P12M (Medium)	10.99	AJ-P23M	12.99
AJ-P33M	15.99	AJ-P63M	29.99
AJ-P64L (Large)	29.99	AJ-P94L	49.95
AJ-P123L			64.95

SONY

Hi-8 Professional Metal Video Cassettes

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

Hi-8 Metal Evaporated Editor (HMEAD)

E6-30 HMEAD	10.49	E6-60 HMEAD	14.89
E6-120 HMEAD			20.19

PR Series Professional Grade VHS

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

PM Series Premier Grade Professional VHS

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

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

T-30BA	3.59	T-60BA	3.99	T-120BA	4.79

MQ Master Quality S-VHS (In Box)

MQST-60	7.49	MQST-120	8.39

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

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

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

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

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

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

BCT Metal Betacam SP Broadcast Master (Box)

BCT-5M (small)	14.99	BCT-10M (small)	15.99
BCT-20M (small)	17.99	BCT-30M (small)	18.99
BCT-30ML	21.49	BCT-60ML	27.99
BCT-90ML			41.99

BCT Metal Professional Series

UVW-30MLA	18.95	UVW-60MLA	25.50
UVW-90MLA			39.95

Mini DV Tape

DVM-30ME	15.99	DVM-60ME	19.95

PVD Series Professional DVCAM Tape

PDVM-12ME (Mini)	24.50	PDVM-22ME (Mini)	26.95
PDVM-32ME (Mini)	29.50	PDVM-40ME (Mini)	31.95
PDV-64ME (Standard)	39.95	POV-94ME (Standard)	44.95
PDV-124ME (Standard)	49.95	PDV-184ME (Standard)	59.95

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QUICK DIAL 731

DIGITAL PROCESSING SYSTEMS INC.

PVR-2500 'Perception' Digital Video Recorder

The Heart of an Advanced Digital Audio/Video Workstation

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

- The PVR-2500 is a full-length PCI card with a FAST SCSI-2 controller which connects to one or up to seven dedicated hard drives. Because the SCSI controller is integrated with the PVR-2500, video data never has to go over the PCI bus during playback. This avoids the bottlenecks found in systems which use the computer's hard drive for video storage.
- Perception gets animations out of your computer fast and easy. Its exclusive multi-format virtual file system ensures complete integration with your Windows NT applications. Any acquired video or computer generated Perception video clips appear simultaneously in many different file formats including TARGA, SGI, BMP and IFF. Perception is compatible with Lightwave 3D, Autodesk 3D Studio Max, Crystal Graphics TOPAS 5.1 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.

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 FX 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.

Scitex

SPHEREOUS Professional Video Editing Software for Macintosh

Working in conjunction with the Apple PowerMac 9500 and Truevision's TARGA 2000 RTX board, SphereOUS provides two simultaneous channels of CCIR 601 high resolution video, key-frameable effects control and four channels of stereo audio. An editors dream, dual streams of video eliminate waiting for transitions to render and enable a still alpha channel to be superimposed without rendering. Who says the pros get to have all the fun? Now, sophisticated, realtime video editing capabilities are yours thanks to the industry-rocking punch of SphereOUS.

- Variable video compression ratios as low as 3:1 (user-selectable up to 18:1) translates into excellent picture quality. PlusSphereOUS offers extremely clean input and output (CCIR 601, 720 x 486 pixel NTSC, 720 x 576 pixel PAL) electronic video paths, with results that are virtually indistinguishable from the original source.
- Two simultaneous streams of broadcast-quality video allow special effects to take immediate shape on your monitor. InstantFX. Realtime. All the Time. InstantFX means your fingers fly across the keyboard, and as soon as you enter an idea POW! there it is on the screen. Want to modify something? Another POW! The minute you think of it, there it is moving from concept to reality in the blink of an eye. SphereOUS fully leverages the dual realtime video stream capability of the TARGA 2000 RTX.
- Realtime audio mixing with four CD-quality, stereo audio tracks - as well as independent channel gain, pan, and phase invert for maximum realtime flexibility. And remember - all audio effects are keyframable, inviting you to customize to your heart's content.
- SphereOUS' QuickTime-native Motion JPEG file format can be freely exchanged with compatible applications, enabling you to work with a variety of third-party animation and effects programs to create precisely the look you want.

DveousFX and AdvancedFX Options

The DveousFX is an optional full-length PCI board which adds 3D space manipulation to the existing 2D digital effects of the TARGA 2000RTX– providing real-time effects capabilities far and above what is possible with the RTX alone. This option allows you to rotate an image - with perspective - on an X, Y, and Z axis. You can also play with an extensive array of wipe patterns such as diamonds and hearts, and experiment with capabilities like soft edges, borders, drop shadows, blurs, and pattern repeat and rotation. There's even a luminance keyer on the overlay track with variable softness and position drop shadow.

- Wipe patterns include: Clock, heart, diamond, circle, box, left-right, center-split, 2-V point, square, triangle, pentagon, hexagon, 5- 6- 10-point stars, envelope, snowflake, hyper-hexagon, rounded hexagon, ellipse
- Timecode support • Batch digitizing
- Unlimited custom effects creation capability
- Realtime video transitions: dissolves, wipes, pushes, zooms
- Realtime video special effects: crop, 2D DVE (size, position, X/Y "rotation")
- Powerful Keyframer Control palette provides keyframe control of multiple layers of video.

For maximum impact, the AdvancedFX mezzanine board takes you a step further with the addition of a pallete of unique warps including page turns, rolls, ripples and spheres. The board also adds chroma keying, lighting and color correction controls that make you the master of features like luma and chroma gain, hue rotate, black level, and posterization. Dual color light source can be positioned in 3D space with a choice of bar, flood or spotlight effect to produce extremely realistic highlights and shadows. These can interact with page turns and ripples to pack your production with a realistic punch. With SurfaceFX, you can even add surface textures for a completely new dimension.

- Warp shapes include: Cylinders, rolls, wave, barrel, circle, bowtie, helix, twist, wrap, ripple, zigzag, paper fold, lace, interlace, split, shred, pipe organ, burst, flare, quad page turn, quad page roll, lens, swirl, rings, melt, qaud page split and multi-picture.
- AIFF/CD audio file import and export
- Tools for organizing and managing source material
- PICT file import/export
- CMX compatible EDL output/input
- Control panel operation: Audio Sliders (record and playback) Mode switches (Loop, Preview), VU Meters, VTR Controls

SphereOUS Control Panel

The optional SphereOUS Control Panel is ergonomically designed with jog knob, four faders for control of stereo audio level, master volume, mute, marks, and forward and rewind.

QUICK DIAL 731

FAST The Art of Digital Video

Video Machine

Video Machine is an edit controller for A/B roll, A/X roll and audio/ video split editing. It controls any VCR with Control-L or Panasonic 5-pin edit protocol. With optional interface it provides RS-232/RS-422 machine control as well. Controls 3 VCRs with no other hardware. It also features EDL export, alpha wipes, test pattern generator, Editing Panel, and more than 400 digital effects.

- Bundled VM-Studio software uses a graphical timeline interface for editing. You can work with all available material at the same time, and all objects in the timeline can be edited and moved to any position, any time.
- During previews and recording uses time code (VITC, RC, Control Track) to accurately cue the VCRs to the in/out points of individual clips. Graphics, titles, and effects are automatically inserted at the point specified.
- Over 400 digital video effects (dissolves, wipes, tumbles, flips, picture-in-picture, fly-ins, fly-outs, zoom etc). With the DVE Editor, create an unlimited number of 2D effects. All effects are performed in real time.
- Supports composite and S-Video signals in PAL and NTSC. Up to six video inputs (two of which are controllable) can be connected, and any two can be assigned to the two video channels. Video standards can be mixed in real time.
- Two integrated frame synchronizers eliminate the need for TBCs (Time Base Correctors). Also provides two 32-bit framestores and a built-in background color generator.
- VM-Titler lets you create titles, logos and graphics in Windows application such as Corel DRAW or Photoshop. Use any font, size and color. Graphics produced in standard word processing or graphics applications are imported via the VM-Titler software module. Scanned pictures or images can even be imported from Photo CDs. Titles and graphics can be manipulated with any of the effects available. Functions such as scroll and crawl titling are off and running within a matter of seconds. Has complex filters for anti-flickering, scaling etc. Produces text without "stair-stepped" effects.

VIDEO MACHINE + DPR = HYBRID EDITING

Linear and Non-Linear Editing in a Single System for Maximum Flexibility

Video Machine with DPR (Digital Player/Recorder) is the only system which offers real-time mixing of analog and digital sources. Video Machine with DPR integrates two complete editing systems under one interface, thus ensuring the optimum balance of cost, performance, training, and maintenance. It executes both tape- and hard disk-based edits effortlessly, and it's simply a matter of preference whether you work in analog or digital, or both — all on the same system. Only the FAST hybrid system gives you the best of both worlds. Instead of being stuck with an inflexible system, you can select your method to suit your circumstances. For example, viewing and logging your tape footage can be tedious enough without having to face the next step. But imagine instructing the system to copy selected scenes onto the hard disk, while you take a coffee break. When you come back, you're ready to enjoy the creative freedom of non-linear. And once the creative decisions are made, you can either have the system perform the on-line edit for you, from tape or hard disk, or you can choose to go with an EDL export. No other system gives you this much flexibility.

DPR (Digital Player/Recorder:

- With DPR Video Machine becomes a state-of-the-art digital editing system. In addition DPR executes effects and transitions in real time. True M-JPEG compression enables every frame or field to be accessed individually.
- Compresses and decompresses video (software-selectable) from 200:1 to 2:1. At 2:1 DPR delivers broadcast, on-line quality allowing for mastering directly from the hard disk.
- Video Machine system treats the DPR just like any other "normal" video source. The DPR is enabled by a single mouse-click in the VM-Studio software. The edit suite instantly converts to nonlinear and allows you for example, to execute an offline edit in real time. A second click changes the editing suite back to analog. You can now edit the project using tape source material from your VCRs. Whether working on- or off-line, linear or non-linear—all four editing modes are available on one complete system.
- Integrated digital eight-channel mixer allows audio to be edited in real time in standard WAVE format. The audio is synced to video and recorded in full 16-bit, 48 kHz sampling. It is easy to split the digital audio and video signals, and the waveform display helps to precisely position edits. All eight online tracks can be monitored simultaneously.
- DPR is an ideal solution for animation. It offers broadcast quality while reducing recording time to a fraction of what is required with single-frame capable VCRs. Scene logging and batch digitizing are also automatically integrated via the connection of the edit control functions of Video Machine.
- Video Machine is based on an open architecture design and is almost infinitely expandable as far as storage. Up to 29 hard disks can be daisy-chained directly to the DPR. Using 9 GB drives, up to 260 GB is available on the system - enough for 15 hours of 5:1 or 300 hours of 100:1 video.

OPTIONAL ACCESSORIES:

Video Machine is designed to interface perfectly with traditional broadcast equipment. These rack-mountable accessories integrate Video Machine into a professional video studio environment.

Studio Control (SC) :
Connects video, audio, sync, machine control and TC cables from VCRs to Video Machine. With built-in LTC reader/generator, additional preview outputs, balanced XLR audio and reference in/out, the SC Box offers a simple way to interface with studio equipment.

YUV Interface:
19-inch terminal box connects to the internal YUV board. Enhanced analog bandwidth, 2X oversampling and a balanced signal filter guarantee excellent quality. Included calibration software lets you adjust volume and timing. Digital signal passes directly without generation loss.

GPI Box :
The GPI box provides control of external DAT recorders, CD players, video mixers and effect generators. As a master, Video Machine can sync control of up to four devices with pulse signals and has tally support for live cameras. In slave mode, Video Machine serves as the player for titles, graphics and digital video effects.

Jog/Shuttle Wheel:
An alternative to the mouse and keyboard, the physical Jog/Shuttle wheel offers a bette "feel" for the edit and during preview.

ANTEX ELECTRONICS

StudioCard

4-Channel Digital Audio Card for Windows

The next generation in digital audio for the desktop. StudioCard is a premium-quality digital audio adapter with advanced features, studio-quality specs and professional connections. Unmatched in quality, flexibility and expandability, it features 4 tracks of audio sound and real-time digital mixing capability,making it the ideal board for musicians who want digital multitracking and mixing on their PC, or producers looking for a versatile board for post-production digital audio editing and uncompromised audio quality. StudioCard is Windows 95' plug and play compatible plus includes drivers for Windows NT as well.

- Key to StudioCard's amazing sound is the marriage of a low noise analog I/O section and high quality A/D and D/A converters. A PCI-based 32-bit memory mapped board, it delivers less than 0.003% total harmonic distortion and 92dB dynamic range. Plus, a PLL-based sample clock generator that can be locked to an assortment of clock sources.
- Incorporates a programmable 32-bit 40 MHz DSP and pro connections like 4 independent balanced analog I/Os (+4dBu or -10 dBV) and AES/EBU or S/PDIF digital I/O. It also offers a MIDI port with deep buffers and time stamping. No matter which type of equipment you have StudioCard will integrate into standard studio environments.
- Compatible with film, video or MIDI. StudioCard offers synchronization via SMPTE, MTC, word and pixel clocks, and composite video. Plus, the StudioCard not only reads SMPTE timecode, but generates it as well.
- Unique to the Antex design is StudioCard's multiple adapter capability. This means you can install multiple StudioCards in a single computer for up to 16-track recording. Start with one StudioCard today - add more StudioCards tomorrow. Also included is an on-board SPx expansion connector for plugging in optional daughtercards for compression or enhanced DSP operations.

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QUICK DIAL 72

nova SYSTEMS, INC.

StudioFrame Modular Video Processing System

The Nova StudioFrame Series is a modular, flexible, digital/analog signal processing system. It is designed to efficiently and effectively combine a wide variety of individual function (or processor) boards such as A-D and D-A converters, video signal encoders and decoders, audio and video distribution amplifiers and frame synchronizers into more complex function groups, all in one equipment mainframe. The scalable nature of the StudioFrame design allows it to be easily reconfigured and/or upgraded as today's video standards and requirements continue to evolve. The system is based on two rackmount frame models (the SF-3 and SF-1) allowing up to thirteen front loading processor boards and thirteen rear mounted passive interface cards to be accommodated in a single chassis. Both the StudioFrame SF-1 and SF-3 chassis are designed to meet the most stringent broadcast requirements. The SF-3 is a thirteen slot, 3RU chassis while the SF-1 is a 4 slot, 1RU chassis. All studio cards as well as the two chassis' are backed by a two year warranty on parts and labor with guaranteed 24-hour turnaround service. The units are ruggedly constructed to endure studio rackmount, production van and DB (Outside Broadcast) mobile applications. A universal power supply operates at either 110 or 240 VAC, 50/60 cycle. DC operation is optionally available as is a redundant supply with automatic switchover. Dual exhaust fans maintain proper airflow and cooling. "Hot swappable" front card loading allows power-on removal/insertion of individual processing modules without disturbing others in the system. All cabling can remain in place while you service any module. An intelligent "centerplane" provides power, sync, timing and data distribution, facilitating expansion to more complex, more cost-effective signal processing functions.

NovaASD/NovaSDA
Analog to Serial Digital & Serial Digital to Analog Converters

Components of the Nova StudioFrame series, the NovaASD and the NovaSDA incorporate the latest digital video processing techniques for high speed A-D and D-A signal conversion. They are designed to meet the most stringent broadcast requirements and their "hot swappable" front card loading facilitates servicing without disturbing other cards in the system. The NovaASD is ideal for for interfacing analog signals with digital video formats and the NovaSDA for interfacing serial digital signals with existing analog video systems as well as for signal monitoring applications.

SDA-1 Serial Digital Component to Analog Component Converter
- SMPTE 259M 4:2:2: Serial Digital Component (D1) input,
- Equalized and reclocked serial digital component output
- Analog component video (Y, R-Y, B-Y/YUV), RGB or RGB/S outputs
- 10-bit D/A converters
- Output level control
- NTSC and PAL compatible

SDA-2 Serial Digital Component to Composite and S-Video Converter
- SMPTE 259M 4:2:2: Serial Digital Component (D1) input,
- Equalized and reclocked serial digital component output
- Dual composite & dual S-Video outputs
- Color bar output selectable
- 10-bit D/A converters
- Output level control
- NTSC and PAL compatible

SDA-3 Serial Digital Composite to Analog Video Converter
- SMPTE 259M Serial Digital Composite (D2,D3) input,
- Equalized and reclocked serial digital composite output
- Four analog composite video outputs
- Color bar output selectable • 10-bit D/A converters

ASD-1 Analog Component to Serial Digital Component Converter
- Analog component video (Y, R-Y, B-Y/YUV), RGB or RGB/S input
- Dual SMPTE 259M 4:2:2 Serial Digital Component (D1) outputs
- 10-bit D/A converters
- Picture positioning control
- NTSC and PAL compatible

ASD-2 Analog Composite and S-Video to Serial Digital Component Converter
- Analog composite and S-Video input
- Dual SMPTE 259M 4:2:2 Serial Digital Component (D1) outputs
- 10-bit D/A converters
- NTSC and PAL compatible

ASD-3 Analog Composite to Serial Digital Composite Converter
- Analog composite video input
- Dual SMPTE 259M 4:2:2 Serial Digital Composite (D2/D3) outputs
- 10-bit D/A converters
- Input gain adjustment

NovaMNR Median Noise Reducer

The NovaMNR is a StudioFrame card that eliminates impulse and transmission noise, cleans up satellite, microwave and fiber feeds and fills in CODEC and time-based corrected videotape drop-outs. It features full bandwidth, uncompressed 10-bit digital processing for ultimate video transparency as well as analog composite inputs and outputs.

- Eliminates "sparklies", those black and white dots that sometimes appear on remote video feeds. The NovaMNR incorporates a proprietary adaptive three-dimensional median filter that analyzes pixels from several fields of video and replaces the impulse noise with uncontaminated, clean video.
- Universal drop-out compensation replaces missing video information, whether it is from a time-base-corrected VCR source or the decoded output of a CODEC feed. The NovaMNR effectively fills in drop-outs with replacement video from the surrounding pixels and previous video field.
- Control's are accessible locally or remotely. A three position threshold switch (off/low/high) adjusts system noise sensitivity while a bypass/operate switch is also included. Both switches are remoteable via RJ-11 jack.
- Also available in PAL and PAL-M versions.

NC-8 RGB/Component to Composite/S-Video Encoder

The NC-8 processor module is a 10-bit digital encoder that converts analog RGB or component video input sources into Y/C and composite video. Designed to facilitate multi-format interface requirements, the module incorporates the latest digital video processing techniques along with luminance and chrominance pre-comb filtering to assure the highest quality encoding. A frame of memory is utilized to provide an effective zero insertion delay.

- 10-bit processing, 8-bit D/A conversion
- Zero insertion delay, frame of memory
- Two composite and one S-video output.
- Analog RGB (Sync on Green or all three), RGB/Sync and YUV (Betacam) inputs. Also available with looping inputs.
- Variable luminance notch filter
- Y and C pre-comb filtering for maximum encoding performance
- Remote serial control
- Output level control
- Color bar output selectable
- Designed to meet the most stringent broadcast requirements.
- "Hot swappable" front card loading facilitates servicing without disturbing other cards.
- Available in PAL and PAL-M versions

NovaRouter Intelligent Matrix Routers

NovaRouter is a series of serially controlled audio and video matrix routing switchers. These intelligent routers are available in 8x8, 16x16 and 32x32 matrices. They are capable of up to five switching levels to support unlimited combinations of Stereo Audio, Composite Video, Y/C Video, Component Video (Beta or MII), RGB/S and VGA Graphics. Audio follow video or breakaway routing is controlled by very intuitive computer software or optional XY control panels.

The computer software and VGA display provides quick visualization of all crosspoints and facilitates routing operations. An unlimited number of switching configurations may be stored and recalled at the click of a mouse. User defined labels for all sources and destinations provide positive identification of the matrix status. One computer can control several NovaRouter Systems for multiple studio or large presentation system applications.

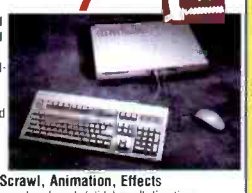
The optional, easy to use, XY control panels provide routing functions for basic systems without the use of a computer interface. All video, audio and audio follow video switching functions are controlled by source select and destination select switches. Changing and verifying the matrix configuration is simple and clear. The XY controls may be front panel mounted or are available as a remote control unit.

Broadcast quality audio and video processing and microprocessor control ensure superior quality and performance. Yet, the simplicity and modular configurations of NovaRouters™ make them economical for broadcast, production, cable TV, graphics, presentation, teleconference and educational applications.

- 8x8, 16x16 and 32x32 switching matrices
- Stereo audio, composite video, Y/C, component video, RGB/S and VGA
- Up to five (5) levels of switching
- Audio follow video and audio break-away
- Serial control via intuitive computer software or optional XY control units
- Computer VGA monitor display provides quick visualization of all crosspoints
- Easy single "click" mouse switching control
- User labeling of sources and destinations
- Store system configurations in memories
- Multiple locations can be controlled from one computer
- Push-button XY control options, front panel mount or remote control units
- Audio and video modules provide easy system upgrade

VIDEONICS POWER Script™
Animated Postscript Character and Graphics Generator

QUICK DIAL 74



The most advanced character generator ever designed for video production, multimedia and industrial applications, PowerScript delivers the huge range of titles and graphics supported by PostScript display technology, plus animation, effects, transparency and color keying. It features two GPI inputs, anti-aliased, 17.5 ns (nanosecond) pixel resolution and 4:2:2 broadcast-quality video. It also offers high-speed RISC processing to provide real-time Level 2 PostScript imaging and fast rendering—even with the most complex images. The PowerScript works stand-alone or with a computer, has a built-in TBC, offers a powerful and intuitive interface, and is suitable for the desktop or can be rackmounted.

Powerful Character Generator
- Choose from 35 built-in fonts or download PostScript fonts from your PC. PowerScript's high-speed RISC processor provides real-time PostScript imaging.
- Characters can be rotated at any angle, scaled to any size, stretched horizontally or vertically.
- Styles include variable bold and italic, underline and shadow (drop shadow, variable displacement and opacity) Each character can be adjusted separately.
- Text can be positioned anywhere on the screen or automatically centered, vertically or horizontally .Left, right, top, bottom and center justification is also provided.
- Characters are automatically kerned, using the font's standard kerning information. Spacing is highly flexible with variable word and letter spacing and line spacing (leading).

Intuitive User Interface
- Built-in real-time object-based drawing tool and text editor—no computer or software required. Design can be done ahead of time and displayed later, or can be done on the fly.
- Supplied keyboard and mouse are used with easy on-screen menus to place and modify graphics and text.
- Change fonts, colors, and other characters instantly.

Transparency and Colors
- Characters can be made transparent (0-100%) over video, other characters and graphics with 64 levels of transparency.
- Opaque characters can use over 4,000,000 colors , transparent characters can use over 8,000.
- Different colors can be used for fill and outline (variable width) as well as each letter and each graphic.

Roll, Scrawl, Animation, Effects
- Variable speed roll, crawl and push (side) in all directions.
- Every text object, graphic and logo can be animated .Complex animations include having elements follow paths, bounce, etc.
- Elements can change outline and/or fill color, transparency, position as they move and results are displayed in real time.
- Move individual characters in different directions; make colors change; flash words; make letters and words bounce; spin a letter across the screen. Use fades and wipes to transition between titles and video or between two pages of titles.

Backgrounds and Graphics
- Titles can be placed on solid color, patterned or graduated backgrounds, or they can be genlocked to incoming video.
- Lines, squares, rectangles, ovals and circles can be created and placed anywhere on the screen. Each graphic object can use a different color, transparency, rotation, size, fill and outline.

Imported Logos and Graphics
- Accepts most PostScript or PCX format graphics without modification. Imported images can be any size and can be scaled, skewed, and rotated when placed on screen.Transparency and anti-aliasing can be defined when graphic is generated.

Expansion Capabilities

Although PowerScript operates on its own, you can still add peripherals and connect to a computer or network. Two PC-card slots allow the addition of non-volatile flash-RAM and Ethernet cards. RS-232 port allows connection to desktop computers for added storage and downloading of fonts or graphics from a PC

QUICK DIAL 72

LEADER

Manufacturing test and measurement equipment for over 40 years, Leader Instruments is the standard which others are measured against for reliability, performance, and most important—cost effectiveness. Before a product is brought to market, an exceptional degree of energy and effort go into its design. Prototypes are built and tested to withstand environmental and other factors far exceeding actual operating conditions. These include high humidity, extremes of heat, cold, shock and vibration. Manufacturing quality is built in every step of the way and only the finest parts are used. At each production run, subassemblies are separately tested before they are integrated into the finished product, then each product is tested again. This is why less than half of 1% of all Leader products are ever returned for warranty repair or adjustment.

5860C WAVEFORM MONITOR

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

5850C VECTORSCOPE

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

5100 4-Channel Component / Composite WAVEFORM

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

5870 Waveform/Vectorscope w/SCH and Line Select

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

5872A Combination Waveform/Vectorscope

Models 5872A offers all the operating advantages of the 5870, except for the following: SCH is deleted from the 5872A (line select retained), making it ideal for satellite work.

5864A Waveform Monitor

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

5854 Vectorscope

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

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

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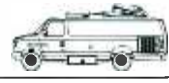

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Continued from page 40

ment table to the FCC. The table pairs a channel for DTV simulcast with every NTSC station. The filing was signed by many broadcast groups and stations. The assignment table optimizes DTV service for all broadcasters with minimal impact to existing NTSC service areas as the top priority.

The goal of the assignment process is to assign the DTV channels in such a way that any DTV interference into NTSC falls mostly in areas *already* lost to NTSC interference, translating to no loss at all. Any reduction of NTSC service area is termed new interference. A DTV transmit antenna is assumed to be at the same location and height and to have the same directional pattern as the antenna of the paired NTSC station.

The noise-limited contour of a DTV station is where the predicted signal strength, in the absence of interference, is just sufficient for errors in the received signal to not exceed the threshold of visibility. The FCC Advisory Committee has determined this threshold as a digital signal bit error rate of $3x10^{-6}$. This bit error rate is achieved at a signal-to-noise ratio of 14.9dB. The DTV service area is the area within the noise-limited contour reduced by the areas where interference from DTV or NTSC stations is above the threshold of visibility. This was the plan according to the broadcasters and the FCC. And finally, we have the channels.

Here come the channels

Now is the time to begin your station's implementation plans. First, you need to analyze your coverage to ensure that you receive fair DTV coverage. Second, make sure that your NTSC service will be unharmed. For the third and final step, after you have established that your station can transmit and the DTV signal can be received as well as your NTSC signal, it is time to begin planning for your first DTV broadcasts. Not all the broadcast and studio equipment necessary for DTV operation is available. Even so, planning must begin *now*. ■

Louis Libin is a broadcast/FCC consultant based in New York.

Waivers

The schedules for the DTV build-out are based on the assumption that certain waivers will be secured for individual cases. Waivers could be required for:

- Broadcast equipment availability
- FAA tower issues
- Local zoning approvals
- Compliance with FCC radiation requests
- Conclusion of retransmission consent negotiations
- Availability of electrical power
- Availability of DTV construction financing
- Channel and site adjustments
- Consulting engineer availability
- Border frequency coordinate issues

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Sony's Business and Professional Group is seeking the following broadcast professionals:

Senior Video Systems Design Engineers

We are looking for seasoned engineers to design large-scale digital audio/video facilities, including floor plans, equipment rack layouts and detailed signal flow diagrams. Candidates must have 5+ years' experience with state-of-the-art analog and digital A/V, production and broadcast facilities, and be especially strong in system-level engineering design and technical problem-solving. Fluency in MS Excel for Windows is required; AutoCAD, Word and Access knowledge is a plus. Team-building, communication skills and the ability to work with minimal supervision are also key. We have both regular and contract positions available, but all require full-time presence at our San Jose facility. Some travel during installation/testing will be required. (Job # CY-BE1)

Project Managers

Responsible for the management of resources to execute fully integrated broadcast systems. Must be able to complete projects on time and within budget. The ideal candidate will bring 5+ years of project management in broadcast or production systems. (Job # CY-BE2)

Senior Marketing Manager

Develop and direct marketing strategy for the broadcast industry. This includes video file server-based automation systems, master control routing switches and related products. Position requires 10+ years of extensive marketing experience in broadcast or other closely related industry. (Job # CY-BE3)

Engineering Instructor/ Trainer

Develop and present courses on repairing and maintaining state-of-the-art video equipment and systems. Courses will be constructed around focused objectives and concentrate on hands-on skills development. You must have strong computer skills, BSCS/BSEE with 5 years' experience in the broadcast/professional video industry. (Job# CY-BE4)

Product Support Engineer

Manage all technical support for products such as Sony's Integrated Duplication Operation, Video Store and Edit Station. You will review all technical documentation, actively problem-solve and act as a liaison between factory design and support, and marketing, field service and product sales. Position requires a BS in EE or CS with 7+ years of experience developing and supporting software-based products and 2+ years with servicing or designing Sony products. (Job # CY-BE5)

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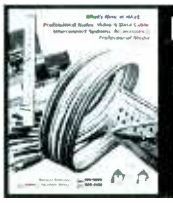
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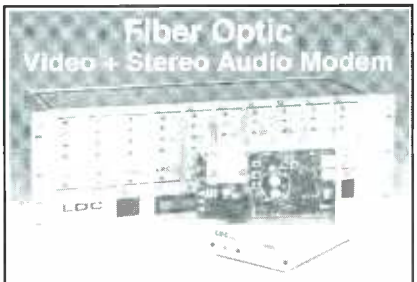

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By Paul McGoldrick

Initials for everything

Is it just me or do all technologies these days have to be expressed in initials or abbreviations? In my early video days at the BBC, it was the people who had the initials, not the equipment. Every position's title was an abbreviation from HE (head of engineering) down through EiC (engineer-in-charge) to SE (shift engineer); there were hundreds of titles you were expected to remember. Those, plus your staff number, were essential to any kind of communications save the video and audio we were producing for transmission.


Paul McGoldrick

Today, the worst area is in networking where three-letter acronyms are prolific. Using a vowel to complete the word is popular: think of LAN (local area network) and WAN (wide area network). What's wrong with local network and wide network? But then, how small is local and how big is wide?

To the rest of the world, ATM is where you convert plastic to paper money, but in engineering we have no choice but to think of it as a communications networking protocol. A short while ago, this column was disparaging of ATM's abilities to "make it" with video people. The same thing seems to be happening in the telecommunications industry where carriers and local PTTs have lots of ATM networks, but all of them seem to be experimental. So, the only real users today seem to be the highly accepted, high-performance corporate networks. And, despite the fact that this is making money for some people, there are still others who think that the standard is an unacceptable compromise, and that the much-vaunted ATM Forum — an industry de facto group, a standards body — works faster than the school principal in deciding guilt or innocence. That sounds good, but for those of us who have been on standards committees, we know that although the processes are slow, sometimes excruciatingly slow, they are often necessary to preserve even the smallest features.

Making amends on ATM

At a recent conference, I did get castigated about ATM. That's not unusual, the being castigated bit, but having three people set on me in as many days on one subject is extremely unusual. The general tone of the conversation was that I had ignored an important aspect of ATM. They are correct and I should make amends: ATM is a packet structure, but it differs from other packet-switching systems. The protocol of Ethernet is one of a connectionless network. When an Ethernet transmission is originated, there is no need for the sending terminal to advise the receiving point; the sending terminal commits packets to the system with the packet header containing the network address to route the packet. With each packet being committed as an individual entity, the routings could be entirely different for each. Some could go astray, some could be out of sequence, but the available bandwidth is likely to be efficiently used.

ATM is a connection network protocol. Before the message packets are transmitted, the preliminary task is a call setup phase; the route from transmit to receive point across the network is defined in this phase with routing of the ATM session only taking place once. The connection path, the virtual circuit, is marked by a connection identifier included in each ATM header in the session. Every ATM switch in the virtual path is configured to switch the incoming cells based on the connection identifier. Compared with a connectionless protocol, there is no need for the constant unbundling and rebundling of the packet to find the output node port required for the destination address. The connection network protocol has major advantages as systems get bigger. The general view is that at about 1,000 users, the connectionless protocol switching becomes almost unmanageable, and even with competent staff, there will be some strange routings: you hear of stories of poor response times between adjacent buildings in San Jose only to find out that servers were having data routed via London!

The use of bandwidth in the ATM connection protocol is inherently low. Once a virtual circuit has been allocated bandwidth, then the amount of the allocation cannot be increased or reduced; the maximum loading on an ATM bearer circuit cannot, under normal use, be allowed to exceed 65%. This is extremely low by telecommunications standards and would be considered a major objection to ATM.

Despite the billing systems we are used to seeing, however, bandwidth is, to all intents and purposes, free in the huge bandwidth systems we now have. ■

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

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CABLE TV CHIEF FIELD TECHNICIAN A municipal utility located in the capitol city of Kentucky, has an opening, in its Community Cable Television Division. An Experienced Chief Technician is needed to assist with the maintenance of its CATV system (17,000 subs) by implementing preventive maintenance standards, providing emergency repair service, conducting proof tests; trouble-shooting system from head-end to taps; performing leakage-detection and repair service; and providing emergency repair service at all hours. Must have high school or equivalent plus five years directly related work experience. Vocational courses in related field and/or SCTE Certification is preferred. Must possess a valid KY drivers license with a good driving history. Must be able to successfully complete drug screening and background investigation. We offer between $13.66 - $16.39 Hourly and an Attractive Benefits Package (KY Retirement System, Life, Health, Dental, Uniforms, Holidays, Vacations and Sick Leave, etc.). Qualified applicants may request an application form by phone: (502) 223-3401 Ext. 133 or by mail: FEWPB Personnel Officer, P.O. Box 308, Frankfort, KY 40602. Applications accepted through April 30, 1997. Equal Opportunity Employer.

Uplink Engineer

TCI's Broadcast Satellite Uplink Center is growing from 275 uplinked services to 400. We need technicians to construct and operate this state of the art facility. Several positions available with responsibilities and compensation dependent on qualifications. Experience with digital video, computer based control systems, RF and broadcast operations desired. SBE, SCTE certification preferred.

Uplink Draftsperson

TCI's National Digital TV Center is seeking CAD draftsperson to set up and administer documentation and planning documentation. Experience with video and broadcast operations desired. SBE, SCTE certification preferred.

Drug and background check will be required for employment. Successful applicants needing an accommodation for the interview should inform manager at time of contact. Send resume with salary requirements to: **TCI National Digital Television Center**, Attn: Office 105, 4100 E. Dry Creek Rd., Littleton, CO 80122, fax 303-486-3891. EOE.

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Sierra Design Labs, the leader in long format video disk recorders, is seeking two technical support specialists for our New York and Lake Tahoe offices. Responsibilities include telephone and On site support of software and hardware Products. Requirements include a strong technical understanding of the professional video post production and broadcast environments, computer literacy in SGI, MAC and PC platforms, as well as excellent written and oral communications skills. Minimum 3 years technical experience in the computer/video industry. Some travel required. Competitive compensation and excellent benefits. Mail or fax resume and salary requirements to: HR, Sierra Design Labs, 999 Tahoe Blvd., Box B, Incline Village, NV 89451; Fax: (702) 831-5710

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TELEVISION TRANSMITTER SUPERVISOR WASV-TV in Asheville, NC has an opening for a transmitter supervisor/chief operator to oversee construction and operation of our new 5,000 watt state-of-the-art transmitter site in beautiful Western North Carolina. This is an excellent opportunity for a self starter with a strong technical background in the maintenance of UHF transmitters and microwave systems to be involved "from the ground up". Formal electronics education, FCC General Radiotelephone License and/or senior SBE certification are preferred. Excellent compensation and benefits. Send resume, cover letter (with references) and salary history to: Bone & Associates, Attn: WASV Project, 6 Blackstone Valley Place, Suite 109, Lincoln, RI 02865 or fax to 401-334-0261. Pappas Telecasting Companies is an EEO and encourages female and minority applications.

SENIOR BROADCAST ENGINEER Search extended. The Wright State University Television Center has an immediate opening for a Senior Broadcast Engineer. The individual will install, operate and maintain all video and audio equipment associated with the engineering service areas of the department. Additional duties include analyzing systems failures, diagnosing problems and isolating them to the component level, training staff and students in engineering operations. Requires an Associates Degree in Electronics or at least two years experience as an electronics technician, and 4 years of experience in broadcast engineer, maintenance and operations. Must have good human relations skills and a willingness to work occasional odd hours. Desired qualifications include SBE certification and an FCC license. Send letter of interest, resume, and the names, addresses and phone numbers of 3 professional references by May 15, 1997, to: Director, 104 TV Center, Wright State University, Dayton, OH 45435 EO/AA Employer.

NATIONAL MOBILE TELEVISION INC. has 2 immediate openings for field engineers and 1 supervisor/maintenance engineer, to be based out of Los Angeles. Send resumes and references to 1933 Del Amo Blvd., Torrance, CA 90501.

IMMEDIATE OPENING FOR MAINTENANCE engineer in central Florida. Must have very strong VTR skills. FCC license preferred. Minimum 2 year technical education and 5 years experience in post production industry. Send resume and salary requirements to: John McMahan, Century III, 2000 Universal Studios Plaza, Orlando, Florida 32819.

HANDS-ON EXPERIENCED TELEVISION studio engineer. Repair of video tape & studio equipment to component level. Resume to Jerrell Kautz, WCBI-TV, Box 271, Columbus, MS 39701, FAX: 601-329-1004, Email: jkautz@wcbi.com.

PRODUCER Seeking experienced producer to launch daily, hour-long talk and demonstration program on local NBC affiliate. The program is focused on home and family in Atlanta and the south. Format will be energetic and fun. Candidates must have experience producing a live, daily non-news program. Send resume and sample show tape to: Executive Producer Programming, 1611 West Peachtree St. NE, Atlanta, GA 30309. EOE M/F

BROADCAST TECHNICIAN Multi-channel cable TV facilities in Littleton, CO. Duties include installation and repair of all types of broadcast audio and video equipment. Minimum qualifications include: 3+ years broadcast video, audio equipment repair and operations experience. The preferred candidate will also possess an Associates Degree in Electronics and experience in maintenance and repair of multiple format broadcast video tape machines. Other duties, weekend and shift work as required. Drug test and criminal records check required of final applicants. Non-smoking environment. Send resume with salary history to: Broadcast Technical Mgr., National Digital TV Center, 4100 E. Dry Creek Rd., Littleton, CO 80122. EOE.

FAST GROWING, SE, FOX NEWS AFFILIATE is seeking experienced, self motivated broadcast employee's: Account Executive, Maintenance Engineer, News Producer/Director. Excellent benefits including medical and a 401K. Women and minorities are encouraged to apply. Equal Opportunity Employer. Fax resumes to: Lynne Carter at 912-435-0485.

THE UNIVERSITY OF OREGON School of Journalism and Communication seeks an Electronic Media Technology Coordinator to supervise and service the operation of the new Carolyn S. Chambers Electronic Media Center. Duties include instruction in a variety of electronic media equipment, including camcorders, lighting, sound and editing equipment; maintenance and repair of that equipment; supervision of part-time student staff; and advising of faculty and administration on equipment and budgetary needs. Five years of appropriate technical experience preferred. BS or BA degree required. Applications and supporting materials, including the names and phone numbers of three professional references, should be sent to: Search Committee, Electronic Media Technology Coordinator, School of Journalism & Communication, 1275 University of Oregon, Eugene, OR 97403-1275. Review of files will begin on April 15 and continue until position is filled. The University of Oregon is an affirmative action/equal employment opportunity employer committed to cultural diversity and compliance with ADA.

ASSISTANT CHIEF ENGINEER with production experience; hands-on-equipment-repairs experience. South Texas, great for family. Mail resume to 48 KNVO-TV, 1800 South Main Street, Suite 850, McAllen, TX 78503-5444, or fax to 210-687-7784.

KCAL-TV, LOS ANGELES, needs a TOC Operator for satellite and microwave. Must know satellite and ENG controllers, routing, frame stores and beta recording. For applications, call the job hotline at (213) 960-3770.

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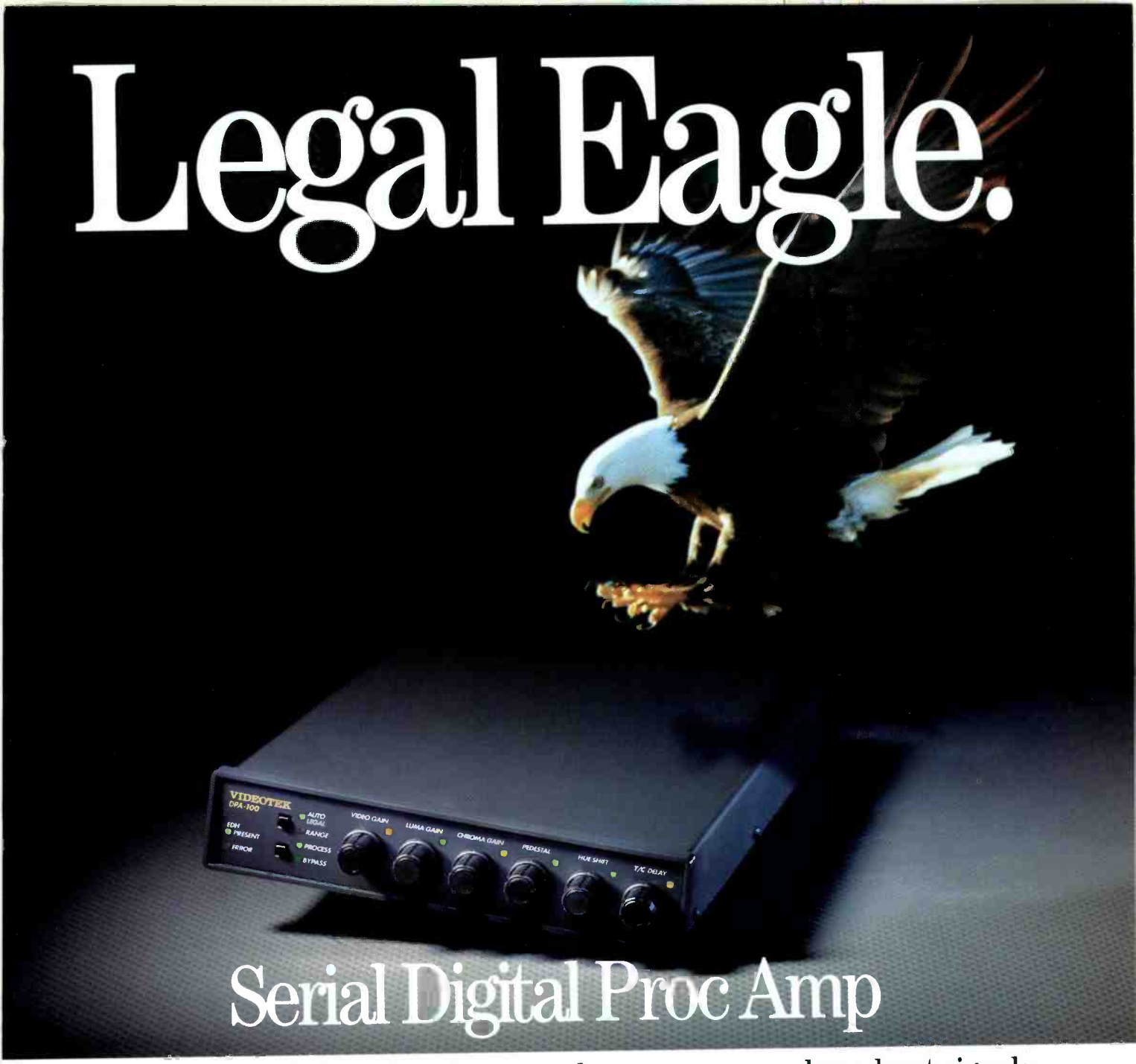

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