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An INTERTEC /K-III Publication

June 1996/$10.00

- 1996 NAB Playback
- Pick Hits

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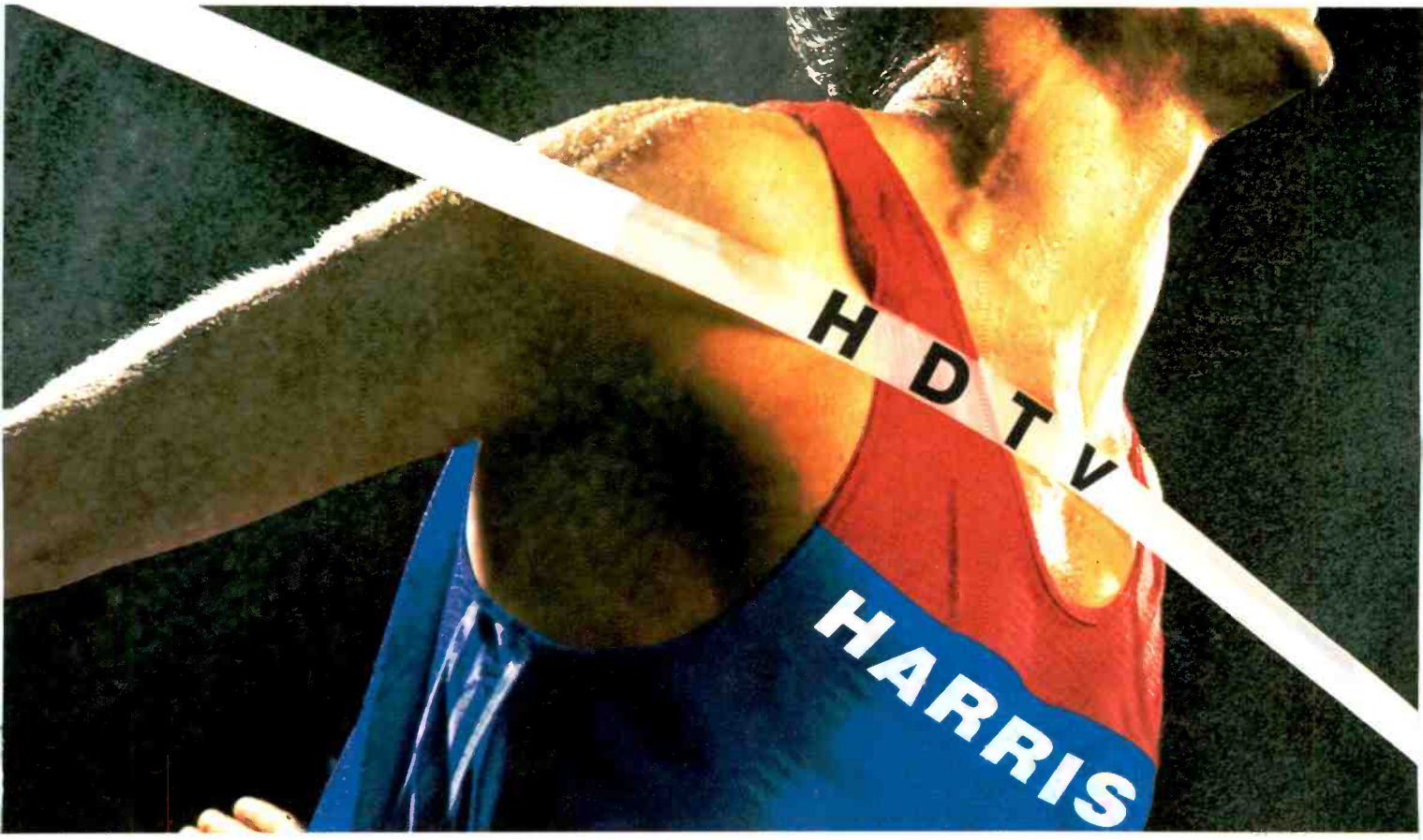
Circle (1) on Action Card

ATV TRANSMITTERS



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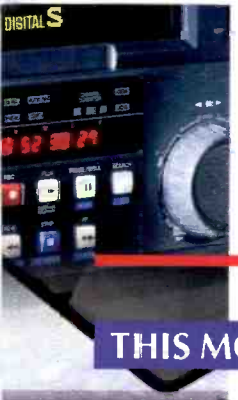
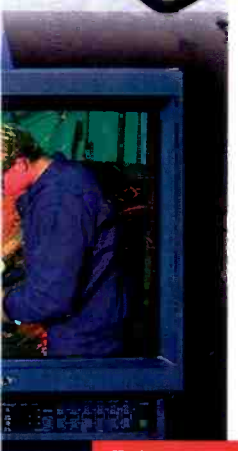
BROADCAST ENGINEERING®

June 1996 • Volume 38 • Number 6

THIS MONTH...





DEPARTMENTS:

COLUMNS:

48

6

ON THE COVER: The 1996 NAB was a plethora of new products and technology. For complete listings of more than 1,100 new products and company offerings, see the NAB Replay, which begins on page 48. Cover design by *BE* art director, Stephanie Masterson.

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EDITORIAL

The longest journey begins with a single step

Sure, but the guy who wrote that never attended NAB.

Fortunately, neither readers nor clients need to understand how editors (at least those at this magazine) cover such a large convention. For many of you, the convention is a flurry of personal visits and a plethora of new technology goodies. For editors like myself, it's much more. Want to know what we go through? I'm glad you asked. You did ask, didn't you?

Wearing my nifty Panasonic pedometer I got while in Japan, I begin my journey to Las Vegas departing on Friday for the 1996 NAB Convention. This year, I'm going to see just how may steps it takes to trek through two different venues over six days.

Saturday is filled with industry meetings. I learn about a governmental agency announcement on HDTV that is to be made in early May. By the time you read this, it will have been made public, but I was sworn to secrecy on that Saturday.

Over three more visits I'm updated on some new codecs, an improved optical STL by Canon and the construction of several facilities and the Olympics broadcast center. The results of these visits will appear in the August issue.

My first day in Las Vegas ends with a staff meeting at the Dive restaurant. Although I'm ready for a break, I should have chosen a different place. It's noisy, crowded and filled with kid-pleasing techno junk. Does the paraphernalia make you think you're in a submarine? Not hardly. But then, who'd want to eat dinner in a sub?

End of day one: 10,301 steps.

Sunday at NAB is filled with tradition. It's the day of the "big players." It begins with a pleasant breakfast hosted by Chyron. We then sit through an hour or so of new product announcements, much of which confirm what some of us already knew from advance materials.

After Chyron, I go to the convention hall. Although the exhibits aren't open, that doesn't stop me. Traipsing around shipping crates and dodging speeding fork lifts, I make my way to several manufacturers' booths. The problem is the exhibits aren't set up yet. Can't demo the products, ac power not available, says one client. Can't find the press kits, says another. Two more visits and it's time to leave the exhibit hall for the Sony press conference.

Making my way to Bally's, and I'm already running late, I forego the urge to verify the location. Instead, relying on my foggy memory of where it was last year and dutifully following the Sony signs, I find myself at the wrong place. I'm at a Sony dealer's meeting.

No problem, the kind folks at Sony redirect me to the correct location, which just happens to be on the other side of the hotel. Oh well, I have company as two other magazines' staffs also went to the wrong place. So, we visit down two flights of escalators, through the casino, which seems to stretch a mile, to the convention section of the hotel. Then, up two flights of stairs, down the long corridors to the right ballroom. The ballroom lights dim as I enter the room. Hey, they must have waited for me!

Ninety minutes later it's off to another biggie of the day — Panasonic. With 30 minutes to spare, I head to the Golden Nugget. Once there, and I'm early, I learn about the soon-to-be-released news of advance sales of DVCPRO. (Hint, see the May issue for that tidbit.)

In the crowded meeting room, there is an air of excitement. Although DVCPRO was announced last year, now it's real. Having just come from the competition, the follow-up questions are pointed and direct, but Panasonic has good answers. DVCPRO turns out to be major news for everyone.

It's 5:00 p.m. and I'm off to see some smaller players in the desktop video arena. I spend an hour learning how a Blossom contains a Plum. Go figure.

After the big "P" comes the big "A," Avid. Once again, it's a crowded meeting room filled to overflowing capacity. There are always more new faces at afternoon and evening press conferences than in the morning; I guess some people don't do mornings. Avid does a well-rehearsed presentation of its new product line, complete with wall-rattling sound. I think they're about the only video company that does audio well since Newtek.

The pace slows further (thank you) at the joint Tektronix/NAB press reception. This year marked Tektronix's 50th year of participation at the NAB. Fortunately, by this time, the Tek folks knew we'd all be stuffed so they treated us to first-class dessert delicacies!

Camera news is next, so I'm off to the Ikegami reception. The overflowing crowd fills the ballroom and hallways. There's real news on the camera front. Need details? See the complete NAB Playback, which begins on page 48.

End of day two, 26,676 steps.

I'd continue my travel log, but I'm out of space. Suffice it to say there were about 60 more visits and meetings over the next four days.

So, how many steps did I make in covering the 1996 NAB Convention? You'll have to guess. However, I'll give the person with the correct (or closest) answer a 1996 *BE* Super Hero T-shirt. If there is more than one entry with the correct answer, a drawing will be held. Mail, fax or E-mail to my CompuServe address your best guess. All entries must be received by noon on July 8. Look for the correct answer and T-shirt winner in the August issue.

Brad Dick

Brad Dick, editor

READER FEEDBACK

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PHILIPS

Circle (10) on Action Card

Poop revisited

Readers:

With this issue, *Broadcast Engineering* opens a page to you. Here's your chance to sound off on topics that you're interested in. Or, as you'll see below, to respond to one of my editorials. So fire up the computer or fax machine and let me know how you feel. Only signed responses are considered, so don't wimp out on me.

The April Editorial on the computer mouse generated a lot of feedback. Frankly, the weight of the responses was against my position. Apparently there are a bunch of you who "love" your mouse. (Just shows how far down the human chain you've regressed.) Anyway, here's a few of the strongly worded, but still wrong, responses that I received.

Dear Brad:

You realize, of course, that you've probably caused any number of offshore factories to hurriedly produce a custom mouse to your description, "Plastic poop." Perhaps emblazoned with GIGO?

Although a DOS veteran may get things done better with keystrokes, it's popularity that drives the marketplace, regardless of superiority of personal preference. Otherwise, we'd be watching Betamax at home.

James Tolson

(Darn right, and I still have my Betamax recorder thank you very much! BD.)

Dear Brad:

Gee fella, you really lost it in your last Broadcast Engineering *editorial, "Plastic Poop." Apparently from your vantage point, writing — as performed on a computer is now some speed-intensive event like the 100-yard dash. All else must tremble as your 10 busy fingers fondle their favorite function keys.*

The reality is that inelegant crud such as XyWrite, based on the DOS operating system, has never (and will never) be the software of choice for those more interested in the end result (effectively communicating an idea) than simply grinding out "productivity" in the absolute minimum of time. The limiting factor in creating good writing is the thought process behind the work, not how fast the writer might move the pencil or jockey the word-processing program.

Programming function keys and then training yourself to recall them on demand is not my idea of a worthwhile

human endeavor. Better the computer adapt to my needs than visa-versa. Otherwise, why not do away with user interfaces altogether and go back to machine code? Then, any nerdy software guru could probably do most 'writing' in a few microseconds — no matter that the turgid results would be about as elegant and accessible as a 1955 shop manual on disassembling carburetors.

Shoot your mouse? Go ahead. But be sure and save another bullet for your foot.

Don Mennie, technical editor

(Don, you're right. The end result of writing is communicating an idea and that's my point. The mouse inhibits that process at every turn. Written communication is words, and it doesn't take 35 fonts, boldface type, an electronic clipboard or any other required mouse feature to do it. BD.)

Brad:

I read your ranting regarding your mouse "infestation" problem in the April Broadcast Engineering. *It was a fun article, one that I can certainly identify with!*

Are you aware that the Macintosh has keyboard equivalents for every mouse function? This has been around since 1989, mostly to make the system easier to use for people with disabilities. You can navigate on the Mac without ever touching the mouse.

Unfortunately, this is one of the things that Windows still lags behind on.

David Bitter
Pixel Workshop, Inc.

Dear Mr. Dick:

I read with interest your April "Plastic Poop" editorial. If you will forgive my saying so, it strikes me that you have taken a rather narrow look at the use of computer mice.

If keyboard commands were used exclusively, there would be over 180 separate keyboard stroke combinations to commit to memory. No small chore, especially when some of the less frequently used programs are used.

Many command combinations also mean different things in different programs. In one Mac CAD program, "shift W" means auto-stretch-the-object-to-fit-a-dimension-constraint. In some other program, it means "close." Unless the user works with a particular program frequently, the mouse beats trying several combinations until you get the right one.

My wife Nancy, on the other hand, agrees with you. Mice are stupid she says.

Her view is as provincial as yours.

Mike Baker

(Hey Mike, does your wife know you called her provincial? BD.)

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

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Circle (11) on Action Card

By Dawn Hightower, senior associate editor

Father of SBE certification retires

Jim Wulliman, the "Father of SBE Certification," has retired. At a ceremony in Las Vegas during the NAB 96 convention, he was awarded the first SBE gold membership pin as a thank you for his many years of dedicated service.

Since the first certification exam was given in 1977, the SBE certification program has developed into the industry's most-respected professional development program. It represents a meaningful level of professional attainment, which rivals that of a 4-year degree.

Jim Wulliman and his wife, Jenny.

Internet technology directory available

The *Interactive Computer Review* is a reference to the information technology market. It is well-indexed, provides a wealth of information and is free. The directory is easy to navigate and gives users access to hard-to-find information about companies and products that drive today's technology. It classifies computer, telecom and new media companies for comparison. The directory is updated each week. The address is www.computerreview.com.

You also may recommend companies to be listed in the directory by contacting the publisher, George M. Luhowy at Computer Review, 19 Pleasant St.; P.O. Box 260, Gloucester, MA 01930; phone (508) 283-2100; fax (508) 281-3125.

MCI chooses SGI server for digital news distribution

MCI has chosen the CHALLENGE media server family from Silicon Graphics, Inc. (SGI) to power a digital news distribution system for a trial with NBC. The 3-month trial began in May and will network 20 NBC stations, including all of its Texas affiliates as well as others in Medford, OR; Richmond, VA; Sacramento, CA and Detroit, MI.

The digital content for the trial will be stored on and distributed by Silicon's media server running software from DNET.

The trial will illustrate how digital technology can streamline the newsgathering process for broadcasters. NBC will store digitized news files on a media server located in Irving. TX, with participating affiliates able to proactively access news content from client workstations at their respective locations. This process represents a departure from current, satellite-based technology that makes newsgathering a reactionary process for affiliates.

DVB-T signals comply with specs from BBC's transmitter

The BBC has successfully transmitted and received digital TV signals that conformed to the DVB-T specs for terrestrial television. It is believed that this is the first end-to-end broadcast using the terrestrial DVB specs, which was finalized by the DVB Project in February.

The signals were transmitted from the BBC's main London transmitting site at Crystal Palace and received and decoded at the BBC's R&D department at Kingswood Warren and at the BBC's TV headquarters in West London. The digital modulator and demodulator, conforming to the DVB specs, were designed and constructed by the BBC.

The transmission was used to transmit and receive the MPEG-2 coded pictures of BBC1. Following this successful reception, the system is being used with a locally generated test pattern for engineering field tests to establish the performance of the system in real urban and rural environments. The mode from the specification being used for these tests is a 2,000 carrier option using 16-QAM modulation with rate 3/4 coding and a 7 microsecond guard interval. The resulting total MPEG data rate available is about 18.1Mb/s.

Plans are in hand to integrate the equipment into the wider infrastructure being used by the BBC to examine the options for digital terrestrial television. This will allow the transmission of a number of MPEG-2 pictures and sound, an electronic program guide, etc., over the system.

For more information, contact DVB Project Office, c/o of European Broadcasting Union, Geneva Switzerland: telephone +41 22 717 2719; fax +41 22 717 2729.

FCC adopts ATV standard

The Federal Communications Commission adopted a Notice of Proposed Rulemaking (NPRM) in early May, which proposes to adopt a single standard for digital television in the United States.

This proposed standard is the result of eight years of the Advanced Television Systems Committee (ATSC) study, in addition to a substantial investment by broadcasters and manufacturers. Under this proposal, broadcasters that transmit digitally must use the ATSC DTV standard.

ITS is moving

The International Teleproduction Society's New York headquarters has moved. The new address is 310 Fifth Avenue, Suite 500, New York, NY 10001. The phone and fax numbers have remained the same. The web address is http://www.itsnet.org.

NAB suggests regulatory reforms to reduce FCC paperwork

The NAB has suggested steps the FCC should take to reduce paperwork and processing delays. However, the FCC was urged to move cautiously in revising rules relating to maintaining interference-free broadcast services and to promoting localism.

The NAB filed comments to the FCC's inquiry into ways to improve its procedures. NAB said that a self-certification system should be adopted for applications, including assignments and transfers. However, NAB opposed use of self-certification for technical matters like granting new or modified construction permits because the interference and engineering risk could pose significant consequences.

NAB also recommended consolidating FCC assignments and transfer functions across bureau and office jurisdictional lines, reform of the fee-processing system and review of station contract filing requirements.

Other recommendations included automating the station call assignment process, revising the ownership reporting requirements and adopting a system of electronic filing of application reports. ■

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NEWS SOLUTIONS

Circle (12) on Action Card

By Harry C. Martin

FCC adopts Grand Alliance ATV standard

In early May, the FCC proposed adopting, as the technology for terrestrial broadcasting in the United States, the Advanced Television Systems Committee (ATSC) digital TV (DTV) standard developed by the Grand Alliance. Under the plan, broadcasters that transmit digitally must use the ATSC DTV standard. The commission took this action so that all affected parties will have confidence and certainty with respect to a single system, which will promote the smooth introduction of a free and universally available DTV service.

The standard is the culmination of more than eight years of work by the Advisory Committee on Advanced Television Service (ACATS), the ATSC, the Advanced Television Test Center (ATTC) and the members of the alliance who designed and built the system.

The technology provides a variety of formats that will allow broadcasters to select the one appropriate for their program material — from high resolution providing the best possible picture quality, to multiple programs of lower resolution, which could result in more choices for viewers.

Even at the lower resolutions, the system represents an improvement over the NTSC standard. The system also permits transmission of text and data. According to the FCC, the system represents a rare opportunity to significantly increase the use of broadcast spectrum while remaining flexible enough to incorporate improvements.

The FCC, in adopting the ATSC DTV standard, has recognized that government-mandated standards may impose costs by freezing the state-of-the art, erecting barriers to innovation or limiting competition. To address these concerns, it proposed to do one or more of the following:

- Rely upon current processes to consider any changes if circumstances warrant;
- Commit to reviewing the standard at some future time;
- Adopt a sunset provision that after an established period of time, adherence to the standard will no longer be a governmental requirement.

The FCC also is seeking comment on alternatives to requiring each element of the ATSC DTV standard.

Later this year, the FCC is expected to consider specific ATV allocations criteria and the assignment of channels to eligible parties.

New fee schedule proposed

The FCC has released its proposed new regulatory fee schedule for fiscal year 1996. Since Congress mandated the same total amount of revenues to be collected as in fiscal year 1995, most of the fee adjustments were minor. Comments have been sought, however, on better ways to implement the fee schedule.

In general, the proposed fees have increased by slightly more than 1%. The FCC had considered eliminating separate fees for construction permits (CPs) and auxiliary stations.

DATELINE: AUG. 1

TV stations in North Carolina and South Carolina must file their license renewal applications on or before Aug. 1, 1996. Commercial TV stations in the following states must file their annual ownership reports or report certifications by Aug. 1: California, Illincis, North Carolina, South Carolina and Wisconsin.

The initial conclusion, however, was that it would be more fair to retain separate fee categories. In the case of CPs, elimination of the fee would require existing stations to subsidize the start-up operations of new competitors in the market. With regard to auxiliaries, the substantial differences in numbers of auxiliaries licensed to different stations would likely result in stations in smaller markets paying a greater proportional share of the total costs of auxiliary regulation.

See Table 1 for a comparison of the regulatory fees assessed on TV stations in fiscal years 1995 and 1996.

FCC implements 2-step renewal process

The Telecommunications Act of 1996 is changing renewal rules and procedures for broadcast licenses.

The commission plans to adopt an 8-year license term for television, TV translator facilities, low-power TV stations and international broadcasting licenses. The FCC proposes to continue to issue licenses for experimental broadcast stations for one year. The terms will run concurrently by state. It is expected that the new uniform license terms will enable the FCC to operate more efficiently. The agency suggests that broadcast renewal applications granted after the effective date of the new rules be given an 8-year term. As for renewals granted prior to the effective date, the FCC proposes to extend the 7-year grants to eight years.

In addition to the changes in the license terms, the telecom act has eliminated comparative renewal challenges by establishing a 2-step procedure. The commission must determine whether to grant an application by examining three criteria: 1) the station has served the public interest, convenience and necessity; 2) there have been no serious violations by the licensee of the act or the FCC's rules and regulations; and 3) there have been no other violations by the licensee of the act or the FCC rules and regulations, which taken together, would constitute a pattern of abuse.

If a licensee does not meet all of the criteria, the FCC has the discretion to deny the application or renew the license on certain terms and conditions. Only after the FCC denies an application may it entertain competing applications.

The new rules, which are the subject of a rulemaking notice, are expected to be in place by the end of the year. ■

	FISCAL YEAR 1995	FISCAL YEAR 1996
VHF COMMERCIAL		
Markets 1-10	$22,420	$22,700
Markets 11-25	19,925	20,175
Markets 26-50	14,950	15,125
Markets 51-100	9,975	10,100
Markets 101+	6,225	6,300
Construction permits	4,975	5,025
UHF COMMERCIAL		
Markets 1-10	$17,925	18,150
Markets 11-25	15,950	16,150
Markets 26-50	11,950	12,150
Markets 51-100	7,975	8,075
Markets 100+	4,975	5,025
Construction permits	3,975	4,025

Table 1. Regulatory fees assessed on TV stations in fiscal year 1995 and 1996.

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

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Circle (13) on Action Card

EAS update

This is only a test

By Leonard J. Charles

The new Emergency Alert System (EAS) was born from a movement to reduce the perceived "tune-out" factor of the lengthy Emergency Broadcast System (EBS) 2-tone attention signal. After soliciting comments toward that end, the FCC decided to revamp the entire method of emergency broadcasting. Was the original intent lost in the creation of the new system? You be the judge.

With the old EBS, stations were required to test once per week randomly between 8:30 a.m. and local sunset. Additionally, a few times a year, the state EBS was tested to verify that the relay chain operated as envisioned. These tests served a dual purpose: to ensure functionality of hardware and to train the audience by the script that was read following the attention signal. Tests of the Emergency Action Notification (EAN) network resulted in a test page from your wire printer or a closed-circuit audio alert from your audio network.

In the EAS, testing will be handled differently. First, although it is still listed in the rules, the Federal Emergency Management Agency (FEMA) dissolved the EAN network last November. As a result, there will still be random testing at the national level, but at this time, its procedures are unclear. These tests will not likely carry down to the local level.

At the local level there are two types of tests that will involve every station and cable system: the *required monthly test* (RMT) and the *required weekly test* (RWT). The reception and/or transmission of either must be documented in the official station records.

The RMT will be originated from the local primary (LP) station in your area or the state primary (SP) station in your state. These tests will be scheduled by your State Emergency Communications Committee (SECC) and will be listed in your state plan. The RMT will run between 8:30 a.m. and local sunset in the odd-numbered months and between local sunset and 8:30 a.m. in the even-numbered months. The length of this test is 19.5 seconds of audio data and attention signal, plus the test script published in your state plan. Every station and cable system is required to re-transmit the RMT within 15 minutes of receiving it. EAS-exempt Class D FM and LPTV stations must transmit only the test script within the same 15-minute time frame. If the overnight RMT is received when a station is off the air, it must be re-transmitted within 15 minutes of sign on.

The RWT will be originated by every participating station and cable system once each week at random days and times. The scheduling of this test is up to the participating station or cable system. The RWT will consist of data only — just the EAS header and end-of-message (EOM) codes, lasting 10.5 seconds. There is no voice message or attention signal in the RWT.

All stations and cable systems must log the receipt of any RWT, but re-transmission is not required. EAS-exempt Class D FM and LPTV stations are not required to transmit the RWT, but must log the reception of any. The RWT is not required within the weeks the RMT is run, and though no script is required, the FCC recommends an announcement or slide be broadcast in conjunction with it to inform the audience of what is being transmitted.

As with all EAS messages, the digital and attention signal portions of all tests are to be transmitted at 80% modulation with no other audio programming.

That concludes this EAS test article. ■

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

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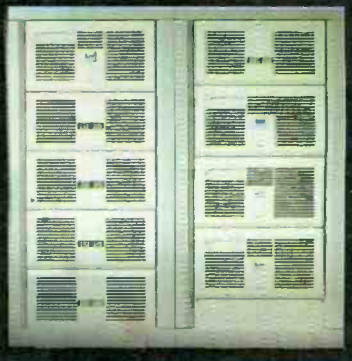

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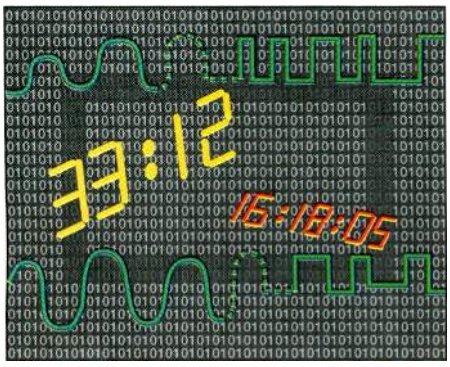
Circle (6) on Action Card

TRANSITION TO DIGITAL

By Kenneth Hunold



When does analog make sense?

In our headlong dash toward the digital Holy Grail, broadcast engineers are constantly being bombarded with the "digital is better" mantra. It has become the common perception that digital is necessarily better than analog. Although it is certainly true that digital is clearly superior in some applications, it does so with the help of analog methods and circuits.

This article is not meant to be a retro-technology piece that espouses the virtues of LPs over CDs, 1/2-track stereo over DAT or even CRTs over micromirrors. Rather, it is meant as a reminder that in today's technology, there are still many places where analog circuits and techniques make sense.

Some basics

Digital circuitry is often favored because the signal is either "on" or it is "off." As long as the receiving piece of equipment can accurately determine whether a bit is a "1" or a "0," the original bitstream can be perfectly reconstructed. But, determining the difference between a "1" or a "0" is not always a trivial matter. Digital circuits are often implemented with analog techniques. Was that bit really a "1" or was it just a high "0?" Was the phase of a carrier wave shifted enough to be considered a "1?" Was that a transition during that clock time or just noise? Is that pulse of light strong enough to be a "1?"

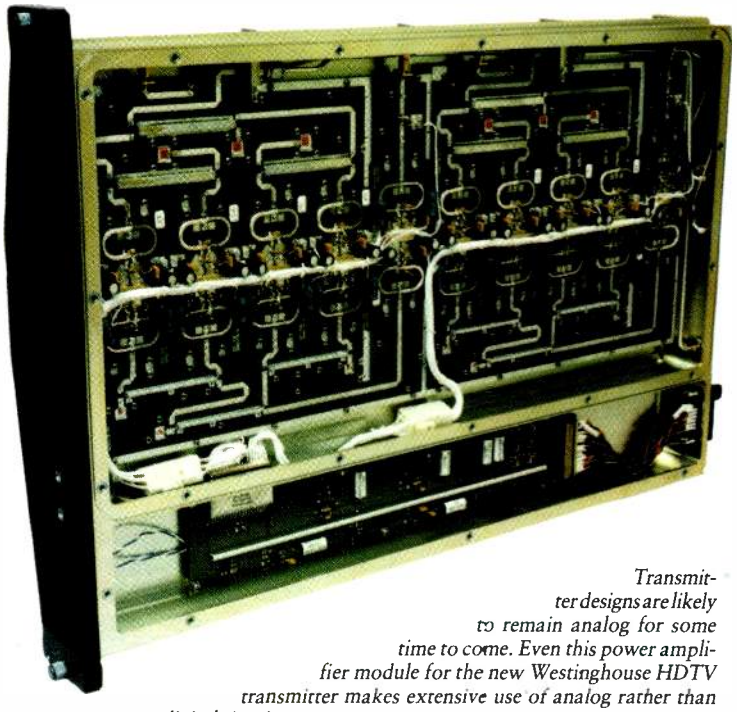
Beyond the issue of analog "making sense," in some instances, analog is the only practical way to implement a process (paradoxically, even a digital one). For instance, consider the 8-VSB modulation technique for over-the-air ATV transmission or some of the QPSK modulation schemes for transmitting digital information. Basically, these are analog processes for transmitting digital data.

In audio circuits, the random noise of low-level analog circuits continues to be below the real-world quantization noise and random noise of even 20-bit converters. The state-of-the-art is only now becoming capable of sampling and quantizing audio signals at 22-bit resolution. It really doesn't make any difference that you may not have a studio quiet enough to require 20-bit (or greater) resolution or that the listening space may not be quiet enough to hear that low-level detail. Effects processing, EQ and dynamics processing can put low-level signals under the audio "microscope," so sampling and processing equipment need to operate at the highest possible resolution.

In digital circuits, determining the difference between a "1" or a "0" is not always a trivial matter.

Even today, these "analogs" cannot be converted directly to their digital representations. First, the signal must be transduced from its physical stimulus into an electrical signal. Second, for audio signals, these low-level signals from say, a microphone, must be amplified significantly before they can be quantized. This amplification is necessary and must be done with analog devices. Only then can the signal be digitized. Current state-of-the-art can only quantize samples made at 48kHz to a maximum resolution of 16 to 22 bits. For video signals, even the so-called digital CCD actually handles analog representations of the video signal (the electric charge stored in an element). The signals are only scanned and sampled by the physical structure of the CCD sensor. The samples are not digital at this point — only discreet.

The early stages of video processing immediately after the CCD, such as shading, pre-gamma correction and other low-level processing, are done in the analog domain while the signal is being amplified to a higher level for conversion to digital. Economically, NTSC video signals are sampled at either 14.3MHz (4fsc) or 13.5MHz and quantized at 10-bit resolution. This is not sufficient for high-quality quantization of the video output signal of the CCD, and will be visible after gamma correction is applied. Until DSP technology advances to the point where video processing can be carried out at the number of bits of precision necessary to allow transparent processing of pre-gamma-corrected video signals, analog circuits will be required for control of these inherently low-level, high-bandwidth signals.



Transmitter designs are likely to remain analog for some time to come. Even this power amplifier module for the new Westinghouse HDTV transmitter makes extensive use of analog rather than digital circuitry.

Digital vs. analog

For transmitting information from one point to another, transmitting a digital representation of the signal is much more accurate than analog. It can, indeed, be perfect. However,

the signals that are to be transmitted along this path started out as analog, either as reflected light or rapidly changing air pressure. It is at the point where these analog signals must be converted to their digital representation where the "purity" of digital is questioned. In nature, light and sound are usually continuously varying functions. In order for digital processing, to be used, these continuously varying signals need to be broken up and sampled at regular intervals, and the value of these samples then must be quantized (reduced) to a finite number of discreet values.

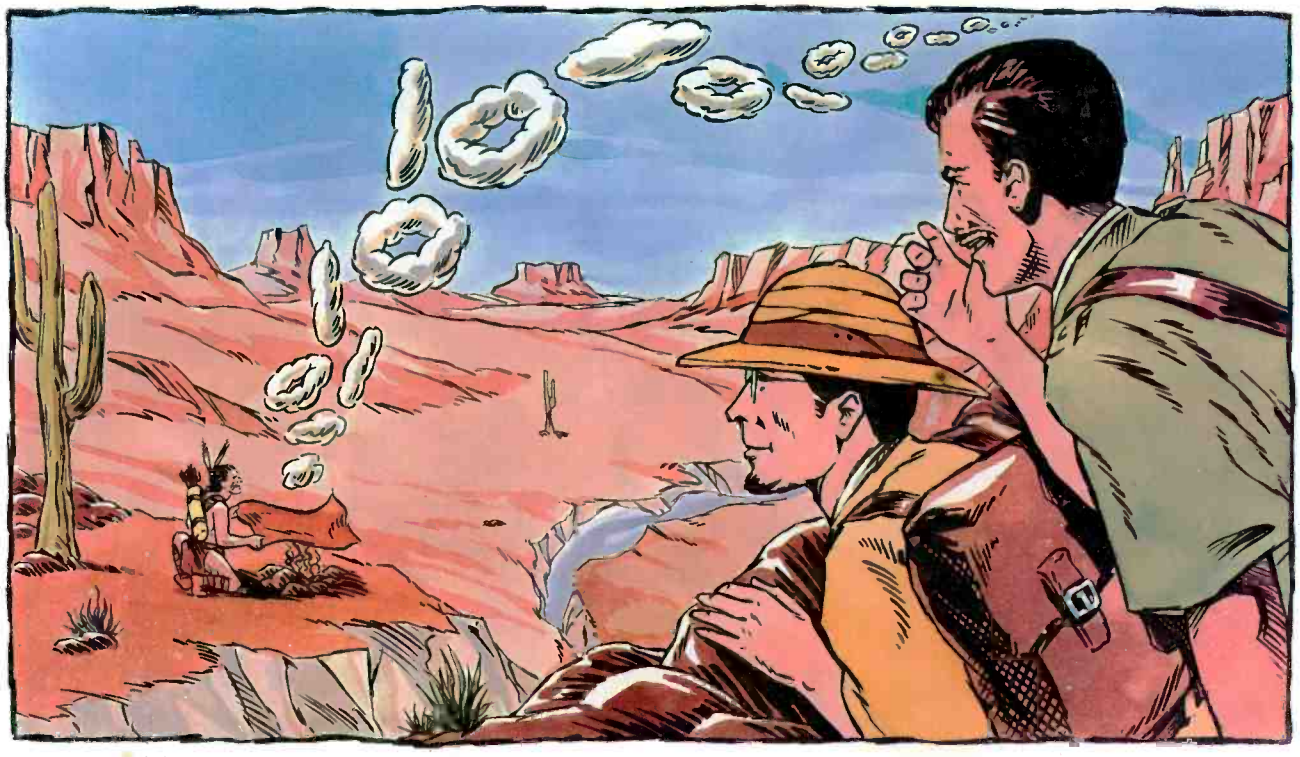
In low-level audio and video processing analog is still king. Microphone pre-amps are still analog. Video cameras, even the ones using "digital" CCDs, still use analog circuitry. In fact, to avoid some of the linearity problems of digital processing, random noise is added to the intended signal to make the process more linear, even at the expense of added noise.

Digital technology does not exist in a developmental vacuum. As the state-of-the-art advances in the fabrication and operating speed of digital circuits, these advances also benefit the analog circuits they are trying to replace.

Along the lines of improving analog circuitry, many new analog products have breathed life and reliability into current analog systems. Analog equipment using discreet components has been reliable for some time, however, components fail and require troubleshooting. The more components, the more likely one is to fail; additionally, the more time required to troubleshoot. Having large blocks of analog components reduced to a single IC simplifies design, repair and maintenance. It generally reduces size and power requirements, as well. What all of this means is that today's analog equipment is far more reliable than equipment of the past. Knowing this, it is possible to retrofit many older designs with new more reliable circuitry, thus extending their usefulness.

Even in today's world of digital audio, new analog audio mixing boards were introduced at NAB, including this one from Mackie Designs.

The (near) death of the 2-inch quad format has taught many of us how difficult it is to take equipment off-line. If 2-inch is any indication, the 3/4-inch U-matic format will be with us for a long time to come. Betacam and S-VHS may be easier to "kill," as digital machines are currently available that can playback the analog recordings. However, more than a few warehouse-sized storage areas are full of archive footage on analog formats. This footage will need to be transferred to some form of digital recording (at consid-



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

erable expense) before the analog formats can be retired permanently.

Digital systems are new enough that they are generally more expensive than their analog counterparts. In many instances this has driven the price of the analog systems down. Many facilities have found that today's analog designs provide a quality level that is "good enough," especially when the quality vs. price must be justified. At the high-end, only the best is acceptable, but as you move down to the lower-end where budgets and expectations are smaller, the price for digital can be too high to implement it throughout. This will mean that analog "islands" may be part of many facilities for some time to come.

Where does analog make sense?

But for all of the areas where analog circuits are necessary, what is the answer to the question, "Where does analog make sense?" Analog makes sense wherever the digital technology needed to replace the analog path is not yet available. Digital technology does an excellent job of transporting fragile analog stimuli. From cameras and microphones to displays and speakers, digital is capable of transporting these signals losslessly (if required). Any digital processing is, almost by definition, exactly repeatable later today, next week or next year. It is this stability and repeatability that digital technology brings to the party, allowing digital technology to coexist and enhance our analog circuits.

As the state-of-the-art advances in the fabrication and operating speed of digital circuits, these advances also benefit the analog circuits they are trying to replace.

There are many instances where our current analog system is actually better than current digital systems. If you can, compare the resolution of the analog output of your top-quality studio cameras to the resolution after the signal has been passed through a digital path. The analog output will look better. But that really isn't the point. The point is to use analog where it makes sense — in the low-noise, small-signal areas where digital can't go (yet). If you are capturing the subtle nuances of an instrument or vocal, microphone and preamp selection is an important matter. Here, analog devices will most often work best.

Save the digital systems for getting your signal across the country or for making that 20-layer commercial that would be unrecognizable after so many generations of analog. Exploit the advantages of digital where they are available, but remember that at certain critical points in the process, analog methods may be more appropriate than digital ones. ■

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

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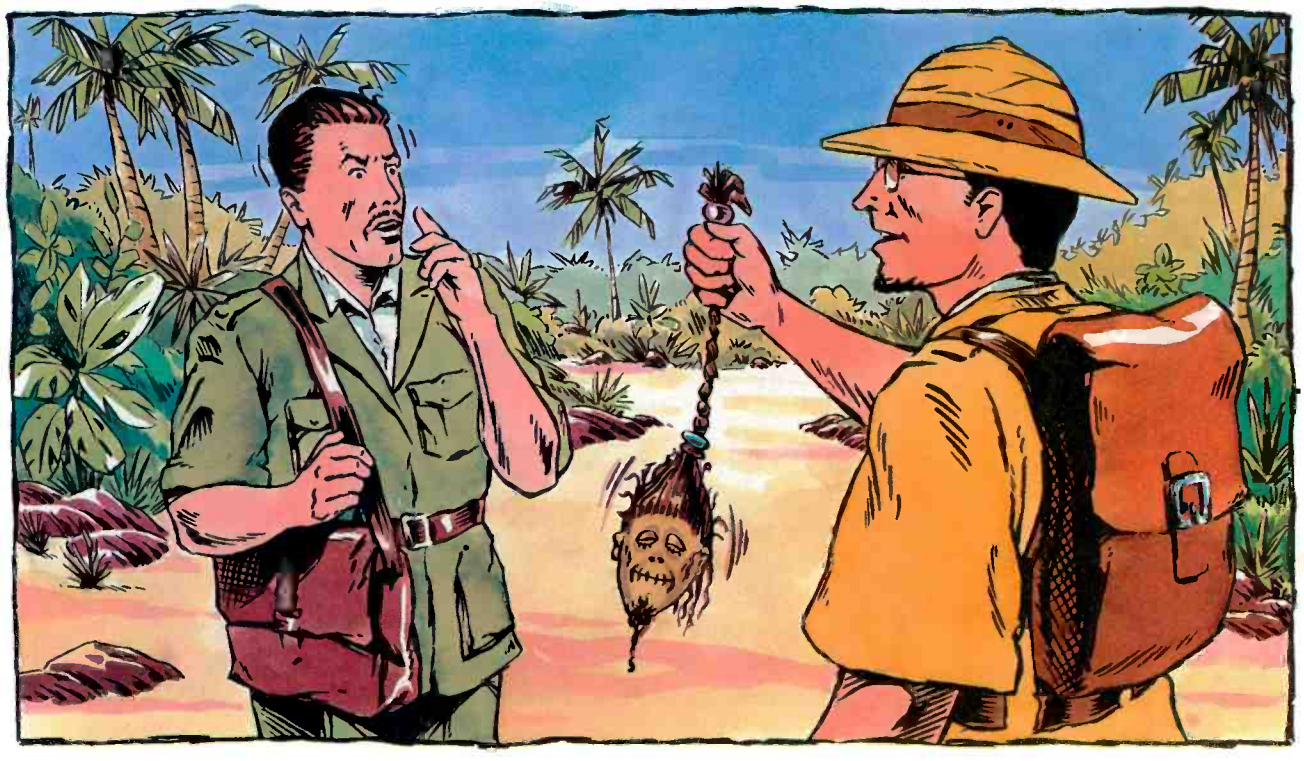
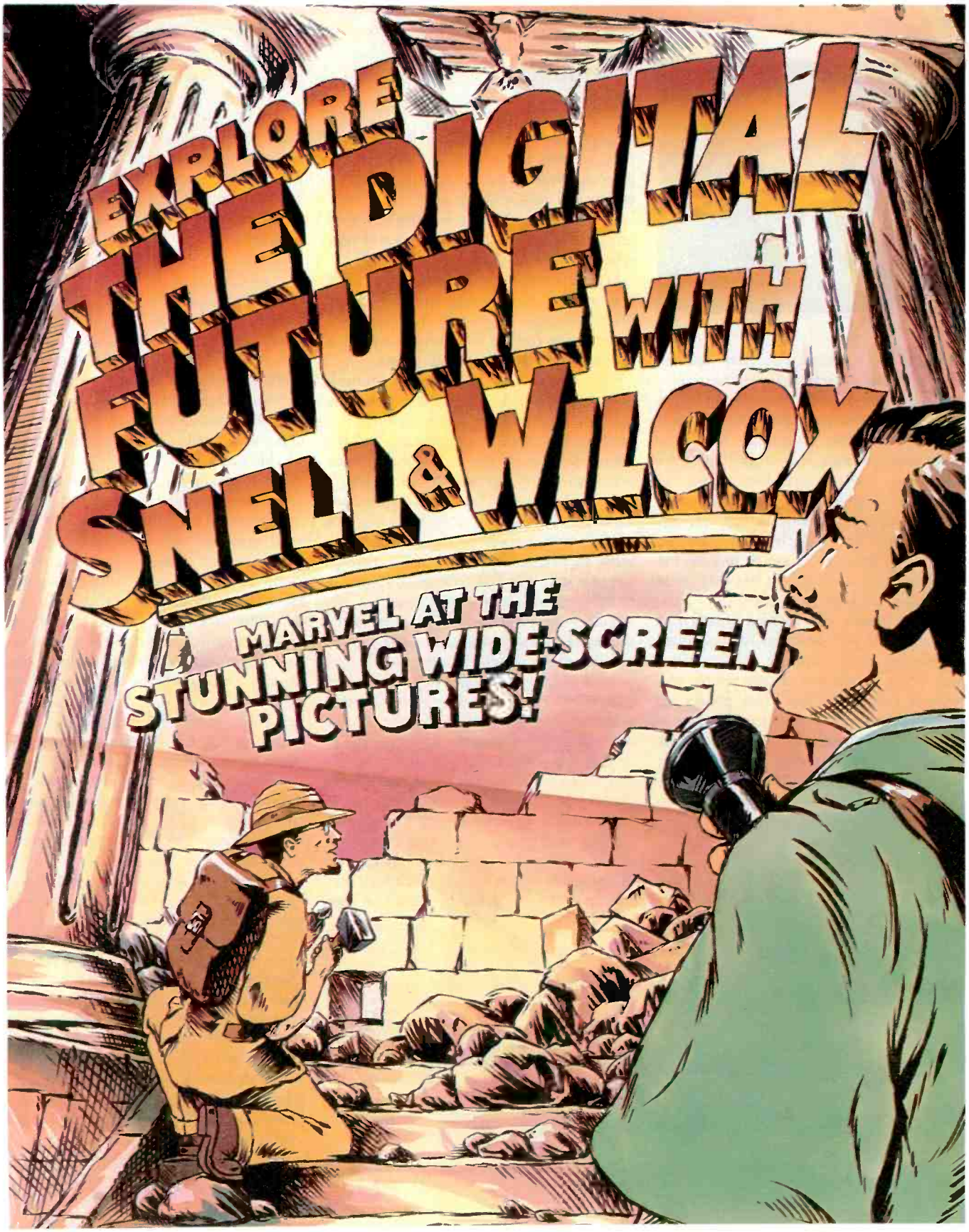


"CLEARLY THE RESULT OF AN EARLY EXPERIMENT IN COMPRESSION..." MUSED WILCOX.



SNELL & WILCOX

Engineering with Vision

Circle (7) on Action Card

By Curtis Chan

The foxhole

Imagine this scenario. You have had the same job now for several years. Your associates have passed you by on the way up the ladder. The people you have trained are also climbing the ladder of success. You are a good manager and your boss thinks the same thing, and you have been spared the agony and anguish of numerous layoffs. You console yourself with the fact that you have reached the pinnacle of your career, and you do what you have to to keep the status quo, no more and no less than what is necessary to keep your job.

As time passes, you become cynical and insecure about your position. You find yourself playing more corporate chess and less time being productive. Furthermore, you become reactive rather than proactive, choosing not to make waves in the company and losing yourself in the crowd, rather than being a positive agent for change. You feel safer agreeing with everyone and deferring responsibilities and decision-making to others.

Putting this scenario into perspective

Each day you come to work, you carry with you 90% confidence and 10% insecurity (anxieties about your life, job, politics, personal weaknesses, financial stability, interpersonal relationships, etc.).

Now, imagine going to a corner of your office each day and digging up a piece of your office equal to 10% of your insecurity.

As time passes, the little piece of your office that you have been digging up now becomes a large foxhole big enough to jump into. Pretend that you are in that hole. Let's look at this from different vantage points.

First, if you have dug yourself in politically with respect to your position and the hole that you have dug is too deep to climb out of, there are some consequences. For the people below you, there is a saying, "one person's floor is another person's ceiling."

From the people below your point-of-view, they see you as a fixed entity, not moving with respect to the ever-changing work environment. Because of this perception, the only way that they will get ahead is to either go around you or to quit.

From your employer's viewpoint, he or she might regard you as one of the company's keystones, thereby keeping you in your present position. On the other hand, your boss might perceive that you are comfortable with your present position (the perception you give by hiding out in your foxhole) or that you are the best person for the job and there is no reason he or she should change the situation.

You also might be wondering why after all of these years, people below you are moving ahead while management does not see you in any other higher capacity, although you have given them plenty of hints that you want to move ahead. The reality is that what you think and what others think about you are not necessarily the same. Remember, company politics can't be avoided and everyone at some point will have some insecurity.

Climbing out of the hole

Back to the foxhole theory. Imagine that there is a large abyss deep enough to put a whole company's personnel into. You are a new recruit and, along with the rest of the work force, are asked to climb into this abyss (working environment).

Imagine that bleachers are being rolled in and your company's managers are sitting in the bleachers.

The command is given to climb out of the hole. Deep down in the chasm, as you struggle to get out, you find people on top of you, on the side of you and underneath you. It's controlled chaos as everyone tries to climb to the top. As you continue your climb, you begin to understand the game and start to develop a sense of teamwork and esprit de corps with those around you. You forge relationships and leverage those around you, motivating and cultivating them into a cohesive force that finally propels you over the top of the abyss.

As you look up into the bleachers, your supervisor is sitting back, smiling at your achievement. Later, some of the stragglers are scooped up and placed in other abysses (companies or divisions), while others voluntarily jump into other abysses, starting the game all over again.

It's been some time since you climbed out of your hole. Now, you find yourself sitting back in the bleachers waiting for one of your employers to surface. The moral of this story is that company dynamics are ever-changing and cyclical. Over time, management finds new blood to replenish itself or it ceases to exist. The chosen leaders of tomorrow are those that see beyond the darkness of the abyss and have the ability to forge within their environment a strong vision for others to follow and can instill in others the passion, sense of urgency and perseverance to follow that vision. ■

Curtis Chan is president of Chan & Associates, a marketing consulting service for audio, broadcast and post-production, Fullerton, CA.

Avoiding the foxhole trap

1. Make sure that you cross train into other areas of discipline that will complement your existing or future areas of interest.
2. If you manage others, make sure that you keep the foxhole shallow by training protégés, making sure that management is aware of their progress and that you make them aware of your intentions of moving ahead.
3. Be more proactive rather than reactive. Find solutions that will help your company or department improve its financial condition (improving profit and minimizing cash-outs), morale, productivity or operational conditions. Avoid mentioning a problem without also having a plan of attack to solve it.
4. Take on added responsibilities and projects that will reflect well on you. Instead of waiting, take the initiative, be responsible and accountable for your actions. Show that you are a good leader and manager. Make sure that your immediate supervisor is aware of your successes.
5. Try not to be perceived as a person who will do anything to get ahead, including backstabbing or gossiping. Sacrificing your integrity for short-term gain may have adverse long-term consequences to your career. Remember, people tend to have shorter-term memories regarding gratitude than they have for being at the butt end of your actions. ■

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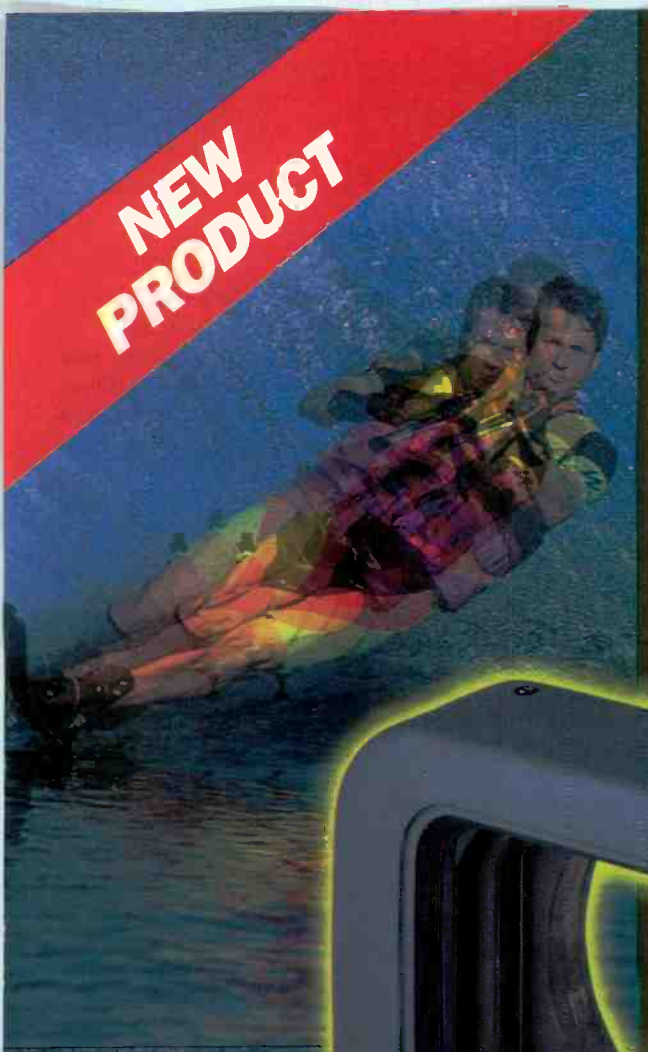

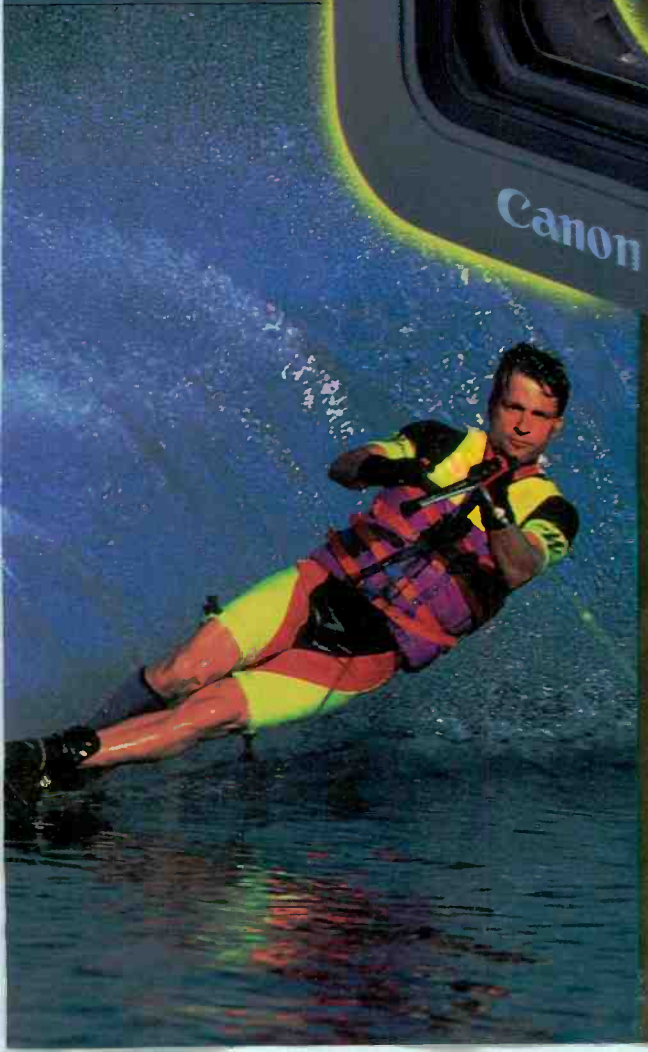

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Circle (8) on Action Card

By Bennett Liles

Audio for post

Recent developments have brought some new options to the world of audio post-production, and have changed some previously unaffordable luxuries into everyday tools for many TV production facilities. The key word is digital, using linear (tape) and nonlinear (disk) storage modes.

One of the most appropriate and affordable digital audio post systems for many TV applications is the *Modular Digital Multitrack* (MDM) tape recorder. It uses a videocassette transport to record eight channels of uncompressed digital audio. The "modular" terminology refers to the ability to link multiple units together, thereby expanding track capability in 8-channel increments.

MDMs are small, inexpensive ($3,000 to $5,000), versatile, easy to use and easy to expand. Hardware comes in two general varieties primarily distinguished by the kind of tape and transport used. The *Digital Tape Recording System* (DTRS) format (currently supported by Tascam and Sony) uses Hi-8, while the ADAT format (supported by Alesis, Fostex and Panasonic) uses S-VHS. Although standard videocassettes can be used, tape manufacturers have recently introduced special versions optimized for MDM audio uses.

Operationally, the two formats are similar and can be used in the same ways. Perhaps the biggest operational difference between formats is the maximum recording time possible without a tape change. ADAT runs its S-VHS tape at about three times normal speed, while DTRS runs its Hi-8 cassettes just slightly faster than standard-play speed. This yields about 60-minutes maximum recording time on ADAT (using T-180s) and about 110-minutes on DTRS.

Production applications

When using multiple microphones — especially the oft-encountered lavaliers on an acoustically reflective set — any mix that puts two or more mics fully open at the same time can make voices sound hollow. With an MDM, the audio mixer can feed a direct output from each mic input to the multitrack audio recorder (which is synched to the VTRs), while feeding a live mono or stereo mix to the VTRs.

The post can be done by audio editing on the video recorder and re-mixing the recorded mic channels from the MDM on the fly. Or, if less than eight mics were used in the original shoot, the individual mic tracks on the MDM can be re-mixed onto a spare track of the same MDM ("track bouncing"), and this remix can be transferred to the videotape sound tracks in one continuous edit.

The choice between these techniques is usually determined by the style of the program and to what extent the audio mixer needs to see the video. Automated mixing (on analog or digital mixers) is helpful for these processes. The cost-effectiveness and capability of such multichannel mixing systems has also increased dramatically in the last year or two.

If extra tracks are to be added ("overdubbing"), this can be done after the mic tracks have been bounced. This frees the original mic tracks for post-production stereo sound effects, music and narration. Such track bouncing is easier on an MDM than it is on analog machines, because no time code is actually recorded on the tape. The machine just "remembers" the offset between its *absolute time* and incoming time code.

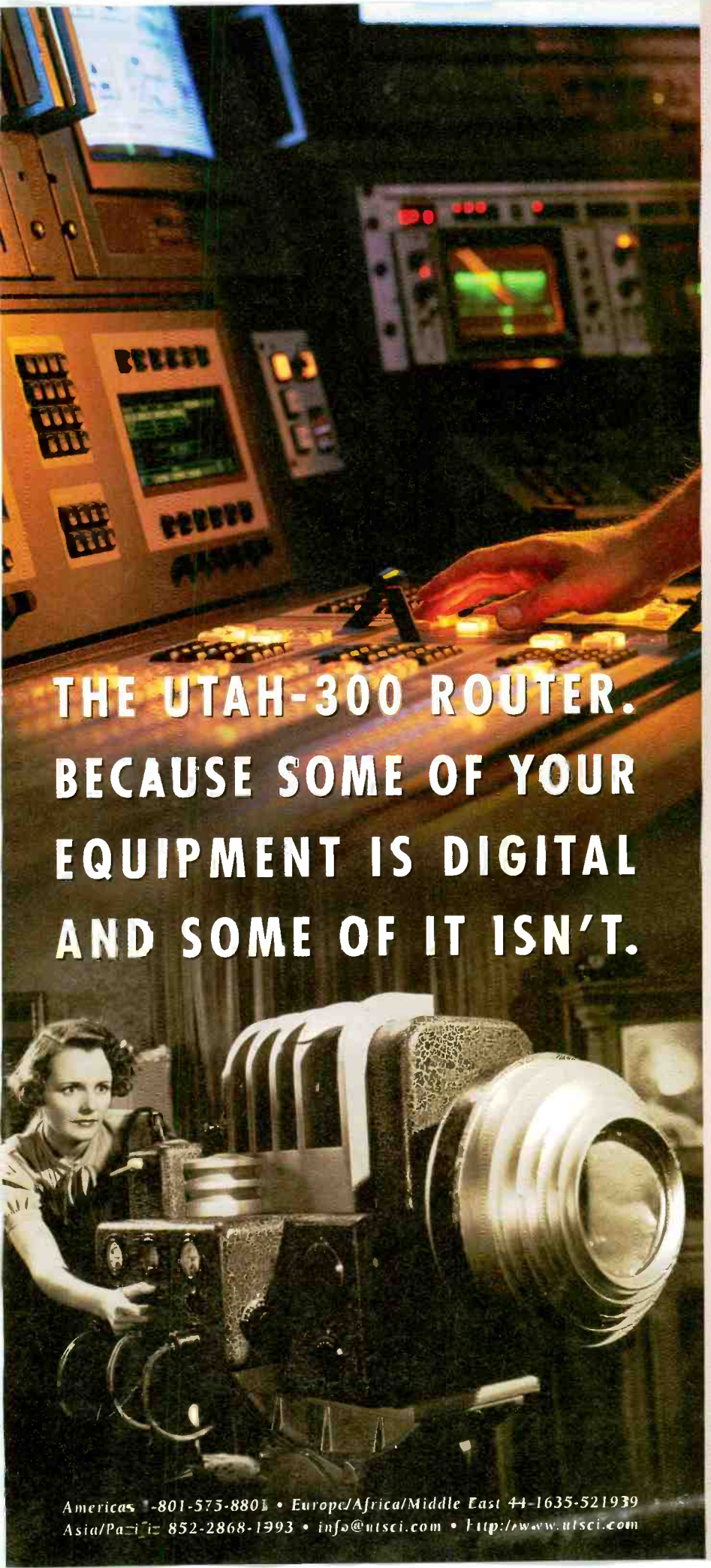
Absolute time is recorded onto the tape during the tape's initial recording. It counts real time from the head of the tape, and ideally, it is printed in one continuous operation from the beginning to the end of the tape. If start/stop recording is expected or nonvirgin tape is to be used, it's best to "pre-stripe" the absolute time in a separate, single-pass operation prior to the shoot.

Hardware and interface issues

Sync (to video) operation requires some extra hardware. Depending on the models used, this can involve an internal circuit board option or outboard devices.

Offset delay between erase, record and play heads are a thing of the past with MDM heads, which rotate at better than 14,000rpm. Another advantage is the MDM's ability to save all machine-setup parameters on the data section of each tape. This includes all locate points, time-code type, frame rate and other information, which will automatically set up a machine whenever the tape is played back. Digital dubbing of all eight tracks simultaneously

This recently completed post room at Sony Music Studios in New York is based around a 56-fader Euphonix CS2000P mixing system.



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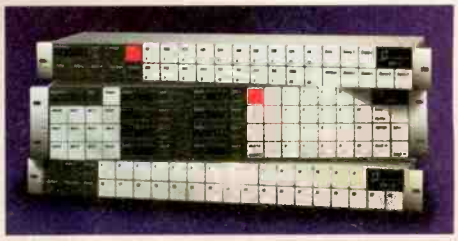

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between MDMs is also possible (using proprietary multichannel I/O interfaces), thus avoiding more A/D and D/A conversions.

Up to 16 MDMs (of the same format) can be stacked with a sync cable loop-through, providing a total of 128 tracks — all for a small fraction of the cost of an analog multitrack recorder (and its tape requirements). A single remote-control panel can also be used to access multiple MDMs.

In noisy, multimic environments, autopunching can help mute tracks to eliminate unwanted audio. Many of these units can edit with single-sample resolution ($^1/_{48,000}$s). Small amounts of track slipping (for lip-sync or phase-matching of multiple mics) can also be accomplished using RAM onboard the MDM. But for extensive editing, track slipping or mixing, it's best to transfer

Modular digital multitracks (MDMs) are small, inexpensive, versatile, easy to use and easy to expand.

the MDM audio to a digital audio workstation (DAW). Some systems allow a digital, 8-tracks-at-once upload to disk, using the same output mentioned earlier for MDM-to-MDM dubbing. In this situation, the MDM makes a nice field-acquisition format for your DAW.

Other third parties make outboard encode/decode devices that convert some standard 8-channel, 16-bit MDMs into 4-channel, 20-bit recorders. For these or any MDM uses, it is critical to note track configurations and other system arrangements during recording so that downstream post-production staff can properly recover the original audio.

MDMs, DAWs and new automated mixing systems are all making life easier — and less expensive — for the audio side of TV post-production. ■

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

For more information on audio post equipment, circle (170) on Action Card.

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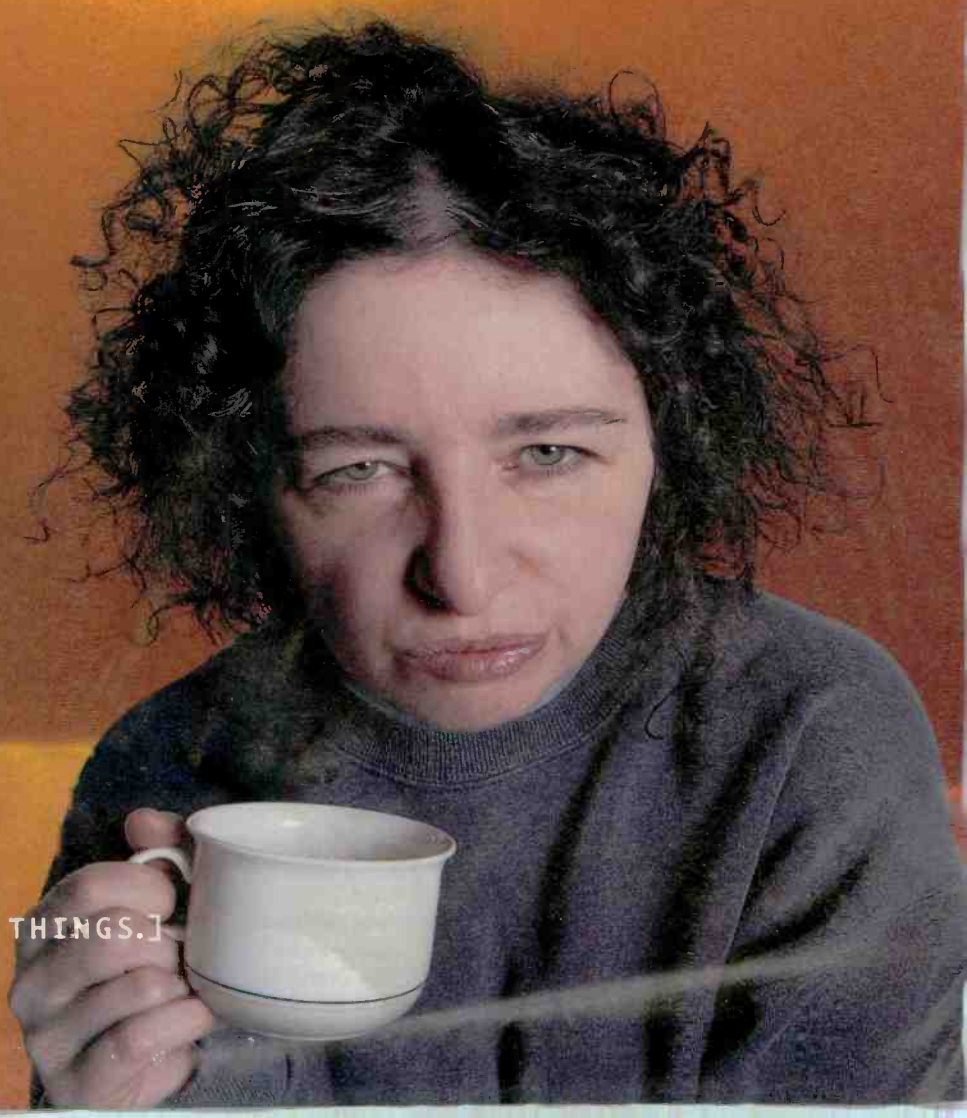
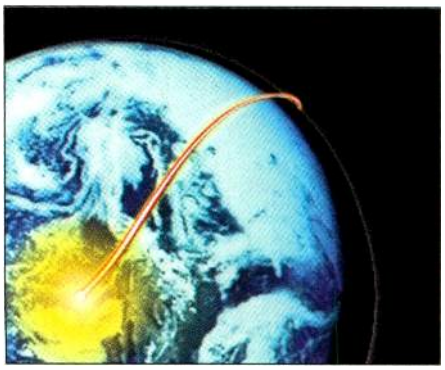


ABEKAS & IMMIX
SCITEX DIGITAL VIDEO

[COOL THINGS. VERY COOL THINGS.]

By Steven Blumenfeld and Mark Dillon



What is interactivity?

For the past few months, this column has focused on the Internet — the widest-of-all networks. Yes, the Internet may be trivialized as cocktail conversation, but for those of us in broadcasting, it is becoming the most controversial technological (and cultural) change since, well, cable. Why? Because it is an "interactive" environment. What is the polar opposite of interactive? Broadcast.

The snake oil of interactivity has been with us since the early '80s. Remember interactive video discs? Interactive CD ROMs? (And our favorite) Interactive TV? Each of these has come and gone — maybe been reasonably successful — yet none has met the hype promised by manufacturers. What makes the Internet different is twofold:

1. The net is not the next hot consumer electronics product foisted on a bewildered consumer by an aggressive manufacturer (remember DAT? CD-I?);
2. The net quietly attracted about 10 million users before business woke up to its commercial importance.

The new net: No longer just a way to transport data

As a computer network, the net's significance is derived from the shift away from data transportation to communications. It is not just a means for file transfers, credit card authorizations or remote machine monitoring — it is becoming a major source of interpersonal communications. Simultaneously, it is acquiring the status of a mass entertainment medium.

A basic feature surrounding most new media is interactivity. OK, so what is that? Today, when people mention interactivity, you may think of CD-ROMs, the web, your computer or even your television. But interactivity is the basis of most human activities. A book is interactive in that you must pick it up, look at it and turn the pages. A game of soccer is most certainly interactive, as you throw, run, kick and do all of this in relation to the ball and other players.

Interactivity simply means that you have the ability to have some impact on the outcome of the events before you. (Does this sound like watching television?) The more frequently and effectively you can affect the outcome, the more interactive the environment becomes.

Because there are many dimensions to interactivity, you can look at it as a range — with some things being less or more interactive. When discussing electronics and computing, think of the low end of the range as the onscreen display and programming of televisions and VCRs. These are menu-based programs that give you a limited amount of choices and affect a small domain of activity. This low end is usually characterized by low content and limited information. Such low-end interactions allow you to change the volume, the color, the channel or any of the machine controls that you need.

Interactivity is the basis of most human activities.

On the high side of the scale are the flight simulations/shoot'em up/fighting computer games. These are characterized by lots of action with constant user intervention. You can do something to change the outcome of the situation rapidly and significantly. The essence of interactivity is control; the more control, the more interactivity. This is important because it is somewhere between these two ranges that most of us find the process enjoyable and useful.

The day is right around the corner when you will interact with your television the way you do with your computer. In the last few weeks, a number of companies have introduced or announced products that integrate your computer to your home theater. Imagine sitting in your living room and watching a show on The Discovery Channel about a new generation of NATO fighter planes, the EF-2000. During the commercial break, you see an ad for the EF-2000 CD-ROM flight simulator. You decide to check out the demo of the game by clicking on its web site and downloading it as you watch the rest of the show. When the show ends, you boot up the demo and fly the plane. This is the type of interactivity that we are looking forward to in the near future. Everything described here is available — it's just not yet integrated into the set top.

You're in the driver's seat now

The 1960's and 1970's mainframe computer model was an extension of the centralizing and depersonalizing world view developed in the industrial revolution. The great and powerful steam engines were replaced with the great and powerful mainframes, serviced by minions of programmers and aphid-like employees of the giant corporation. The most popular expression of this image was HAL in *2001: A Space Odyssey*.

The Internet, especially the World Wide Web, is 180 degrees in opposition to the concept of HAL. There is no central processor and no main data bank — just 50,000 different processors and disk drives that are connected to each other. What makes this scheme even more remarkable is not that they are connected, but how they are related to each other.

Broadcast television, more precisely the network TV model, is the entertainment industry equivalent of HAL. Just as the distribution of computer power has invalidated the prophecy of HAL, the same forces are at work on the centralized broadcast model of entertainment distribution. In the 7-, 12- or even 36-channel environment, the range of options and the tendency for domination within a time slot meant the viewing experience would pretty much be alike for everyone in the same town.

The Internet has more than 50,000 web sites, but no channels, no TV Guide and no schedule. What you will see is up to where you start, what pointers you select at other sites, which search engine you use and what bookmarks you've made. Consequently, it is unlikely that anyone in the United States last night had an Internet viewing experience just like someone else's. Why? Because the hours you spend in front of the screen are assembled by you, as you continually make small decisions about what you want to see and where you want to go next.

That is interactivity — the ability to control the outcome of events. ■

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

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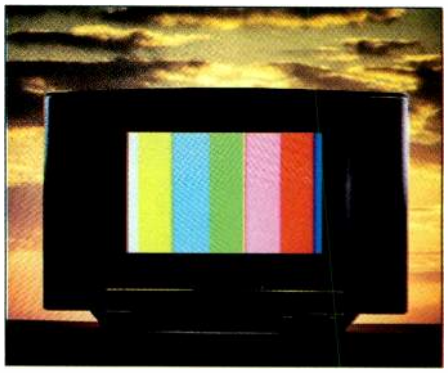
By Louis Libin



Washington, DC — site of the model HDTV station

Station implementation of digital TV transmission just came one step closer when broadcasters and equipment manufacturers joined together to create America's first model HDTV station in the nation's capital. The primary sponsors of the project are the Association for Maximum Service Television (MSTV) and the Consumer Electronics Manufacturers Association (CEMA), a sector of the Electronic Industries Association (EIA).

What is it and who is in charge?

The main purpose of the experimental station project is to conduct a series of demonstrations of HDTV broadcasting with a fully equipped HDTV studio-transmission facility. At the initial board of directors meeting, James C. McKinney was appointed project director and a member of the board. McKinney was chairman of the Advanced Television Systems Committee (ATSC) and is the recognized expert on HDTV. It was under the leadership of McKinney that the digital TV standard was documented and produced. Previously, McKinney held three bureau chief positions at the FCC. He was also deputy assistant to President Reagan and director of the White House Military Office.

Washington, DC, was chosen for the location of the station. McKinney said, "In order for both professional and commercial equipment manufacturers to perfect their equipment, there must be a test bed. We believe that the most appropriate test bed is an existing TV station. Existing TV stations will all have to make a transition to digital, and the information we learn will be invaluable to broadcasters, manufacturers and consumers."

Background on HDTV testing

Beginning in 1991, six systems underwent extensive testing at the Advanced Television Test Center (ATTC) in Alexandria, VA. CableLabs, Boulder, CO, tested systems over a cable test bed at the ATTC. The Advanced Television Evaluation Laboratory (ATEL) in Ottawa, Ontario, Canada, also participated in these early tests.

In 1993, the Advisory Committee decided to limit further consideration to the four all-digital systems. The committee ordered supplementary tests to evaluate improvements that had been made to individual systems since initial testing. The Advisory Committee also adopted a resolution encouraging the digital HDTV groups to try to find a way to merge the four remaining all-digital systems into a single grand alliance.

On May 24, 1993, the seven companies announced the formation of the Digital HDTV Grand Alliance. In the summer of 1994, the transmission subsystem underwent six weeks of extensive broadcast and cable field tests at Charlotte, NC. The tests proved that the Grand Alliance digital transmission technology will outperform today's analog transmission.

Now the Grand Alliance consortium has ceased to exist and we are left with a terrestrial transmission standard that will be an FCC standard.

Many issues still need to be answered, resolved, tested and standardized prior to going on the air with ATV. In simple terms, now, the receivers must be able to demodulate the transmitted signal and interpret the bitstream to recreate the high-quality picture, sound and data. These are the issues that the model station will tackle and solve.

The project

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

The host station will also provide public demonstrations in the Washington, DC, area for public viewing of HDTV, in addition to training for broadcast station technical personnel.

The experiments, demonstrations and competitive equipment evaluations will be planned and conducted by a technical committee. Emphasis will be placed on practical methods of implementation, including technical performance of equipment and system capabilities and not on consumer studies. Members may sponsor individual experiments, a quarterly report to members will be developed by the technical committee and a bi-yearly communication meeting will be held with members.

To be located at. . .

So which station will be used? The Model HDTV Station Project, Inc. selected WRC-TV, Washington, DC, as the host station for the HDTV project. The station is owned and operated by the National Broadcasting Company (NBC). Also, the David Sarnoff Research Center, Princeton, NJ, has been contracted to implement the HDTV station to be constructed at the WRC facilities.

ATV standard on its way

All four FCC commissioners unanimously voted to propose that a single digital TV standard be mandated for terrestrial, over-the-air TV broadcast. The standard was documented by the Advanced Television Systems Committee (ATSC). The commissioners noted the importance of having a single standard. The standard is the definition of the bitstream and a technique for its digital transmission in a 6MHz RF channel.

The advanced TV standard proposal is an extremely important part of the entire advanced TV process. The proposal is the second step in a 3-step advanced TV transition process. In August of 1995, the FCC presented the first step, a Notice of Proposed Rulemaking (NPRM) on policymaking.

The third and final step will be presented soon, perhaps as early as this summer, and will cover the important spectrum allocation and advanced TV channel assignments. ■

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On-air when?

The design of the model station is already in progress. The implementation schedule will begin later this year with installation of an HDTV transmitter and compression encoder at WRC. HDTV production equipment and techniques will be added in early 1997 and the project is scheduled to conclude in 1999.

It is understood that the Grand Alliance will loan two sets of Grand Alliance HDTV hardware for use prior to the availability of prototype or commercial equipment. Much of the equipment and program material will be supplied on a loan basis by member manufacturers and broadcasters. Individual manufacturers will also provide equipment maintenance and technical assistance.

Information on equipment performance and user needs is essential prior to the construction and operation of regular commercial HDTV stations if those stations are to be rapidly constructed and to become operational in an effective manner. In the longer term, information from this project will prove invaluable in encouraging manufacturers to develop next-generation equipment with improved performance, simplified operation, reduced cost and enhanced capabilities.

The project will involve the collaboration of respective organizations to design, install and operate an experimental high-definition TV terrestrial broadcast station.

What to watch for

You should keep in mind that the HDTV broadcast service is coming, and the FCC is about to assign each TV station a new channel. Most of the assignments will be in the UHF band. You will be spending much of your time determining and justifying the basis for their assignment of UHF Channel 68 or 32 or 48. The biggest issue will be ensuring that your current viewing audience will be able to receive the new signal. Also, keep in mind that approximately 1,700 TV stations across the United States will be planning to build their HDTV facilities. There may be some serious competition between stations with respect to construction of new broadcast facilities. So follow the progress of the experimental station closely. Your station may be the next facility that goes digital. ■

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

Goals of the HDTV model station

- Demonstrate HDTV broadcasting from a fully equipped broadcast facility.
- Understand the performance of today's HDTV equipment in actual broadcast conditions.
- Identify the actual user needs of the community to efficiently operate an HDTV station.
- Provide training and familiarization.
- Provide a source of HDTV signals for evaluation of prototype receivers. ■

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Pick Hits of NAB 96

By Steve Epstein, technical editor

NAB 1996 was a milestone in many ways. This was the 50th anniversary of the Broadcast Engineering conference. Convention attendance was well over 90,000 and the exhibit space outgrew the LVCC and had to be housed in the Sands Convention Center, as well. However, many found the show difficult to see due to the enormous crowds. In the main hall, many of the larger exhibitors know how to make effective use of the aisles. Placing several of these exhibitors in close proximity caused most of the center aisles to be completely obstructed, especially the first two days.

As the crowds eased later in the show, it was possible to take time to explore the exhibits in both venues. It has been apparent for some time that the show is growing and diverging. Convergence may be on the horizon, especially in the consumer markets, but it is not apparent in the wide range of exhibits at NAB. Numerous groups exist, including call-letter broadcasters, video professionals, multimedia/desktop video advocates and the most recent addition — the Internet proponents. This year, our judges looked high and low to find an assortment of products that fit the wide range of needs of this year's attendees. Although every product may not fit everyone's needs, one or more products on this list will fit the needs of nearly every attendee. In no particular order, here are *Broadcast Engineering's* 1996 NAB Pick Hits.

Dielectric HDTV/NTSC stacked antennas

These antennas are combined HDTV UHF and NTSC VHF units. The HDTV/TF-3 is a direct mechanical replacement for the TF-6 (Channels 2-6), which offers lower windload than the existing TF-6. The HDTV/TW-9B is a direct mechanical replacement for the TW-15A (Channels 7-13) with windload within 15% of the original. The HDTV/TDM-5A offers Channels 2-6 circularly polarized NTSC and HDTV UHF, while the HDTV/TCL-12A offers circular polarization for Channels 7-13. All units have a radome-covered omnidirectional HDTV slotted cylinder, center-fed unit on top of the stack.

Circle (151) on Action Card

Scitex DVeous

DVeous is a twin-channel DVE that can be used in dual video or video plus key plus full-bandwidth SuperShadow modes. A second twin channel is optional. SuperShadow provides independent control of all transforms and warps. All channels have Z-axis keying for intersecting plane effects. Other features include UltraWarp, which provides new warp effects and SurfaceFX, which adds light source and texture features. A TimeFrame Effects editor is standard for independent effects timelines. Serial digital, parallel digital, component analog and composite analog inputs, and serial digital plus component analog or serial digital plus composite analog outputs are available.

Circle (150) on Action Card

Discreet Logic FIRE

FIRE is an editing system that provides a nonlinear, disk-based solution for on-line suites. This picture-based system for noncompressed formats is based on an open architecture and provides editors with an array of finishing tools. FIRE supports industry-standard EDLs and custom keyboard emulations. A SPARKS developer's kit is available that allows third parties to develop software plug-ins. Data is stored in an RGB 4:4:4 format and direct access to the RGB data from capture through completion is available. For storage, STONE arrays, which guarantee real-time streams, even from a single array, are recommended.

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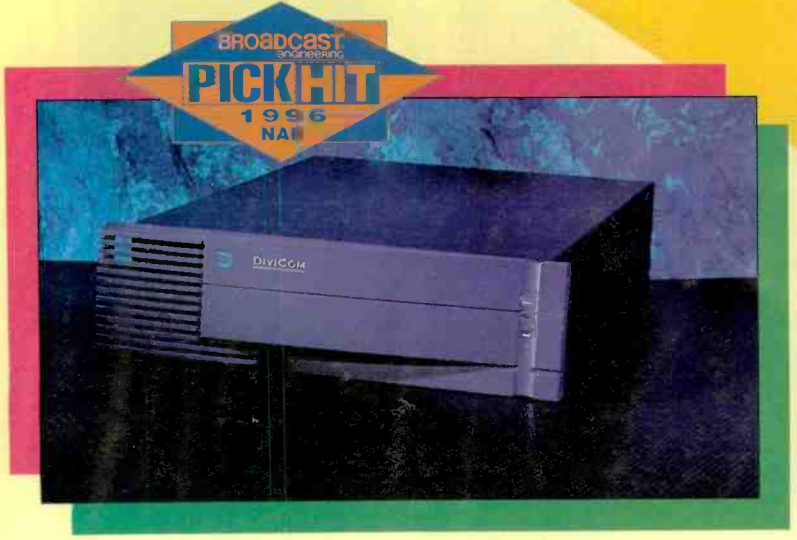


DiviCom MediaView MV20

The MV20 is a 3RU high-performance, fully-integrated MPEG-2 encoding system. It can compress one video signal along with two or more stereo audio channels and outputs in a compressed MPEG-2 transport stream. For flexibility, six modules can be plugged into the unit to provide for digital and analog audio inputs, multiple video input formats, data inputs and conditional access control. Other features include wide-range motion estimation, field/frame adaptation and repeat field detection. A 4RU version is available that can accommodate an additional four modules. Output data rates range from 1.5 to 15Mb/s.

Circle (153) on Action Card

Drastic Technologies VVCR

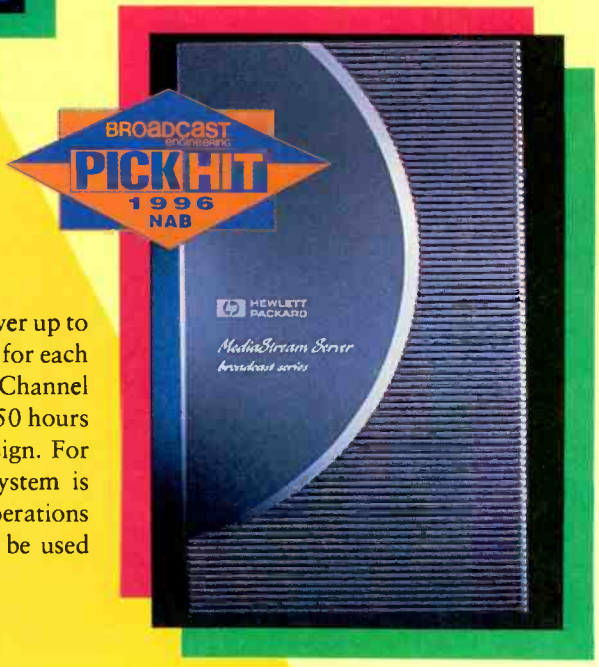
VVCR combines the familiar aspects of a traditional VTR with the freedom of a nonlinear recorder. It can deliver a visually lossless image at a compression ratio of 2.5:1. Additional compression, up to 20:1, can be used to increase storage time if desired. VVCR plays and records PAL or NTSC component or composite video at full CCIR-601 resolution along with two or four audio channels. Storage time can be increased by adding external SCSI-2 and SCSI-2 fast-and-wide hard drives. Sony RS-422 and Pioneer VDR protocol are supported for remote operation.

Circle (154) on Action Card

Graham-Patten D/ESAM 200

The D/ESAM 200 uses the same virtual console approach developed for the larger D/ESAM 820 and 400 mixers. Up to 16 input channels can be mixed to a total of four output buses. Four AES/EBU digital inputs (eight channels) are standard. Two plug-in modules (four channels each) can be added if desired. Plug-in modules can be analog, 48kHz or sample-rate-converted digital. Outputs are analog and digital along with analog monitor outputs. Other standard features include a 16-channel parametric equalizer, digital audio delay, 4-channel LED bar graph VU or PPM meters and the D/MEM memory system.

Circle (155) on Action Card



Hewlett-Packard MediaStream Server-Broadcast Series

The Broadcast Series of the MediaStream video server can deliver up to six channels of video and six channels of AES/EBU digital audio for each video channel. Multiple servers can be networked using Fibre Channel to provide additional channels as needed. Units can store up to 50 hours of program material using MPEG-2 within the redundant design. For archival, a high-speed link to the StorageTek MediaVault system is available. Modular design makes it easy to expand units as operations grow. A format-independent file system allows the system to be used throughout the transition from NTSC to HDTV.

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The new Sachtler Vario Pedestals offer unique features for studio and OB operation:

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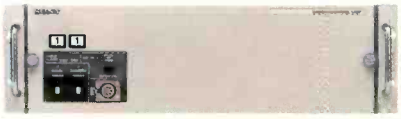

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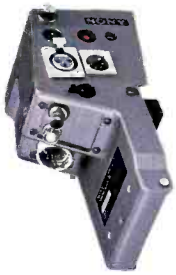


They're *always* using *each* other's *stuff.*









the camera that best suits your particular production. From top-of-the-line, feature laden, "gotta be perfect" studio cameras, to the "how did he keep his feet inbounds on that catch?" portables. And since everything is modular (and upgradeable) it's a future-proof system that will keep you on the cutting edge with advancing technologies. For more information about all eleven of the Sony BVP Studio/OB/EFP family, from our renowned BVP-700/750 to the BVP-500/550 workhorse, give us a call at 1-800-635-SONY, EXT. Mix & Match. And find out more about the most functional family you'll ever meet.

SONY

Intergraph Studio Z Rax

This rack-mounted video workstation offers up to 90 minutes of uncompressed CCIR-601 video on a general-purpose platform. Systems are available with dual or quad Pentium Pro processors, a maximum of 144GB of RAID storage and a suite of real-time video production tools. Running on Windows-NT, they can be used for the entire authoring process: scriptwriting, storyboarding, live video capture and creating and rendering computer-generated images, including 3-D animations. Resolutions up to 1,152x864 pixels are supported for high-quality texturing. Eight megabytes of texture memory are included with the system for photorealistic surface rendering.

Circle (157) on Action Card

Panasonic AJ-LT75 laptop editor

This all-in-one laptop editor includes two full-feature DVCPRO VTRs, two color 6.5-inch LCD monitors, stereo speakers and a complete cuts-only editor in a compact package that weighs less than 20 pounds. The unit can perform assemble, insert, auto assemble and split audio edits. Pictures are displayed at up to 60x normal speed and the unit can playback MiniDV cassettes with an adapter. Recordings up to two hours can be made on either VTR, both of which can be controlled externally through RS-422 ports, allowing the unit to be used in multiple-machine editing situations.

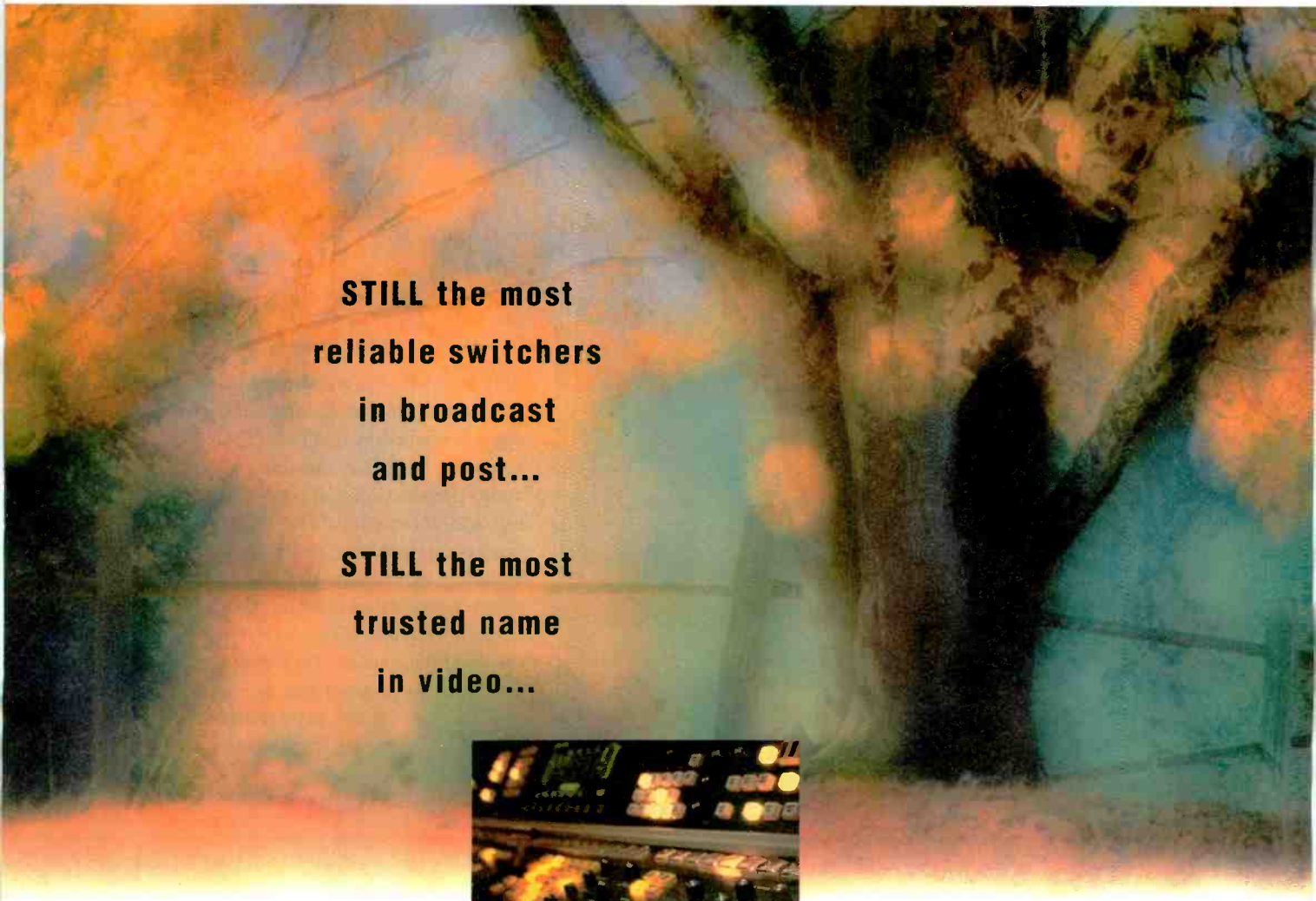
Circle (159) on Action Card

Panasonic AJ-D700 camcorder

The AJ-D700 is a full-size DVCPRO camcorder. It features three ½-inch FIT CCDs and 10-bit digital signal processing. Recordings can also be made from an external source on to medium-size DVCPRO cassettes, which provide up to 63 minutes of recording time. It consumes less than 23W and weighs less than 13 pounds with lens, viewfinder and battery. A PCMCIA setup storage card makes consistent setup a snap. Playback to microwave or air can be accomplished without the need for an external playback adapter. Other features include a full range of controls, scene file storage and a 1.5-inch viewfinder.

Circle (158) on Action Card

Grass Valley



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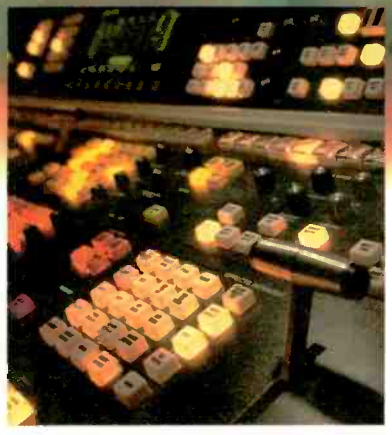
Chances are, you know us by more than our reputation.

After all, Grass Valley production, routing, and distribution systems are the premiere choice of video professionals everywhere. In fact, major broadcast and production facilities around the world use Grass Valley products.

So more than likely, you know first hand what it's like to work with Grass Valley equipment. The superb fit and finish. The precision and control. The perfect assurance and unfettered creativity that come from using tools that are so well designed, so reliable.



Grass Valley...still the most trusted name in video because the trust we've earned is yours. And, we're pleased to say, that puts you in pretty good company.

Call us at 1-800-395-9478 ext. 901

Tektronix

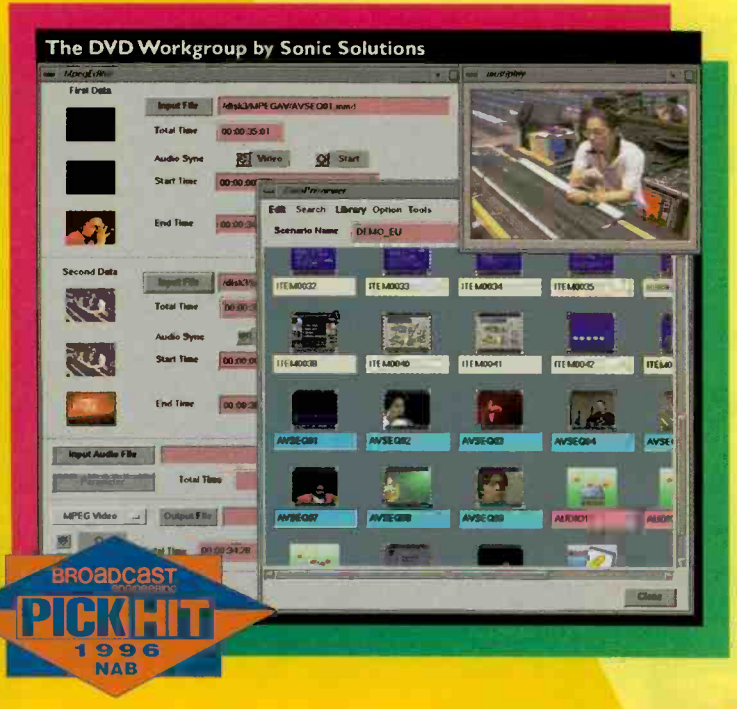
http://www.tek.com/VND

Circle (32) on Action Card

QuVis QuBit

QuBit is a combination digital videotape and disk recorder that allows for 8-, 10- or 12-bit recording. Additionally, 20-bit audio can be recorded on four channels at CD or DAT rates. A 100-base-T network interface allows the unit to be accessed across an Ethernet network. Recording capacity is approximately one hour on the disk drive and two hours to tape using QuVis' STORM compression. I/O is analog and digital in several video and audio formats. Video and computer connections allow the unit to be interfaced easily into a wide range of facilities.

Circle (160) on Action Card



Sonic Solutions DVD Creator

DVD Creator is a complete and fully networked solution for preparing video and audio content for digital video disks (DVDs). It is composed of three modules: MPEG-2 variable bit-rate compression, audio preparation and encoding and DVD authoring and formatting. The Creator's modular networked architecture provides increased efficiency, allowing work to be done in parallel. Audio and video compression must be done with care, however, authoring a DVD may be the most difficult task involved. Scenarist-DVD provides the functions necessary to prepare and format a title for DVD release. Among the tasks required are layout of interactive elements, simulation and data verification.

Circle (161) on Action Card

Sony DNW-A50 hybrid recorder

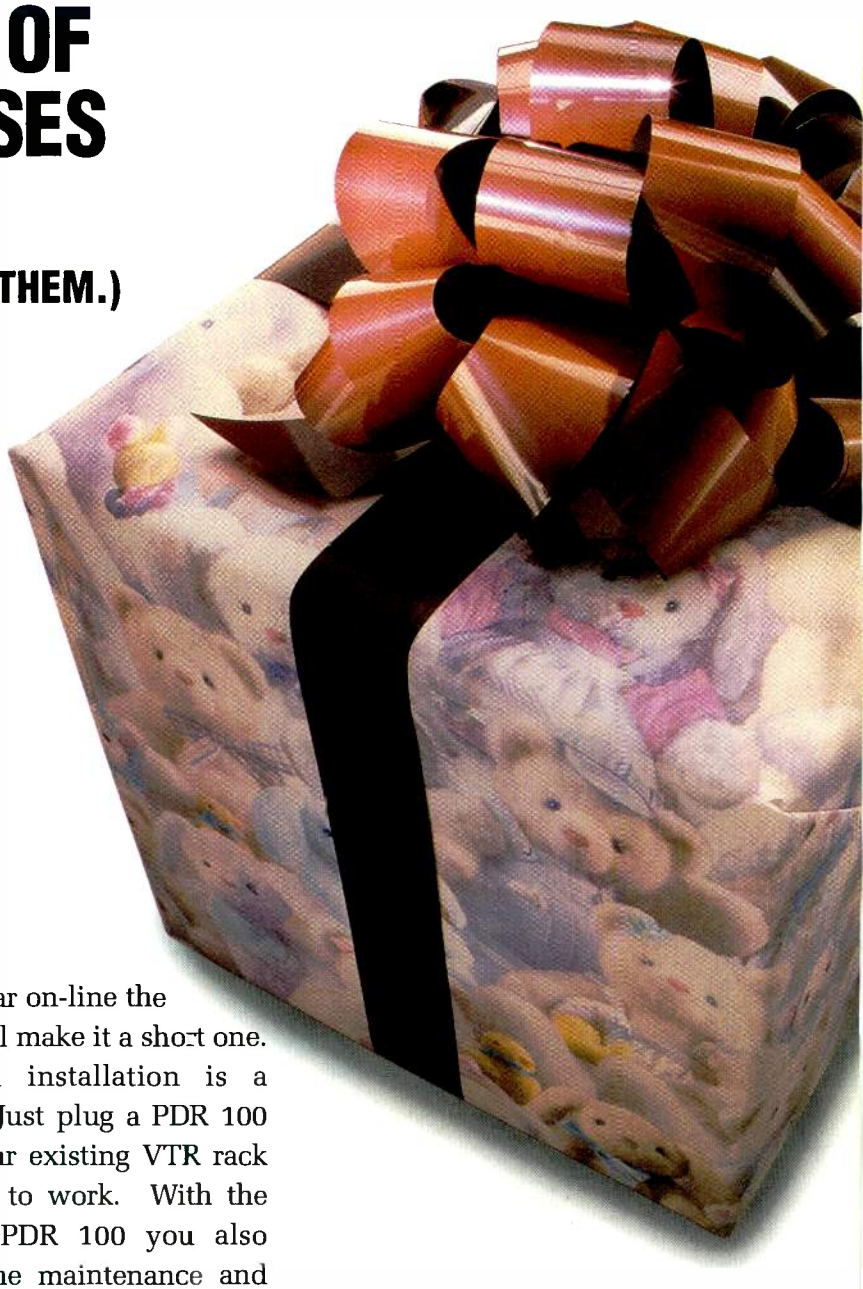
The DNW-A50 is a digital video hybrid recorder that combines tape and disk into a single unit. Betacam SX tapes can be downloaded to disk at four times play speed. Additionally, analog Betacam tapes can be digitized and downloaded to the internal disk at normal speed. Nonlinear editing from the disk can be accomplished within the unit. Using the MPEG-2 4:2:2 Studio Profile, high-quality, low bit-rate recordings can be made on metal tape or disk using a compression ratio of approximately 10:1. Four channels of 16-bit/48kHz digital audio are also supported.

Circle (162) on Action Card

Profile

WE CAN THINK OF A THOUSAND USES FOR TAPE.

(EDITING VIDEO ISN'T ONE OF THEM.)



You know, of course, that tape is dying. At least for video editing it is. One reason is the Profile™ PDR 100, the world's first practical disk recorder.

The Profile PDR 100 is the machine the editing world has been waiting for. You can simultaneously play or record any of four channels. For just a little more than the price of a single VTR, one Profile PDR 100 can make it seem as if you're editing in a three-machine session. So when you're ready to make the leap to nonlinear on-line the PDR will make it a short one.

And installation is a cinch. Just plug a PDR 100 into your existing VTR rack and get to work. With the Profile PDR 100 you also avoid the maintenance and wear that comes from head-to-media friction. You'll save on precious tape, too. So you can use it for a thousand other things.

To find out more about the Profile PDR 100, call 1-800-395-9478, ext.701. Tape this ad to your wall so you won't forget.

1-800-395-9478, EXT 701

Tektronix

http://www.tek.com/VND

Circle (33) on Action Card

Sony BVM series E&F video monitors

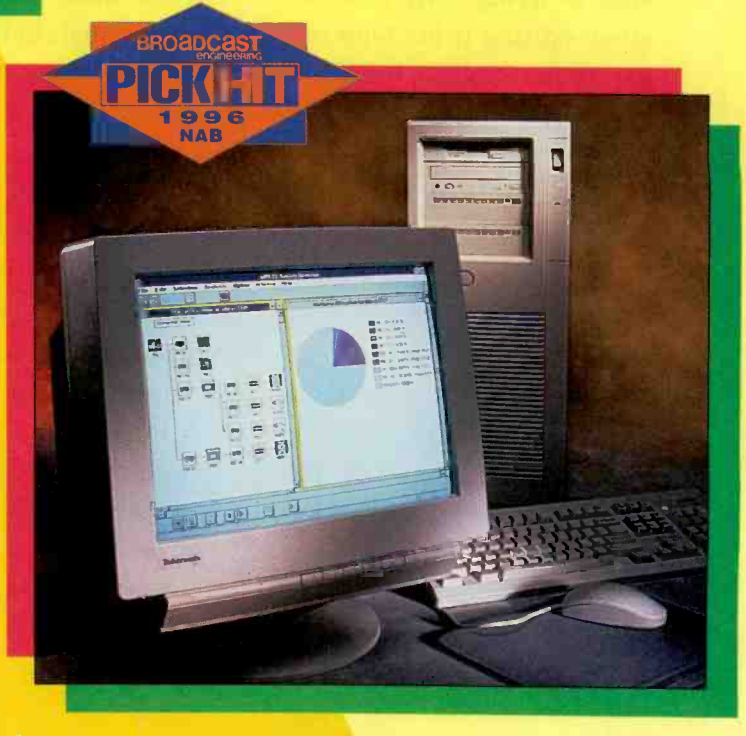
The E&F series monitors offer a new chassis construction, which incorporates easy-to-install rear-panel input boards, an optional IC memory card and RS-485 remote-control capability. Optional digital inputs for one 4-slot monitor include up to 12 component (4:2:2) (NTSC/PAL) and 12 composite serial digital (4fsc) (NTSC/PAL) inputs. Possible analog inputs include 24 composite inputs or eight component inputs (Y/R-Y/B-Y, RGB, Y/C). Standard features include auto-setup, closed-caption and VITC readers along with EDH and interactive status reporting (ISR). Units are available with either 14-inch or 20-inch CRTs.

Circle (163) on Action Card

SyntheSys Video BitAlyzer

The BitAlyzer combines the features of a high-bandwidth digital storage oscilloscope, waveform monitor, test-pattern generator logic analyzer, bit error rate and EDH tester and jitter spectrum analyzer into a single unit. Additional features include automatic measurements, unattended operation and integrated help features. Combined, these features allow testing of digital video to be accomplished quickly and easily. Users can compare measured parameters to default standard values or can manually adjust them to fit their requirements. The innovative design allows future hardware and software upgrades and enhancements to be easily added to the current unit.

Circle (164) on Action Card



Tektronix MTS100 MPEG Test System

The MTS100 combines creation, generation and analysis of MPEG-2 transport streams into a single unit. The MTS100 incorporates a multiplexer that allows users to develop a variety of custom transport stream data files. It also includes an acquisition and analysis function that provides detailed information about the stream's conformance to MPEG-1 and MPEG-2 standards. With the MTS100 you can analyze acquired transport stream using a simple graphical interface. The system searches for errors in the transport stream, PES packet, and table headers and highlights any errors found. The unit operates on Windows NT and can be easily integrated into networks.

Circle (165) on Action Card

We let Rick Dees use one and now he won't give it back!

"Nope. No way. Forget it. This Instant Replay is mine."

Hey, we understand. After all, Instant Replay puts 1,000 of his favorite noises right in front of him — ready for instant playback. No other audio player makes it so easy to be spontaneous and creative. It's fast it's easy and it's fun.

Check it out One Instant Replay can store up to 16 hours of stereo sound. That's 16 hours of sound effects, spots, promos, even entire songs — anything — and you can play any of them back instantly just by pressing one of 50 Hot-Keys! There's no need for a computer and no need for training. It's self-contained and it works right out of the box — just push the buttons and go!

Try Instant Replay Free! Call 818-991-0360

To prove how Instant Replay can make your station better, you can Test Drive one with no obligation! Call us now for free overnight delivery of your Test Drive unit. And like Rick Dees, once you get your hands on Instant Replay you won't want to give it back either.

D-NET

Transfer one cut or one thousand between machines using the D-NET high-speed digital audio network.

Print hard copy lists of all stored cuts so you always know what's where!

Store up to 16 hours of CD-quality digital audio on Instant Replay's internal hard disk.

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If you're a call-letter station, you can try Instant Replay for 10 days with no obligation. If you decide to buy Instant Replay, we'll make arrangements through one of our authorized dealers. Offer good in the continental US only. Offer expires July 1, 1996.

*Suggested retail prices: $2995 for 4 hours of storage; $3495 for 8 hours of storage and $3995 for 16 hours of storage.

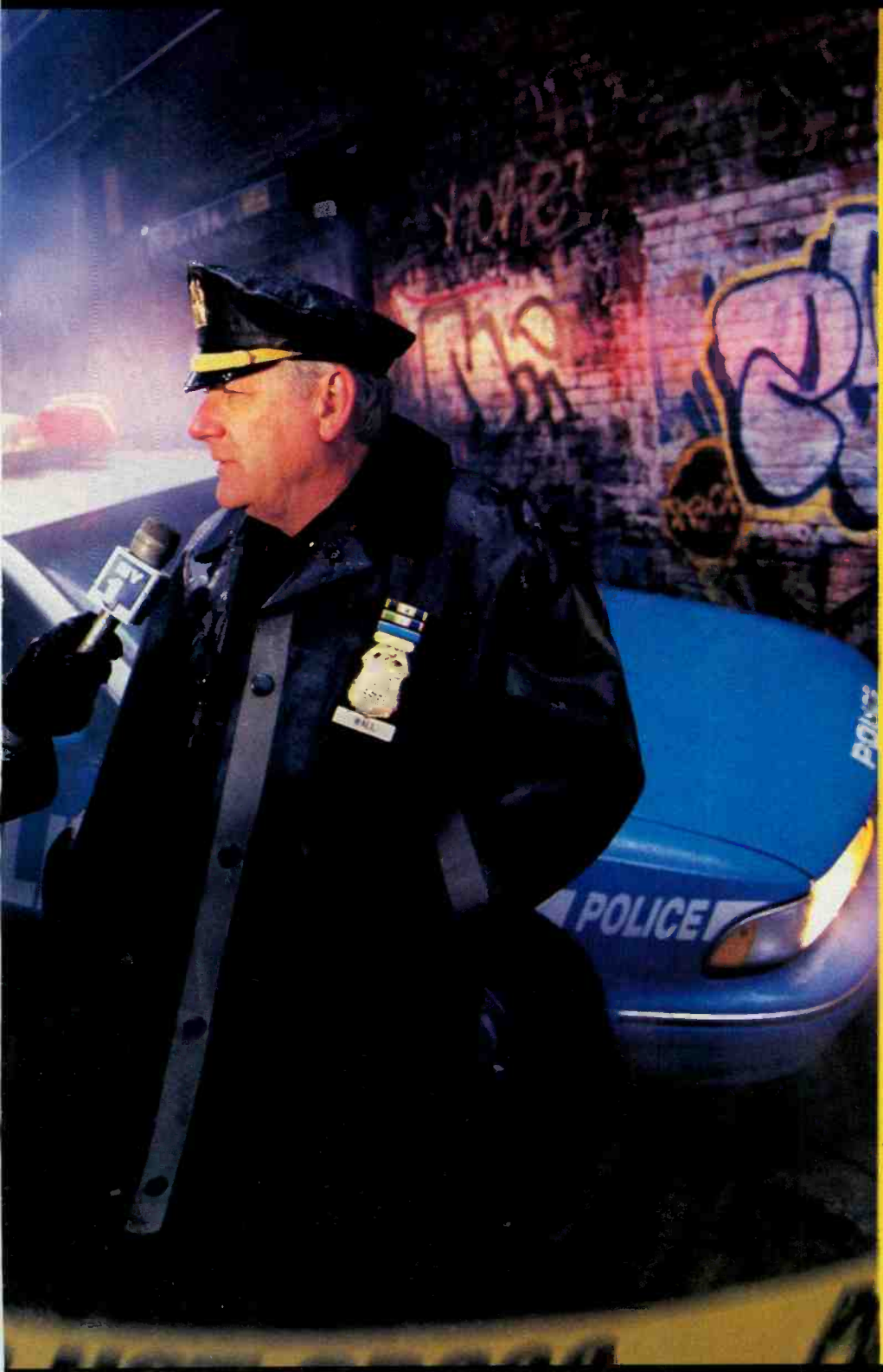
Circle (40) on Action Card

The News is



For more information call: 1-800-528-8601 (Upon request enter product code 16) One Panasonic Way, Secaucus, NJ 07094.

on the Street.



DVCPRO

April 9th, 1996. News is made as Panasonic's DVCPRO hits the streets. Time Warner's revolutionary 24-hour news channel, NY1, converts its entire operation to DVCPRO. By equipping its 26 news correspondents with DVCPRO digital camcorders, NY1 has changed the face of newsgathering forever.

Lightweight Panasonic DVCPRO camcorders are perfectly suited for the station's pioneering videojournalist concept, which helps NY1 deliver its round-the-clock coverage of New York news, politics and sports.

DVCPRO camcorders and VTRs enable NY1 "to achieve the highest quality acquisition while significantly lowering operating costs." (NY1's own words)

For fast and first coverage of what's breaking in New York, viewers turn to NY1.

For their breakthrough to broadcast digital technology, NY1 turns to Panasonic.

Official Broadcast Equipment Supplier of the 1996 Olympic Games

36 USC 380

Panasonic

Broadcast & Television Systems Company

Tektronix TG2000

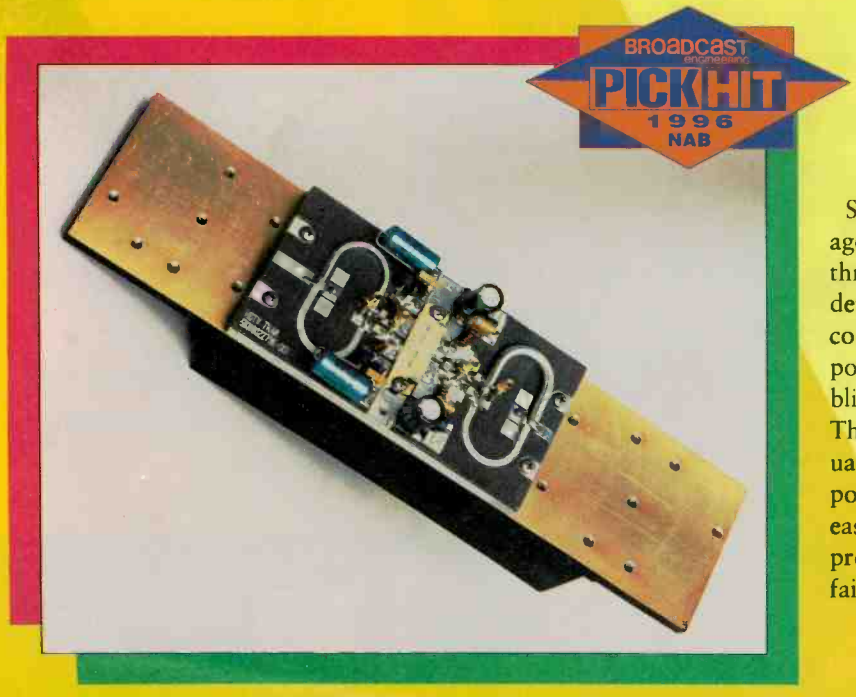
The TG2000 is a multiformat analog and digital precision signal-generation platform. It provides reference-quality test signals and stressing functions in the analog and digital domains. Comprehensive test signal libraries are supplied in all formats and are supplemented by a Windows-based test program. The unit is a modular expandable platform designed for current and future requirements. It supports multiple video formats including 18MHz component digital. The TG2000 mainframe has nine slots, one of which is used for the standard BG1 blackburst generator. An additional slot is used for gen-lock if desired.

Circle (166) on Action Card

Videotek SDC-101 Serial Digital Video Corrector

The SDC-101 accepts a component serial digital signal and provides users real-time control over common video parameters for correcting or enhancing the signals. Familiar analog terms give the unit the feel of an analog color corrector. Corrections may be applied in total view or to selected components to provide the desired results. An output connector allows users to configure an external alarm for indicating gamut, EDH or other data errors. An RS-232 port allows for computer control and may be used to load the 50 user-defined memories that can be recalled via preset SMPTE time-code values.

Circle (167) on Action Card



Westinghouse Silicon Carbide HDTV transmitter

Silicon carbide is a high-temperature, high-voltage semiconductor that can deliver greater than three times the power of conventional silicon devices. Transistors capable of 500W outputs are combined into 1.5kW power modules. These high-power transistors reduce the number of assemblies and lower the cost of labor and materials. The modular design allows broadcasters to gradually build transmitters from low-power to full-power units. The modular design also provides for ease of maintenance. Units are air cooled and provide for easy troubleshooting and graceful failure in the event of a problem.

Circle (168) on Action Card

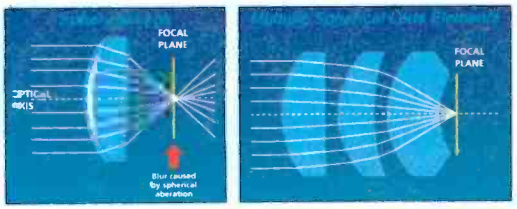
FUJINON ASPHERIC TECHNOLOGY

Our AT lineup: the lightest, sharpest zoom lenses in the field.

Even our toughest critics agree: Fujinon's proprietary AT has advanced the TV zoom lens state of the art more than any other breakthrough in the last 20 years. And now we've integrated AT throughout our line of hand-held and ENG-style lenses.

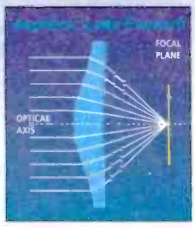
Lenses with AT are lighter, smaller, and better balanced than their conventional counterparts because they require fewer lens elements to deliver optimum performance. They are also optically superior, and deliver greater corner resolution, reduced distortion, and closer minimum focus distance.

You'll find AT only on Fujinon hand-held and ENG-style TV zoom lenses, because only Fujinon has developed the technology to manufacture the large AT optics that these lenses require.



Spherical aberration causes a soft image, and requires multiple spherical elements to correct.

There's an AT-equipped Fujinon lens for every application, from the A8.5X5.5 with its ultra-short MOD and extremely wide angle, to the ultra-long telephoto of the A36X14.5, and 11 other exceptional performers in between. Each one is rugged, and built to take the punishment of the field.



Aspheric Technology corrects for spherical aberration in a single element.

So whether you're shooting the news or capturing an endangered species, AT gets you a closer shot, with greater detail and in greater comfort than ever before. For more information, contact Fujinon at 1-800-553-6611.

FUJINON

Broadcast & Communications Products Division

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FUJI PHOTO OPTICAL CO., LTD. 1-324 Uetake, Omiya City, Saitama 330 Japan;
Phone: 048-668-2152, FAX: 048-651-8517, TELEX: J22885

FOCUSED ON THE FUTURE

Circle (22) on Action Card

RULES

BE's Pick Hits judges operate anonymously. Each year, they look for new products that meet the following criteria:

1. *Products must be new and not shown at a previous NAB convention.* In some cases, distinguishing a new product from a modified older one is difficult. For "Pick Hits" purposes, a new product is one with a new model number or designation.

2. *Products must have some positive impact on the intended user's everyday work.* Judges search for equipment to be used on a regular basis. Products should provide new solutions to common problems.

3. *Products must offer substantial improvement over previous technology.* Unique circuit architecture need not be included, but some new approach or application must be involved in the product's design.

4. *The prices of the products must be within reach of their intended users.* The judges seek products appropriate to a wide range of facilities.

5. *The products must be available for purchase within calendar 1996.* Equipment must be on display on the show floor and currently (or imminently) in production. Judges take the exhibitor's word on availability dates. Products demonstrated in private showings do not qualify.

JUDGES

STEVEN M. BLUMENFELD
Vice President Technology
GTE Interactive Media
Carlsbad, CA

MARVIN BORN
Vice President, Engineering
WBNS-TV
Columbus, OH

RICK EDWARDS
President
Towercom
Ft. Lauderdale, FL

DAVID C. FELLAND
Director of Engineering
and Operations
WMVS/WMVT,
and Director of Engineering
Wisconsin Educational
Communications Board
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KENNETH HUNOLD
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Bureau, Reston, VA

PETER ZAWISTOWSKI
Senior Engineer
Target Enterprises
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Presenting Fujinon's new 18X Series. The most cost-effective lenses in the TV zoom jungle.

Fujinon's new 18X9 and 18X6.7 deliver the widest angle and highest magnification in their class. Add to that superb Fujinon optics, Aspheric Technology, 2X extender, macro, and rock solid construction... all in a 3-lb. package.

Fujinon's 18X lenses. King of the EFP jungle. For more information, contact Fujinon at 1-800-553-6611.

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FUJINON

FOCUSED ON THE FUTURE

Circle (23) on Action Card

Take 1,000 exhibitors, add 90,000 attendees, spread them over two exhibit floors at different locations and what have you got? One big convention, that's what.

The 1996 NAB was the largest on record, and finally broke the mold of having everything at least "near" the convention center. The addition of the Sands Convention Hall made for some interesting waits and inconvenience as attendees tried to see it all.

We *BE* editors know how it was, because most of us spent up to six days there covering the show. With an army of more than 40, Intertec Publishing had more people supporting this show than many exhibitors, let alone other magazines. Therefore, what follows is the most in-depth coverage you'll be able to get —direct from the convention floor.

Missed a few booths did ya? Don't worry. The following pages provide a review of those companies you saw and the many you wished you'd had time to see. So sit back, grab yourself a cool one and read on. You're about to get the really big picture of NAB 96.

If you want more information on the products listed, just use the reader service number listed below each section.

Brad Dick, editor

NAB Playback Table of Contents

VIDEO SERVERS AND ON-AIR PRESENTATION EQUIPMENT

By Dave H. Spindle

Dave H. Spindle is principal at Capricorn Associates, consultants for multimedia innovation, based in Chicago.

For NAB '94 coverage, I authored the article "Video Servers: The Tapeless Society?" Well, the society is not quite tapeless yet, but there is a new level of maturity in disk-based video servers and some interesting twists in the use of tape.

Avid Technologies continued its winning ways at NAB '96 with AirPlay MP, a new release of the AirPlay audio/video server. AirPlay MP makes use of Avid's new 100MHz PowerPC-based media processor in a complete solution for on-air presentation. Motion JPEG compression is combined with RAID-3 disk storage of 28 hours on a SCSI network to create an extremely robust system with four independent and redundant playback channels. New features include the ability to import and play files from other Avid products, such as the new MediaServer, MediaComposer and NewsCutter via AvidNet, a high-speed fiber network. MediaServer increases available program material to hundreds of hours. Avid is also adding the provision for control by Louth Automation. Other enhancements in progress include an Informix database and search application, E-Mass tertiary storage and an implementation using Silicon Graphics Challenge XL hardware.

One of the most visible servers was the Tektronix Profile PDR-100. The Profile has a number of refinements and innovations including the capability for simultaneous 4-channel record/play in serial digital component or analog composite standards. The Profile supports up to 16 simultaneous audio channels. The Profile uses variable Motion JPEG compression to store up to 720 minutes of video at 18Mb/s to 48Mb/s.

Pioneer New Media Technologies, Inc. debuted an optical disc-based browse server that uses variable MPEG-2 compression. The basic system provides storage of up to 500 discs, for a capacity of 481 hours at 1.5MB/s. One of the major features of the system is a database key word retrieval mode.

Hewlett Packard's MediaStream Server-Broadcast series is designed for multichannel broadcasting and relies on MPEG-2 MP@ML compression. (For more information, see *BE* Pick Hits, p.30.) It is now available with up to six video output channels (each with six audio channels) and a storage capacity of 50 hours. HP also announced intentions to support MPEG 4:2:2 MP@ML in the near future. HP has strategic alliances with Louth Automation, Columbine and Chyron/Pro-Bel for on-air automation solutions. A strategic alliance with StorageTek provides access to thousands of hours of tertiary storage. HP is working with AVID Technologies to adapt MediaStream into new editing environments.

Hitachi Denshi America, Ltd. showcased its video file server that uses custom software for handling all commercial insertions. It uses the MPEG-2 video compression scheme and a RAID-5 disk array for recording. The server can record from five to 30 hours, depending on the options selected.

Silicon Graphics announced the CHALLENGE media server at NAB. Together with other vendors, CHALLENGE offers end-to-end solutions for broadcast and post-production markets. Multichannel TV automation with Louth and Arris Interactive Digital Video, real-time MPEG-2 DVB with Imedia and Optivision, NVOD with Vela Research, media asset management with The Bulldog Group and Cinebase Software and RAID and tertiary storage with Ciprico and StorageTek, are part of the vast array of CHALLENGE-based applications.

The Quantel Clipbox video server offers complete, integrated solutions including on-air presentation, news and post-production. There is a choice of uncompressed ITU-R 601 video or compression levels of up to 20:1 using Quantel Grid Compression. Clipbox supports up to 14 A/V output ports and RAID-3 disc storage capacities up to 160 hours. Quantel's simultaneous true random access permits instant alteration and implementation of running order — down to frame accuracy. Quantel intends to support third-party on-air automation systems.

The Sony Bitstream VideoStore is another MPEG-2 MP@ML-based multichannel video file server. The system consists of two subsystems, the Bitstream encoder and the VideoStore control and storage unit whose RAID-3-based disc storage capacity is 60 hours of video/2-channel audio at 5Mb/s. Twelve independent, simultaneous output channels are available. Sony demonstrated the system interfaced to a Channelmatic automation system, downloading traffic schedules for local ad insertion.

Philips Broadcast Television Systems' Media Pool server was back at NAB '96 with enhancements. Media Pool uses variable Motion JPEG and RAID-3 drive architecture to provide up to eight channels of video and audio. Media Pool has external interfaces for Odetics and StorageTek tertiary storage up to 50 terabytes. The automation interface of choice is Alamar, but Media Pool supports industry standard protocol for other on-air automation systems. The big news is the cost-effective pre-configured MP-021, an entry-level 2-channel system with six hours of A/V capacity and Stream and DiskCart software applications. Stream emulates VTRs, while DiskCart is a disk-based alternative to cart machines. The MP-021 is upwardly scaleable.

AlphaStudio Broadcast System is a new offering from Digital Equipment Corporation (DEC) running under DEC's 64-bit RISC Alpha technology and UNIX. AlphaStudio is a highly scaleable open architecture system that uses a switched high-speed network to move video/audio/data files between the content server and "REV" stations that serve record, edit and view functions. Video can be uncompressed or variable-rate Motion JPEG compressed. Unlimited REV stations can be supported. Louth Automation or Columbine/JDS provide on-air automation interfaces.

Hybrids, tape with cache

Odetics debuted Spectrum, a marriage of disk and tape solutions that creates a complete cost-effective multichannel broadcast automation system. Spectrum uses the Odetics TCS-45/90 automated video cassette library interfaced to a Tektronix Profile for digital spot playlist caching. Spectrum is scaleable to 24 on-air channels. There was also the SpotBank with new 6.0 software, a RAID-3 disk-based system for multichannel spot insertion and automation.

Thomson Broadcast Systems Pro-Cart, a Betacam deck-based product, makes use of the Profile as its spot playlist cache. The Windows operating system controls not only the Pro-Cart robotics, but also external VTRs, audio/video servers, routing switchers, mixers and GPI triggers. Pro-Cart boasts easy maintenance and interchangeability of the internal Betacam decks, as well as a fast access door for loading up to 10 tapes. Thomson also offers a range of Pro-Cart software applications, such as database, playback editing and transmission, recording and automation.

The disk-based video server market has indeed matured as of NAB '96 and servers can be considered reliable, innovative and efficient. However, there was this one little thing I saw at the Sands from StorageTek in the Speer Communications booth — about the size of a small gazebo — that stored 2.4 pedabytes of video data at 8:1 compression on streaming data cassettes. That's 2,400,000,000,000,000 bytes, or enough capacity for 31,579 continuous hours — about 3.6 years. Awesome!

ACTION CARD 176

VIDEO STORAGE

By Michael Heiss

Michael Heiss is a marketing and technology applications consultant based in Los Angeles.

A great deal of the technology on display at this year's NAB involved the products used to create and manipulate sounds and images, but how do you store those sounds and images? Fortunately, the same show that in many ways is giving rise to the problem by providing easy ways to create multiple images gave us ways to deal with the storage problem.

Looking at products on the show floor, a number of categories are developing, and there were some interesting products in each. A matrix of categories is becoming clearer. On one axis is removable media vs. non-removable media. On another axis is media type: magnetic disk, WORM optical disc, optical disc playback, and yes, tape is still with us. Working at a diagonal angle across these two axes are factors that combine storage time, size and cost.

For major league storage requirements, you turn toward large-scale, nonremovable media. Here, the means used to record the media is irrelevant, because you will be transporting only data, not media. Similarly, the type of storage device used is unimportant; the goal is instant access to video and lots of it. No longer confined to spot playback, large-scale servers have proven that they can serve as network delay and program playback units, as well.

Joining the large-capacity fray were major installation demonstrations of ASC's Virtual Recorder and MountainGate's Stampede and Renegade. ASC's VR-300 is a multichannel disk-based system. It can be combined with its VR NLE nonlinear editing system and/or the VRX multipurpose automation recorder for added functionality. MountainGate's Stampede provides up to eight hot-swappable drive modules in the same chassis. It supports RAID levels 1, 3 and 5 and has dual power supplies.

The Renegade supports 10 drives and RAID levels 0, 1, 3, 5, 6 and 7. The Tektronix Profile 4-channel PDR was found integrated into a variety of solutions including the Tektronix Live Event System, which includes a flexible GUI to facilitate logging and selection of clips. Also providing solutions in RAID-based storage was Ciprico. Ciprico provides high-bandwidth RAID solutions to a variety of manufacturers. In addition, its latest units, the Spectra series, provide plug-and-play solutions for SGI workstations and have received SGI Gold Seal Approval.

If you need large-scale storage, but have material on removable optical, instead of fixed magnetic disc, Pioneer's New Media Technol-

700 watts

In an 8¾ inch package!

This 700W Compact Medium Power Amplifier (CMPA) gives you room to grow. The lightweight CMPA packs high efficiency and power into one rack drawer. What you do with the extra room is up to you – but when space is at a premium, try the CMPA:

- Features an integral pin diode attenuator
- Easy-to-use microprocessor control
- Offers an optional integral linearizer
- Available in extended C- and Ku-band frequencies

Varian supports this small amplifier in a big way. The CMPA is backed by the industry's largest sales and global service network. Put the new CMPA to work, and you'll put the space you save to good use.

What will you do with that extra space?

To find out more, call us:

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(38) on Action Card

ogies' DiscBank can keep you occupied for up to 125 hours. Also at Pioneer was the Digital FastFile, which offers one hour of storage at 32Mb/s Motion JPEG and a rewritable video disc recorder with FastFile. Lest you think that tape is a thing of the past for large-scale storage, Panasonic introduced a version of its well-known MARC automated record/playback system for use with the DVCPRO format. The DVCPRO MARC provides up to 1,200 hours of playback capacity.

Sony's DNW series Hybrid recorders integrate a Betacam SX transport with a disk-based device in the same unit. (For more information, see *BE* Pick Hits, p.30.) This is the ultimate "have your cake and eat it too" for one machine cuts-only editing in the field or high-speed transfer and storage back in the facility. Other tape-disk hybrid units include the QuBit from QuVis (for more information, see *BE* Pick Hits, p.30) and a news server by Panasonic and Mercury computing that integrates DVCPRO tape acquisition with the hard drives on a PCI server.

Mostly, however, the role of temporal, rather than archival or long-form storage, is going to disk-based units and arrays that aim to take the place of tape systems. No matter if you are doing editing, graphics creation and manipulation or other work, the world is turning to systems that are desktop or small profile rack height, PC- or SGI-based, and typically *not* designed for media interchangeability. Use these to create the video and then move it back to the large server or off to tape for future use. Many of these units are quickly becoming the "tapeless VCR" of the future, but here today.

Numerous units were on display, far too many to mention, however, here's a sampling of a few. Scitex Diskus offers 10-bit serial CCIR-601 and analog RGB and Betacam I/O with an Ethernet interface for image transfer and remote control. MountainGate's VDR comes in component, composite and HD versions, it supports random-access segment playlists. Philips Broadcast showed its VDR 110, which includes a single-channel disk recorder, memory expansions to 56GB and play time from 12 minutes to more than three hours at 4:1 compression. Drastic Technologies' VVCR offers an easily expandable unit that uses SCSI-2 and SCSI-2 Fast/Wide hard drives along with laserdisc and Betacam BVW-75 emulation. (For more information, see *BE* Pick Hits, p.30.) Fast Forward's Omega units offer single- or dual-channel capabilities and YUV analog component and composite I/O. Sierra Design Labs had quite a few additions to its Quickframe line of DDRs, among them Diskcovery, SCSIframer, NFSserver, Audioframer and Analogframer, which provides interfaces for analog devices. One interesting unit worth mentioning is the Anacapa SIMM-based solid-state drive, which uses RAM rather than disks to store information. With a SCSI interface, the unit plugs in as a disk drive, but offers much quicker access.

FWB introduced the PCI Ultra SCSI JackHammer for Windows NT systems. The JackHammer is a RISC-based, fast-and-wide SCSI-3 accelerator that maximizes performance of any drive for Pentium systems with a PCI local bus, and JackHammer's Intelligent Direct Memory Access transfers data directly to memory and is fully compatible with all SCSI-1, fast SCSI-2, fast-and-wide SCSI-2 and Ultra SCSI storage devices. The Tagged Command Queing improves drive performance by enabling multiple I/O requests to be stored and sorted and then executed together.

Also announced was the SledgeHammer*Pro line of high-performance disk arrays featuring removable canister technology. SledgeHammer*Pro arrays deliver flexibility, performance and the reliability needed in high-end digital video and publishing. Available with 2-,4- and 8-bay configurations, in single- or dual-channel, the arrays range from 4GB to 36GB per system and up to 108GB when daisy-chained.

In May, FWB began shipping a new disk utility for the Macintosh. The ToolKit 2.0 provides for IDE, SCSI-3 and System 7.5.3 platforms, an elegant interface and high-performance IDE support. The ToolKit is ready to run on the PPCP platforms of the future.

Storage Concepts unveiled the *FibreRAID* fully functional RAID storage solution. Providing sustained data rates for high performance applications, the *FibreRAID* is perfect for real-time image capture and retrieval applications. When coupled with other Storage Concepts products like the Concept 910, 100MB/s transfer rates are possible. Also shown was the Videoplex Server for VOD applications.

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Circle (37) on Action Card

Rapid Tech announced the availability of an intelligent PC-based MultiStreamXpress (MSX) card. The adapter card is a high-performance dual-channel multimedia board operating on the Windows NT platform. Designed for the OEM and resale markets, the MSX allows SCSI RAID operation for dual-stream video operation. The MSX can play while recording or provide two-channel output.

Lest you forget, we must again remind you that tape is still a vital media. Despite all of the inroads by magnetic, optical, phase change and magneto-optical products, tape remains the primary format for program and news production. No NAB report, particularly one that is at the 40th anniversary of the introduction of the practical VTR, would be complete without new formats and this year's show is no exception.

The influence of DV was obvious — JVC, Panasonic and Sony all offered DV implementations. Sony and Panasonic offered their take on professional versions of the consumer DV format, Sony's DVCAM and Panasonic's DVCPRO. In a move that is unfortunately reminiscent of all too many such format wars in years past, the two versions are not entirely compatible. JVC took a different road, promoting Digital-S as an answer for field and edit bay use and on the analog side pumping up its S-VHS line with 22-DX and Edit Desk systems. Hedging its bets, JVC announced a dockable DV unit that adheres to neither the DVCPRO or Sony DV formats. Rather, it's strictly based on the consumer DV format. On the other hand, that means that at least both of the competing machines will play the tapes back.

Along the lines of more traditional tape formats, Sony showed the DVW-250, a portable unit based on the Digital Betacam format. Panasonic added a camcorder and studio VTR to its D-3 line and an HD processor upgrade to the AJ-D580 D5 VTR. Also announced was the ability to use the Viewgraghics Dataview with the AJ-D580 to record data at high speeds rather then video.

ACTION CARD 177

TV AUTOMATION, MASTER CONTROL, AND BUSINESS SYSTEMS

By Philip A. Hallenbeck

Philip A. Hallenbeck is project manager for Turner Entertainment's Network Operations, Atlanta.

Automation news this year was predominately the development and enhancement of the disk cache interface. It has become even more evident that the role of the video file server is more than an external device. Rather, it is the center of an automation system's capabilities, providing multiple-channel play-out, random access, scaleable storage and variable compression rates. When looking at automation for the future, pay close attention to the cache interface to guarantee that you'll have the flexibility to grow your system and to meet business requirements.

Alamar's MC-2095 uses a distributed intelligence design to control all VTR formats, laser disc recorders, cart machines, still-stores, character generators, switchers and routers and satellite feeds. New at NAB was the enhanced MSL-4000 & the MC-2075E. The MSL-4000, a LAN-based intelligent interface controller, allows the end user to download events to an independent machine server well in advance of air. This capability permits events to be cached to disk prior to air and provides the Alamar system another degree of redundancy in the event of main computer failure. The MC-2075E is a PC-based multichannel, multitasking platform, which will handle a maximum of 32 independent on-air channels, controlling up to 256 devices and managing 500 playlists with a total of 9,999 events per list.

Open was the buzz word at the Avid booth. Open architecture for AirPlay, Open Media Framework support for Panasonic DVC and open access to digital news archives. Avid announced that its AirPlay control software is migrating to an open architecture environment. This development will split the AirPlay application into a control application and a separate playback engine, permitting the control application to drive commercial and promo playback on the Hewlett Packard MediaStream video server. Additionally, Avid and Panasonic

announced a tight integration of Panasonic's DVCPRO technology with the adoption of Open Media Framework as the on-disk file format for DVC. Avid endorsed DVCPRO as a high-quality, cost-effective field acquisition for digital newsgathering (DNG).

Inside the newsroom, Avid offers AvidNews, its next-generation newsroom computer system. In addition to consolidating the features of NetStation and NewsView, AvidNews includes a media asset management system from IBM. This system provides journalists with the ability to research and access archived video and make rough cut edits of stories right from their desktops. Additionally, the latest versions of Avid NetStation and NewsView newsroom software with new features, such as web page composition, were demonstrated.

Leitch has introduced event automation software, *Event*WORKS, that allows a PC user two separate types of control capability: time-based execution of events and sequential execution of events with programmable delays. Several operations can now be programmed to occur unattended according to any user's time schedule. The product integrates and simplifies control of routers, salvos, machine control, GPIs and LogoMotion in one easy-to-operate package.

Florical Systems introduced the latest addition to its full automation package, SpotCacher, a hierarchical storage management system. SpotCacher serves as an intelligent interface using past experience and future needs to make decisions about the material resident in the cache. Florical's media database is an essential element of SpotCacher, tracking material through all locations, storing many of the SpotCacher decision-making factors. A single SpotCacher will handle up to 64 presentation channels, with the ability to network multiple SpotCachers for larger systems. Florical provides a total system architecture through Air Boss, including Showtimer for automated satellite/program record, Validator, which verifies air material, Spot Linker to assemble spots to cache or disk, Cart Director, which maintains the database and control of cart machines and News Repeater, which permits a fully automated second channel of program origination.

Leightronix demonstrated its full line of control systems for automated VCR and switcher control solutions for the broadcast, cable and closed-circuit TV markets. The event controllers range from the Mini-T-Pro event controller for 16 devices, with an internal 8x1 audio and video switcher, through the Pro 8 and Pro 16, with 100 programmable event control of up to 16 VCRs with internal 8x3 or 16x4 internal switchers to the TCD-1000, which controls 100 events with random day selection and controls up to 64 VCRs and external routing switchers. All of these control products offer a 5-year warranty and support Windows, as well as DOS-based, event scheduling software.

New Windows client interfaces, AutoShow and AutoSat, were the new additions to Louth Automation's ADC-100. AutoShow is a program acquisition system that provides automatic recording of multiple incoming sources, as well as segmenting previously recorded shows. AutoSat is a satellite downlink control system that integrates with AutoShow and ADC-100, providing virtually unattended positioning, tuning, routing and recording of scheduled incoming feeds. The new Windows client user interface is user-configurable and multitasking, allowing more workstations access to the automation database. Louth is also offering single cache or mirrored cache interfaces. ADC-100 is a client/server automation system that con-

trols video file servers, cart machines, external VTRs, still-stores, character generators, switchers and record incoming sources.

Matco (Manufacturing and Test Company, Inc.) introduced the newest member of its machine control system line, the MA-204B. The MA-204B features all of the capabilities of its predecessor the MA-204a, including variable event list size by channel, 16-week advance event list programming, 24 control outputs, parallel and RS-422 interfacing, remote control via modem and a choice of time code or PC clock reference. In addition, the new MA-204B provides up to 10,000-event programming, support for character generators, parallel printer support, split audio and video control and DOS and Windows control software is included with the basic system.

Odetics was showing its line of turnkey automation solutions based on the "Spectrum" automation software. The Spectrum software is new this year, and builds on the previous "CacheMachine" software. Spectrum incorporates centralized spot archiving and random-access spot playback from a digital disk recorder cache. Both the spot archive and program playout use an Odetics TCS90 automated video library.

SpotBank 6.0 software provides enhancements to Odetics disk-based spot insertion/automation system including an easier-to-use GUI, additional disk options and improved frame accuracy for multichannel playback. SpotBank 6.0 supports the Tektronix Profile with RAID 3 disk array and can run up to four channels from a single workstation.

Pro-Bel was showing its MAPP System, a media management application for broadcast disk servers. As a media mapping system, MAPP includes acquisition, caching, database playout and archiving. Using scaleable SQL database technology, the system can be configured from one to hundreds of users. Two playout lists may be run per each MAPP system and multiple disks may be placed under control of a single database, taking advantage of fast data transfers between disks. Pro-Bel allows for integration of existing automation and cart machines through in-slot replacement of a caching controller, which will provide automatic prioritized dubbing of missing material. The MAPP system will also fully integrate with the Pro-Bel Procion Workbench tools, using MAPP workstations to support router control, playout and record automation and machine control.

Quantel demonstrated the Memex Software products Landscape, OptIcon and Icon, interfacing with the Clipbox. Landscape automation software combines cart machine control with control and media management of disk and random-access storage systems. Landscape will control MC switchers, VTRs, still-stores, digital effects and subtitling captioning systems through a standard user interface to allow event editing, such as auto re-timing and missing lists. System monitoring is displayed via dedicated video outputs and user workstations and includes on-air event schedule, alarm and status indication and dynamic device status for switchers, transports and digital disks.

Opticon is a cost-effective automation system geared toward local stations and cable head-ends for automated opt-out and commercial insertion. It is designed to work in concert with the Memex Icon Network Control System to automate playing and switching of VTRs and other playback material. OptIcon is a PC-based control system with a standard MS-Windows user interface and is capable of controlling simple video/audio switcher and two playback machines.

Icon allows network playout centers and satellite distributors to provide automated signaling and control to local stations and head-ends via the VBI. The system requires a minimum of one line of the VBI on each field of the video signal to transmit current on-air and machine control data. Generating a real-time teletext page, the Icon display includes the current on-air event status, a number of upcoming events, overrun or underrun conditions, countdown for remote cues and a message line for important messages.

Videomedia had its new V-Lan VIP Suite on display. The V-Lan VIP Suite consists of multiple software application modules that work independently or combined to provide a fully integrated station or system automation control package. Control modules are available separately or in combination, which allows users to adapt VIP Suite specifically for their needs.

ACTION CARD 178

TBCS, FRAME SYNCS AND FORMAT CONVERTERS

By Kenneth Hunold

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

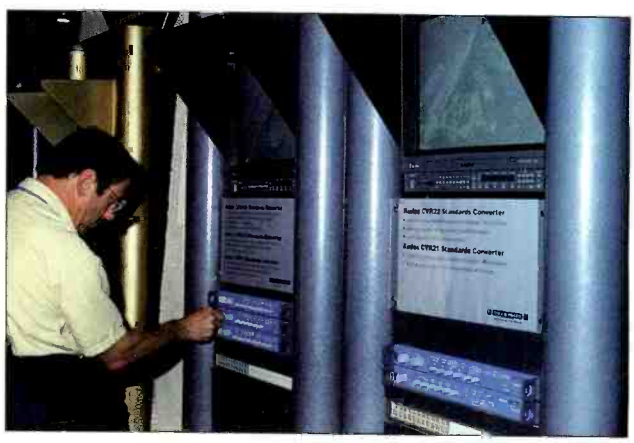
One way or another, images come into a facility in one format, and to be used, must be converted to another. Years ago, the major conversion need was from one international standard to another. More recently, the need has been converting from analog to digital or from a graphics to video format. Exhibits from one end of NAB to the other were demonstrating a variety of signal-conversion devices.

AJA Video showed its D10E serial encoder for converting a serial digital 4:2:2 signal into a composite NTSC signal (or PAL if 625/50.) AJA also offered a D10C 4:2:2 digital-to-analog converter. Available soon will be the D10D NTSC-to-serial digital 4:2:2 decoder and the D10A component analog-to-digital converter. These units are unique in that their small size allows them to be used in areas where quality A/D and D/A converters are needed and space is at a premium.

AJ Technology featured its Video MOP series, which are digital video image processors that include noise reduction. The Dust MOP cleans up noise, spikes and dropouts. Also on display was the Huey component color corrector and the Huey Jr. format converter/color corrector.

Avitech International showed its line of PC card-based VGA-to-NTSC converters. The VGA GeO card converts computer graphics at resolutions up to 1,280x1,024 and features an alpha (key) channel output. Also shown were the VGA+NTSC and the DUAL VGA+NTSC that supports simultaneous VGA and NTSC outputs.

Communications Specialties offered an early view of the new ScanDo Ultra. The Ultra model will allow computer displays up to 1,600x1,280 resolution to be converted to an NTSC signal. It also downconverts these workstation-class resolutions to VGA, MAC or SVGA resolution for display on a standard VGA monitor or LCD projector panel. Also



shown were the rest of the ScanDo line, including the ScanDo 800, 1,024 and Pro, which accommodate resolutions up to 800x600, 1,024x768, and 1,024x768 with gen-lock, respectively.

Digital Processing Systems (DPS) introduced its DPS-465 TBC/frame sync. The DPS-465 was designed as a bridge between composite signals and the various component standards (Y/C, Y/B-Y/R-Y, Beta and MII).

Extron Electronics introduced its CD-400 digital quad-standard decoder. The unit can decode NTSC, S-video, PAL and SECAM signals into their RGB components. Also shown was the Emotia line of scan converters with a maximum VGA resolution of 640x480. Resolutions up to 1,024x768 are available on the Super Emotia line, with gen-lock available only on the top-of-the-line Super Emotia GX.

Faroudja Laboratories introduced an NTSC decoder, the A2D1. It decodes an analog NTSC signal and converts it to a component serial digital signal. Faroudja also showed its DFD-U decoder, which converts NTSC, PAL or Y/C inputs to RGB, color-difference component or component serial digital outputs. Also shown were scan line doublers and quadruplers for displaying 525- or 625-line signals on large-screen displays.

Folsom Research showed its model 9600 VIP, which allows four

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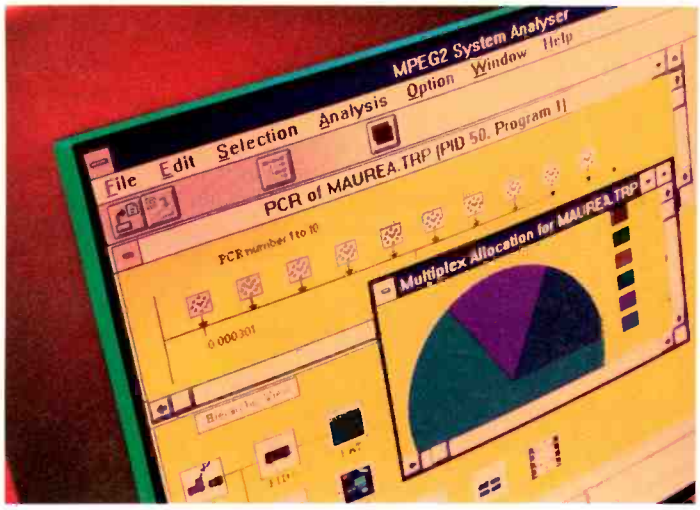

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TESTING THE CHANGING WORLD OF COMMUNICATIONS

Tektronix

Circle (9) on Action Card

NTSC signals to be displayed on a computer display. Also shown were the 9400JR and 9500SR video scan converters, which allow high-resolution computer displays to be viewed on an NTSC or PAL monitor.

Hotronic Inc. showed its AX81 synchronizing video router. The AX81 is a dual-channel frame sync with an internal 8x2 router. This could allow no-glitch or no-freeze switching between any two of up to eight nonsynchronous inputs. Also shown were the AT series 10-bit frame sync with optional tracking audio delay, the AP series TBC/frame syncs and the PC-TBC, which is an 8-bit TBC/FS on a PC card.

Leitch offered many different interfaces with both of its DigiBus products, as well as its modular stand-alone products. Leitch offers its module sets arranged in functional groups for many tasks. Included were the DEC-3610 NTSC to 4:2:2 decoder, DES-3610 decoder/synchronizer, VFS-3620 composite synchronizer and ENC-3610 component encoder. Input and output system options, including analog, digital or fiber-optic interfaces can be selected by choosing the appropriate input or output format module. A full range of audio products to complement the video products is available, including A/D and D/A converters and tracking delay systems.

Magni Systems showed its gen-lockable VGA Producer 16, a PC card converter that provides high-performance VGA-to-NTSC scan conversion. An optional plug-in card provides component and RGB outputs. Also shown was the MAGNICODER, a stand-alone VGA-to-NTSC converter intended primarily for recording or presenting VGA displays on an NTSC screen.

Miranda Technologies introduced its µLink encoders and decoders. Designed to be mounted in a video jackfield, the ASD-251u converts NTSC or PAL signals to a 4:2:2 serial component digital signal and the SDM-251u provides complementary encoding using 2x oversampling. Also introduced for the Imaging series was the ASD-211i adaptive decoder with EDH insertion, VFC-123i 4:2:2 to 4fsc format converter and FRS-101i 4:2:2 frame sync with EDH.

Nova Systems showed its NovaScan VGA-to-NTSC scan converter and its NovaBlox signal-processing products. The new Studio Frame series is a modular, rack-mountable chassis for mounting individual processing modules. The units are hot-swappable and redundant power supplies are available. Studio frame modules include the SDA-1 component D/A converter, SDA-2 digital component to NTSC encoder, SDA-3 NTSC composite D/A converter and NC-8 analog component to NTSC encoder.

Pixel Instruments showed its DS4200 4:2:2 digital frame sync and its VS2100, a 10-bit analog I/O frame sync. Also shown was a range of audio-for-video products, including the DD3100D, which measures the delay of a serial digital signal and can control the AD3100 or AD3000 audio delays.

Prime Image introduced a TBC/frame sync. The Compon model transcodes YUV, Y/C and composite signals and is available for the NTSC, PAL or PAL-M standards. Eight-bit processing and a 3-way adaptive comb filter are used. Also shown was the Xpon TBC/frame sync in a PC card form factor. Eight-bit processing, all-world standard I/O with 5-field interpolation and adaptive comb filtering are featured.

Snell and Wilcox introduced a 2-RU version of its Alchemist standards converter. The small size is made possible by providing only digital inputs and outputs. If analog inputs and/or outputs are required, they can be included in a features box, which can also include other processing options. Also introduced was an addition to the Kudos converter line, the CVR-45D and a new synchronizer, the TBS-24D. This 8-bit 4:2:2 unit can synchronize and convert an analog component signal into a serial 4:2:2 signal. Analog composite and component outputs are also available.

Sony showed its new DSC-1024 digital scan converter. The DSC-1024 converts PC and workstation resolutions (up to 1,280x1,024) to an NTSC signal. It can also convert any of these resolutions (including 1,125-line HDTV signals) to NTSC, VGA or SVGA for display on a PC monitor or projector. Special interpolation modes are used when increasing or decreasing the number of scan lines.

Tekniche Limited introduced two standards converters. The IXION is a 1-RU motion-adaptive 4-field, 4-line converter with 10-bit processing and a lower cost. The DSC121 features comb filter decoding and encoding and noise reduction. These units join the existing CYRUS and CYRUS PRIME standards converter line. Also introduced were additions to the Genesis product line, the 6017 comb filter decoder and 6054 NTSC/PAL digital encoder. The 6017 is a precision decoder that converts a composite input signal (NTSC, PAL or PAL M/N) to a serial digital component signal. All processing is at 10-bit precision, and EDH is inserted at the component digital output. The 6054 encoder is a 10-bit digital encoder that converts a 270Mb/s serial component digital signal to a composite signal. EDH decoding is provided for confirming system data integrity.

Thomson Broadcast offered a variety of interfaces for digital systems called the Evolution range. These products include A/D converters, D/A converters and encoding converters. These cards will fit in a 3-RU frame that can hold up to nine or 14 interfaces, depending on the type of card. Single rack-unit interfaces are also available. Thomson offers many standards converters, including the new 7830 motion-compensated standards converter. The 7830 can convert between all-world standard systems and includes noise reduction, 2% overscan mode and image enhancement.

Video International Development introduced a redesigned DTC 4600 10-bit standards converter. The unit features all-analog world standards inputs and outputs, as well as analog component inputs and outputs. Component digital and NTSC composite digital inputs and outputs are also available. Also introduced was the MNR 320 multistandard TBC and median filter noise reducer that uses 8-bit processing and recursive and median filter noise reduction.

Vistek Electronics, Ltd. introduced some additions to its V1600 digital interface system. The V1640 frame sync is a serial component digital synchronizer featuring 10-bit operation with dynamic rounding to 8-bit resolution, if required. Up to 14 synchronizers can be installed in a 3-RU frame. Also introduced was the V4238 digital encoder using the company's proprietary "clean encoding." It is intended to make a high-quality analog or digital NTSC signal from either an analog or digital component input. Vistek also introduced the Vega, a compact standards converter that provides bidirectional conversion of NTSC and PAL signals and includes a 270Mb/s interface and integral audio delay.

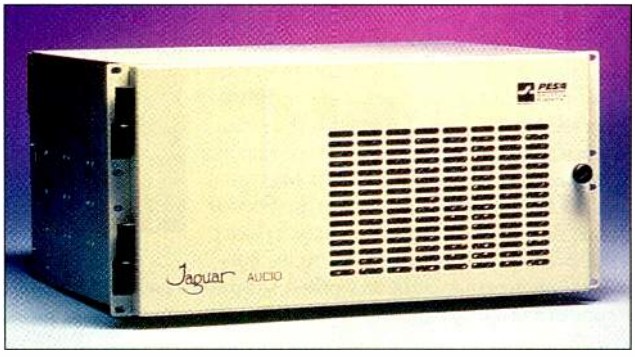
ACTION CARD 179

VIDEO ROUTING AND DISTRIBUTION

By Charles H. Goode

Charles H. Goode is vice president, engineering, for the Smith Broadcasting Group, Inc., St. Petersburg, FL.

Many of the routing switchers and distribution products on display this year had a heavy emphasis on digital. Nearly all were based on digital control systems, and plenty offered digital audio and video I/O. Despite this, there were plenty of analog offerings, especially in the



The PESA Jaguar line of audio and video routers comes in analog and digital versions. Matrix configurations up to 64x64 are standard.

smaller frame sizes.

One small matrix was on hand at the Broadcast Video Systems (BVS) booth, the new BVS VM400 video switching matrix. It's designed to plug directly into a Leitch or GVG DA frame, providing an economical solution for auxiliary video switching and monitoring.

On display at BTS/Philips, was the VENUS routing switcher system that offers wideband analog video, composite or component, and is, therefore, fully HDTV compatible.

Datatek had two new models, the 2600 and 2800. The 2800 series is an integrated all-signal format routing switcher family. Signal formats include data, as well as analog/digital audio and video. The mainframes are compact, occupying only 11 rack units for a 64x64 VAA switch. The fully modular frames offer optional redundant power supplies, plug-in modules and field expandability.

In the Di-Tech booth, the Meridian series of 32x32 frames was on display. These 2RU units offer switching of analog and digital audio and video, as well as data. They are field expandable and offer optional redundant power supplies. Other units in the Meridian line include a series of data matrices and a single frame 64x64 serial digital model, and even larger units are available. A 128x160 video/stereo audio can fit into a single 70-inch standard equipment rack. Visual 9002 for Windows is a versatile router control environment that can be networked. Drop down pick lists, 16 levels of control and multiple systems configurations are among the features offered.

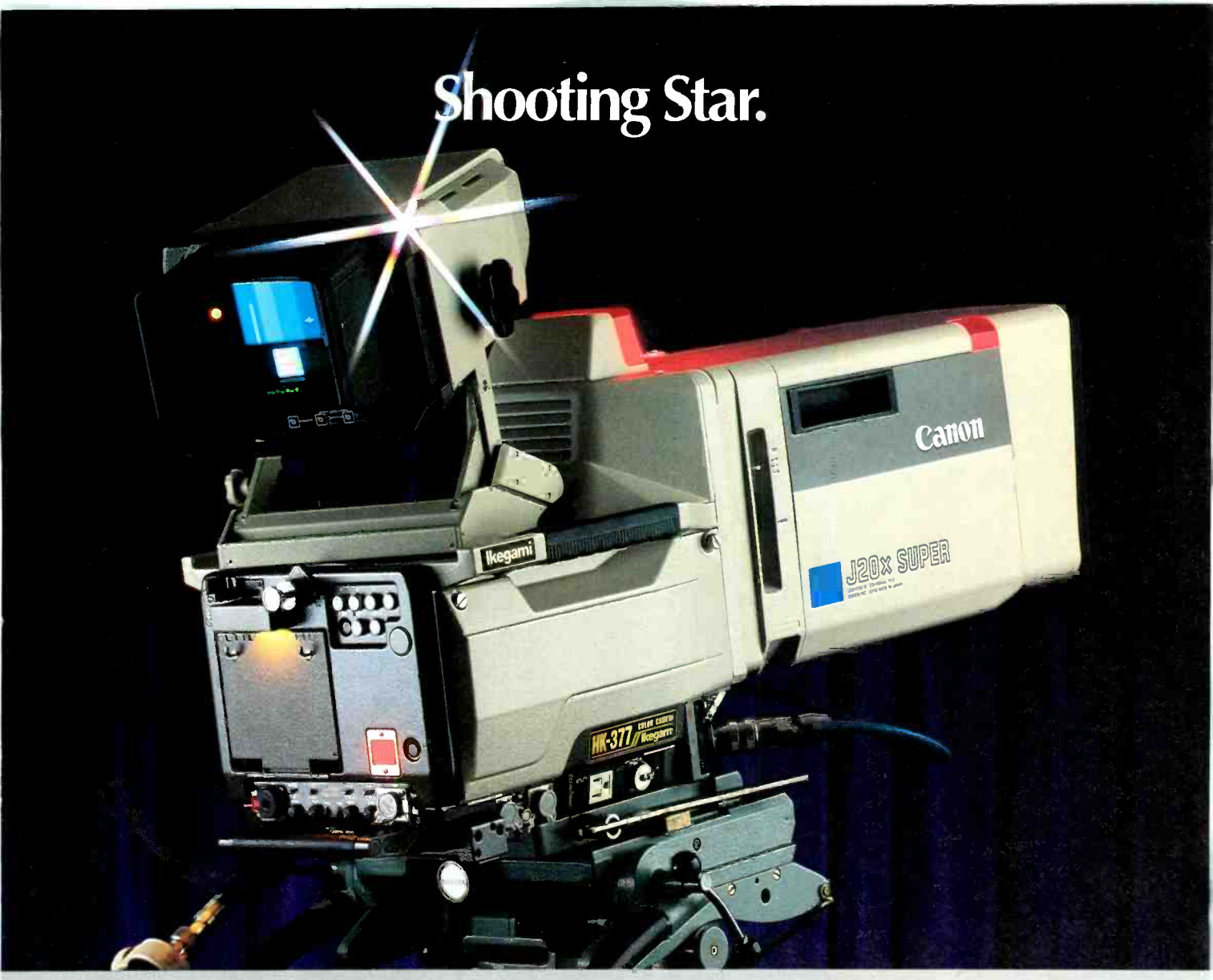
Digipath's SAHARA series of 32x routers offers users the ability to "select a size." Routers can be populated with individual plug-in modules, either at the time of purchase or during future expansion. Maintenance is quick and easy, simply exchange the faulty module with a working replacement. Analog and digital models are available, as are serial digital units with and without reclocking. Serial ports provide configuration and remote access.

Dynatech/Utah Scientific was showing the SC-3 control system for the Utah-300 routing system. The SC-3 can control the Utah-300, AVS or DYN series of routers (any combination simultaneously). Numerous control ports provide a wide array of computer, remote, custom or networked control capabilities. A real-time switch port is available for the Utah-300 for advanced switching applications. Because of its modular design, the SC-3 is easily adaptable to special control applications.

At the Grass Valley Products division of Tektronix, the hot item was the 8900 series of serial digital DAs. Analog and digital units can be mixed in the same frame. Also on display was the 7000 series signal management system routers, which can handle virtually all video and audio formats and can be sized up to 1,024x1,024. A GUI makes configuration and control as easy as point and click.

Leitch's VIA router family received a new member. The serial digital video router is a mixed-mode router for coax and fiber. The new router provides connectors for direct connection of fiber and coax. I/O modules are also available for ECL data signals specific to telco applications. Other devices from Leitch include the EDH serial distribution DA, an EDH Mix Box, the VTG6800 Mix Box and EDHview software. The EDH DA provides equalization and reclocking to eight serial outputs and can function as an EDH check word generator/encoder. The Mix Box provides an EDH DA with a stand-alone housing and advanced user interface. The VTG6800 is a stand-alone serial test generator that

Shooting Star.



The HK-377 Ultra-wideband Studio/Field CCD Camera System has the highest resolution, sensitivity and pixel count of any NTSC camera currently available. The camera employs newly-developed 2/3" FIT CCDs, each with more than 600,000 pixels. An ultra-wideband triax system with 10MHz bandwidth for each RGB channel delivers an unprecedented 900 TV Lines resolution at the base station output. The new base station has provisions for digital signal output (optional) to accommodate the demands of high-quality production.

The HK-377P portable companion offers the same performance characteristics as the HK-377 and operates through the same Base Station or can be configured for stand-alone operation.

Unique features of Ikegami's new high-end camera also include extensive remote control of detail functions, including the Skin Detail to soften the complexion and to give your stars a more youthful appearance. A high-resolution viewfinder has its own VF DTL (Viewfinder Detail) and PIP (Picture-In-Picture) circuits. The HK-377 has an AHD (Auto Hue Detect) circuit for "skin tone capture." Master Control Panels are equipped with memory card I/O Ports. A "Snap Shot File" permits control and scene file data to be written into, and read quickly, for shooting parameter replication.

The HK-377/377P cameras have the Skin Tone Detail feature which received the Engineering Emmy Award for technical achievement.

Current users include: ABC (20/20, World News Tonight, Good Morning America, All My Children, Loving, and all shows shot in NY), CBS (Late Show with David Letterman, 60 Minutes , CBS Evening News, and Sunday Morning), Disney/MGM, MTI, TNN, Turner Entertainment Network, WBNS-TV, Goodyear Blimp, Unitel Mobile Video, Channels 2 and 13 Buenos Aires, and TV Globo, Brazil.

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Circle (30) on Action Card

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Alaska – 1989

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SONY

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provides embedded audio and EDH generation. EDHview software provides networked interconnection of many EDH DA cards to help in the maintenance and ongoing monitoring of facilities.

Link Electronics offers several lines of video and audio distribution amplifiers and pulse generators that can be integrated into the same frame to conserve space. One of the company's newest products is the Digiflex 1000 series frame and modules. Link Electronics also offers portable video and audio distribution amplifiers that operate in the 10V to 20V range at low power consumption. Other products include the Starflex modular frame system and various encoders and signal generators.

On the video side, the biggest news at NVision is that the company is now making basic video products. The initial offering is the NV1200 series of terminal equipment that includes DAs, A/D and D/A units.

PESA featured its Jaguar family of routing switchers. The Jaguar products feature high component density, as well as 125MHz bandwidth. The switchers include analog and digital systems. A new control product, the second version of the 3300 controller offers a Windows interface. The PNC1000 provides Novell network access from any networked PC. The PVC3000 telephone interface allows password-protected router control from any touch-tone telephone.

Ross Video introduced a dual serial equalizing amplifier, the DSA-8004. Two amplifiers are mounted on a single card, which allows 20 amplifiers in one frame. Other new products include the VEA-8007, an analog video equalizing DA, the CMA-8011 component monitoring amplifier for serial digital video distribution and monitoring that has analog video monitoring outputs, and the CMA-8012, which is designed for composite digital facilities.

The Sony DVS series digital routing switcher is versatile and offers a variety of configurations and features. Tie-line management, virtual mapping and free assignment capabilities are some of the features of these systems. Undermonitor display units are included to provide source and destination descriptions with up to 17 characters.

Telect featured a modular frame that allows for the integration of audio/video routing, distribution, control and even fiber-conversion equipment into a single unit. This rugged unit can be used in mobile installations if desired.

Video Accessory Corporation featured a low-cost portable video distribution amplifier. The one input, four output, MVB/VDA Mini-Brick unit can operate continually for up to four days on a single 9V battery. Other products in the Brick line include an automatic video switch, stereo audio switch, 4x1 video switch and a 4x1 audio switch.

Videotek introduced a new serial digital distribution amplifier. The DDA-144 and DDA-144F accept a serial digital input and produce four serial digital and four analog outputs from a single amplifier.

Vistek had a wide range of routing switchers on display. The ARRAY V2000 series can be configured for a variety of switching applications. The control system can be a single button per crosspoint or a software system that runs in the Windows graphic environment.

ACTION CARD 180

VIDEO STUDIO EQUIPMENT

By Les Brown

Les Brown is president of Les Brown Associates, Grass Valley, CA.

NAB 96 was an evolutionary show for most studio equipment suppliers. Innovations weren't major, though enhancement was considerable and there were several flashes of brilliance that promise to make life in the studio easier and more creative.

Lowel-Light's camera-top i-light series has been enhanced through the addition of a built-in dimmer using new technology that minimizes battery drain and generates no discernible heat. It wasn't possible to visually detect color temperature shift between 100% and 70% output with either 55W or 100W lamps. The focusable camera-top unit is usable with either 12V or 14V systems. On the studio side, Lowel showed its new Fren-L 650 system featuring a ball-bearing, rack-and-pinion 8:1 focus mechanism that remains smooth at even the slowest speed.

Frezzi Energy Systems reported exceptional interest in its family of

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Circle (43) on Action Card

mini fixtures designed to mount on field cameras. The Mini-Arc version has a built-in ballast and battery bracket that accepts any NP-type battery through direct connection. For users who prefer to power their lighting directly from the battery serving the camera, a variety of power-tap connectors are available. Power consumption is a mere 24W, so a fully charged battery provides the equivalent of a 100W quartz light for more than an hour. Life expectancy of the lamp is typically more than 500 hours. Including the battery, which is sold separately, the unit weighs in at just three pounds. For incandescent users, Frezzi showed two versions of its popular Mini-Fill fixture, which take either 50W or 100W lamps. One model incorporates a built-in dimmer control which, when demonstrated, caused minimal color temperature shift over a broad range.

Sachtler added several new suspension system devices to its already broad line, as well as half a dozen new Fresnel fixtures. The emphasis at Sachtler was on higher-power units up to 4,000W. Sachtler reports that all of its Reporter series fixtures have attained a "GS" (German safety approval) as Protective Class II devices. This classification means that no ground wire protection is required.

At Rosco Entertainment Technology, the company was showing its unique approach to studio lighting control. Rosco's Intelligent Power System eliminates large dimmer panels and their requirement for cooling and electrical isolation. The system uses insulated gate bipolar transistors instead of conventional silicon-controlled rectifiers. There's no central dimmer rack, but instead, control units mount directly on the lighting grid, close to the fixtures that each serves. The technology does away with the need for filter chokes and generates essentially zero electrical interference.

ACTION CARD 181

New lighting effects; easier setup

Lighting effects for the studio became more versatile and easier to use at NAB 96. At Chimera Photographic Lighting, there was a new range of fabrics for light diffusion, plus a series of window patterns including blinds, leaves and window panes. Chimera showed its Chimera lantern, which strongly resembles a paper Chinese lantern, but which is not intended to be seen by itself. Rather, it's meant to light a subject or room in an omnidirectional style. Built-in adjustable flaps allow it to be easily tailored to provide a base ambient light for a set or room or for evenly lighting a multicamera roundtable discussion.

The F.J. Westcott Company brought several new lighting products to NAB. Westcott's Gary Regester Signature Edition Halo puts the concepts of key and fill lighting into one umbrella-type modifier. The oval-shaped reflector produces an asymmetric difference in lighting value across the diffusion surface. The brighter end acts as a key light, while the opposite end provides a gentle fill light to reduce overall contrast. The overall result is elimination of the double highlights and shadows that commonly occur when two modifiers are used.

ACTION CARD 182

Prompter choices grow

At Listec, the new A-6000WIN Windows prompter allows use of any Windows-based word processor to become the tool for generating prompter displays. Instead of a dedicated prompting program, the A-

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System RTI - actually a microcomputer contained in the Paglok Adapter - evaluates the charged state of the battery and the energy being consumed, and displays in the viewfinder the time remaining in hours, minutes and seconds.

Moment to Moment Accuracy.

As the load characteristics change, such as when a camera light is added or subtracted, the time remaining is instantly recalculated. In standby, the system assumes the last load will be resumed, and shows time to run for this load with only the standby current subtracted. When a battery is replaced, the system immediately interrogates it and displays the charge status in amp hours. Switch to record and amp hours are replaced with a precise read-out of time remaining.

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The video overlay signal intercepts the composite video signal and can be routed - internally or externally - from the Paglok adapter to the finder, without interfering with the camera's electronics.

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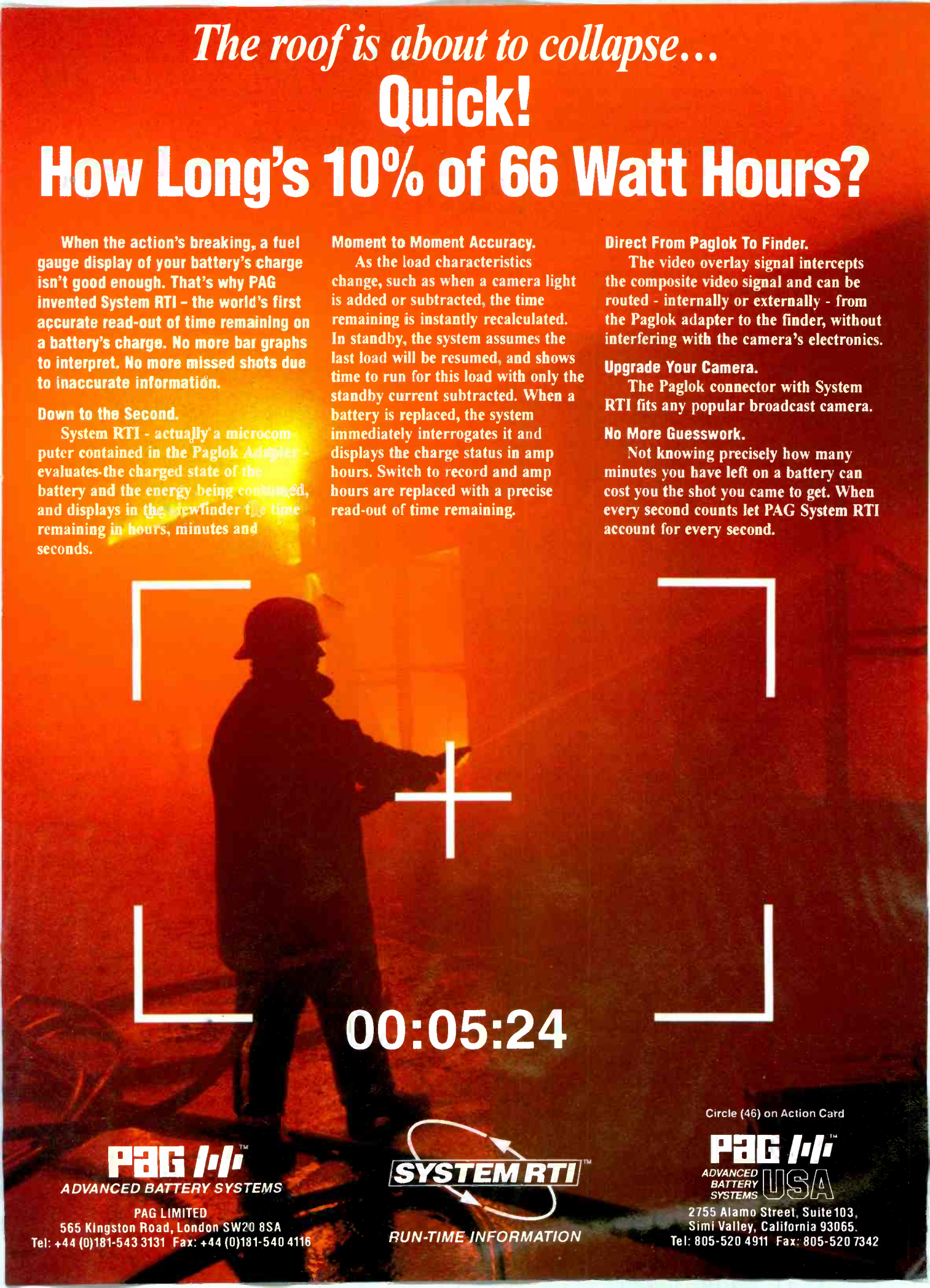

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Circle (46) on Action Card

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6000WIN is a Windows printer driver. The user creates the script in his or her favorite word processor (or imports it from a text file) and prints to the prompter. Listec also showed a 12-inch flat screen prompter display using an exceptionally bright TFT panel. Even in relatively high ambient light, the text was brilliant and clear, overcoming the complaints often heard about previous attempts at flat-screen prompting. The device is projected for autumn delivery.

At Audio Video Design, prompters were shown for camera and freestanding use with a choice of 12-inch or 17-inch high-resolution Sony monitors. AVD software was available for IBM-compatible computers running either DOS or Windows; for Amiga or for Macintosh. AVD has also packed prompting systems in custom flight cases, which reduce on-location setup time to 10 minutes or less.

Mirror Image Teleprompters showed a prompting system that packs monitor, stand and reflector into a single case for quick stand-alone setup. New hardware also includes a pair of lightweight versions using 9-inch monitors. One uses conventional video; the other uses a monochrome VGA monitor that attaches directly and without adapters to laptop or desktop personal computers. Mirror Image offers Beacon Software prompting tools, available for IBM-compatible or Mac applications.

ACTION CARD 183

VIDEO ACCESSORIES

By Peter Zawistowski

Peter Zawistowski is senior engineer at Target Enterprises, North Reading, MA.

There were enough "toys" and video accessories to please the most technical of tech types. Let's start with batteries.

Anton/Bauer introduced the InterActive 2000 PowerCharger. The 2000 is fully compatible with all current Anton/Bauer Gold Mount batteries. The modular design allows the user to start with an economical system and allows upgrading to an LCD display, additional charge modules and diagnostics in the future. The unit is available as a 2- or 4-charge position model, expandable to four, six or eight charge positions.

At the Christie Electric booth, the CASP/2000, a highly versatile battery support instrument, was displayed. The charger can work with any rechargeable battery and up to six intermixed batteries can be connected and charged at once. NiCad, silver-zinc, lithium and other types of batteries will work with the CASP system. The analyzer section determines the charge energy required and the useful ampere-hours in the battery.

PAG was showing its full line of batteries. The Paglok 2.5 is a smaller version of the Paglok SuperPack. It's ideal for those new, smaller camcorders where 5Ah capacity isn't needed. PAG provides a complete line of battery systems complete with LCD readouts and computer capability.

United States Broadcast (USB) announced its NP-1C broadcast battery. The NP-1C is a replacement for 10 NP series of broadcast batteries. With almost 3A of power, it's free from the typical NiCad problems. Using nickel metal hydride cells, the battery has more power, is lighter and will not suffer from memory charge. USB also showed its Three- and Six-Star General series of chargers. The system allows mixing of batteries within an intelligent charger system.

Allen Avionics, well-known for its electromagnetic delay lines for video (delays up to 1,450-feet of coax), had products available as stand-alone boxes or rack-mount configurations.

The company's Video Hum Eliminators remove interference caused by small differences in ground potential or induced currents in long cable runs. Video Noise Eliminators are designed for HDTV and high-frequency bandwidths that we'll all have to get used to now that the Grand Alliance system is FCC approved. Video isolation transformers will eliminate 60Hz hum caused by ground loops by breaking the ground connection between input and output. All three of these boxes are available in single, triple or GBR and sync input/outputs.

Timing is everything and ESE always seems to find new ways to display it. The LX-5112 self-setting analog clock can operate as a time-code reader, a stand-alone clock or as an impulse clock. This 12-inch clock is only 1.7 inches deep and is capable of automatically setting itself to the correct time by SMPTE/EBU ASCII or ESE time-code inputs.

Ray Conover, "Dr. Dish"
VP and Director of Engineering.
Conus and U.S. Satellite Broadcasting

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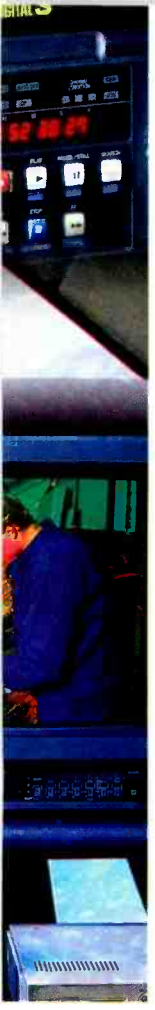

But, clocks aren't the only thing ESE makes. The LX-219A and LX-220 blackburst generators provide six or 10 outputs, respectively, and provide a precision and stable RS-170A blackburst signal. The ES-219 and the PC-219 are composite blackburst/sync generators with adjustable subcarrier frequency and SCH phase. The ES-219 is a stand-alone device and the PC-219 is a half card-size PC and Amiga-compatible single card for Toaster and desktop editing systems.

Winsted has introduced its new 94-inch ergonomically designed counter system for desktop editing and production. The desk's curved 94-inch work surface provides plenty of space for keyboard, mouse and other desktop material. Available with an optional 48-inch riser, the desk will hold monitors, speakers or whatever you've got. It's available in five different accent trims. A unique cable management system hides cables inside the desks legs and raceways

Videotek announced several new products. The SDC-101 digital color corrector (for more information, see the *BE* Pick Hits, p. 30) and companion RCU-102 remote control are designed to correct any serial digital component video signal or for creative control. Subtle or major changes in the digital video are done in real-time and can be stored in any of the 50 programmable, user-defined memories. These memories can be controlled by SMPTE time-code trigger, RS-422 interface or the RCU-102 remote. A "MAKE LEGAL" function can be used to easily ensure legal video signals.

The DDA-144 is a component serial digital distribution amplifier with composite analog monitoring. The input signal is equalized and serially reclocked to assure a stable, usable output. The DA provides four serial digital outputs and four composite analog monitoring outputs.

The DM-144 and DM-192 are additions to the Videotek line of demodulators. The DM-144 is a 154-channel cable-ready unit equipped with BTSC audio outputs on XLR-type connections and two baseband video outputs for monitoring of signals. The DM-192 is equipped with envelope or synchronous detection and provides channel agile tuning. This unit is suitable for full FCC proof-of-performance testing for broadcast or cable applications.

The Miranda µLINK line of products packs a lot of utility in a small, directly patchable package.

Broadcast Video Systems (BVS) introduced the VITS 2 video analyzer to monitor video quality remotely. Any line of the video field can be sampled, digitized and retrieved by way of modem. A PC can then display this signal on a VGA monitor and permit various measurements. K-factor, signal-to-noise and other tests can be displayed, stored and later retrieved. Results can also be printed.

The 738 component fade-to-black module was designed to free the effects function of a switcher or nonlinear editor by permitting a fade-to-black without undoing the effect or using another mix effects bus.

MASTERKEY 6 is a digital 10-bit serial digital linear keyer. A range of features include master fade to black, selectable external or self-key modes, key area mask, size and position adjustable via the control panel. Serial digital program, key and fill inputs are standard, and optional analog RGB preview output make this unit well-suited for existing digital edit suites.

ACTION CARD 184

Car 54 where are you?

Clear-Com displayed the TW-20, 2-way radio interface for communications from walkie-talkies and 2-way radio to a wired Clear-Com party-line (PL) intercom system. No more of the Mickey Mouse kluges we've all used. The TW-20 fixes the 2-way interface problem once and for all.

Folsom Research demonstrated its two autosync video converters. The model 9500SR is a broadcast-quality device, capable of converting just about any graphics source or high-resolution imaging system to NTSC, PAL, RGB, Betacam or S-VHS. The 9500SR automatically determines the configuration and aspect ratio on the incoming video and makes the necessary adjustments. User-adjustable underscan eliminates any data loss. The dynamic pan and zoom allows the user to select a specific area to be converted. The NTSC and PAL outputs are gen-lockable.

The 9400JR is a lower-cost broadcast-quality video scan converter. This unit also automatically synchronizes to video sources up to 85kHz in horizontal frequencies. The gen-lockable outputs are available as NTSC or PAL, Y/C and

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RGB. Interlaced and non-interlaced video sources can be converted.

Hotronics showed the AT61P-AU, a 10-bit frame synchronizer with analog I/O. The matching stereo audio delay unit provides 20-bit audio resolution and has 48kHz sampling synchronized to the video. Video correction range is from two to four frames. Audio delay is adjustable in one field increments to four frames.

The Hotronic AL86 is 6-second solid-state delay for audio and video. Each stereo audio channel has 20-bit resolution and 10-bit video resolution. The delay is selectable from one frame to 180 frames.

Now that you've got 50 dozen tape formats to worry about, how about erasing them? Sanix demonstrated its line of bulk erasers, powerful enough to zap your IRS records, if you're lucky. Looking closely at its system shows that there's more to bulking a tape than an open coil magnet!

Macrovision demonstrated a range of encryption products. Highlighting the Macrovision booth was its new VES-TM minicrypt encoder. The device requires only 9W of 12VDC power, allowing it to be packaged with cameras and transmitters. Each VES-TM is configured as an encoder and decoder, making each unit universal in application.

River City Sound Productions provides about every type of background or sound effect you can think of. If your production department needs backgrounds, sports, country, hi-tech or whatever, they've got it. And, one of the best things about the product is that it's royalty-free. No renewal or needle drop fees to worry about. That's a headache reliever.

Dubner International announced two nifty products and the packaging of its technology by another company. The first device is the VideoALERT. It provides a low-cost video and audio signal level monitoring system for broadcast or cable applications. The device monitors the presence of vertical sync and tracks peak video levels on a frame-by-frame basis. It's packaged with a Creative Labs SoundBlaster board to handle the audio side of things.

Also shown was the Cadence Detection System, C.A.D.E. II, which functions by examining a video field and comparing it to data stored earlier. This allows the user to locate cut points, as well as the characteristic pull-down pattern of film-to-tape transfers.

Finally, Dubner announced that its Scene Stealer will be used in the Nesbit System's Media Library System for Windows. The combination of products provides an integrated system for developing and managing a video database.

ACTION CARD 185

CAMERAS, LENSES, MONITORS AND ACCESSORIES

By *BE* staff

One area of this year's show in which there was a great deal of activity was image-acquisition systems (cameras, to the old-timers). The manufacturers who have served our industry so well for so long know that budgets are tight and that backs get sore. The words of the day: smaller, lighter, switchable and less expensive.

Panasonic was showing a wide range of cameras including the new AQ-23W DSP camera. The unit is switchable between 4:3 and 16:9 operation, providing 18MHz sampling, 10-bit digital conversion and 36MHz, 16-bit processing. Designed for ENG/EFP operation, it uses 3-chip 520,000 pixel FIT CCD's.

Key additions to the D-3 composite line of equipment included the AJ-D300 all-digital camcorder and the AJ-D360 digital studio VTR. These two units provide the primary acquisition editing base for NBC's Olympic coverage. Panasonic said that more than 700 AJ-D360 and 120 AJ-D300 units will be used by world broadcasters in Atlanta. The AJ-D700 is a full-size DVCPRO camcorder that features three ½-inch FIT CCDs and 20-bit digital signal processing. It consumes less than 23W and weighs less than 13 pounds with lens, viewfinder and battery. It also features a full range of controls, scene file storage and a 1.5-inch viewfinder (for more information, see *BE* Pick Hits, p. 30).

The VW-E590 is a new low-light 3-CCD DSP camera, primarily designed for broadcast point-of-view, graphics, teleconferencing and medical imaging applications. The WV-E590 is capable of operation under extremely low light conditions, down to 0.0035lux.

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JVC was showing its new Digital S series of products, including this new version of the popular KY27.

Philips (formerly known as BTS) was showing its entire line of studio and portable cameras. From the LDK 10 and LKD9SR studio cameras to the companion portable versions, the LDK 10P and LDK 9P, it's a user's choice. Philips also showed a DVCPRO-compatible LDK 750 camera for ENG-type applications. This marked the company's support for the DVCPRO format.

If you have the LDK 10P portable camera, Philips can provide what's called the SuperXPander studio adapter kit. It enables the lightweight studio-quality camera to be used anywhere a full-sized studio camera might be used. Also, the LDK10/10P cameras can be connected with triax cable.

Ikegami was quick to the floor with a new DVCPRO camera, the HL-V77 series. The HL-V77, V77W and V73 are all-in-one portable digital camera/recorders with built-in DVCPRO VCRs. (For more information, see *BE* Picks Hits, p. 30.) The camera head uses newly developed DSP ICs. The V77W features 16:9/4:3 switchable modes with 520,000 pixel 2/3-inch FIT CCDs. The HL-V73 is equipped with 400,000 pixel 2/3-inch IT CCDs.

The company's DNG disk-based camera still generated much interest. With features that tape can't provide, like CamCutter's RetroLoop recording, high-end users see a place for this technology in their operations. Avid played a major role in getting this product to market, and it ties seamlessly to Avid's editing systems.

Sony introduced the SC camcorder series, complete with models DNW-7, DNW-90 and DNW-90WS. Conforming to the MPEG-2 4:2:2 profile at main level, they are perfect for ENG applications. The DNW-7 is the company's lower-cost version, the DNW-90 offers low-light capability for high-end ENG and EFP applications. For those concerned about the future, the DNW-90WS provides 4:3/16:9 switchable capability. A dockable recorder version of the SX format is available in the DNV-5.

In the battle of titans, Sony introduced the DVCAM series of products. On the camera side, the DXC-D30 is a dockable camera. It becomes the DSR-130 when docked with the DSR-1 VTR.

The DSR-200 digital camcorder is Sony's professional version of the recently introduced consumer DV format. This camera is primarily aimed at the professional event videography market.

JVC was highlighting its low-light cameras, the KY-27C and KY-19.

The Barco Vivaldi monitor displays four broadcast-quality NTSC images on a VGA monitor, complete with active titling below the image.

Why Settle For Less Than 100% Digital?

The Hitachi SK-2600 is the only *fully digital triaxial camera system* in the world.

Fire, floods, world upheavals — whatever the year 2000 brings, the "2600" is the camera you'll want to shoot it with. This is the camera that will not only make you look good today, but will keep on making you look good 10 to 12 years into your buying cycle — well into the new millennium.

We start with a completely digital triaxial system and add such advanced technologies as a 4:3 aspect ratio, easily switchable to 16:9. Of course we offer flesh tone detail that keeps your talent as youthful as your system. Our six-vector color corrector allows you to paint and fine tune individual colors to make matching extremely easy. The unique LSI processor processes RGB in a single wafer, eliminating cross talk and noise. And only with digital technology can you set up one camera the way you like and transfer the information precisely to all other cameras for an exact match.

These ahead-of-their-time features are just part of the reason that, whatever the next millennium brings, if you own a 2600, the one thing it won't bring you is regrets.

Hitachi's SK-2600 Offers You All These Breakthrough Technological Advantages:

Full digital transmission system

4:3 aspect ratio, easily switchable to 16:9

Flesh tone detail for a softer, more youthful look

Six-vector color corrector and true linear matrix operating simultaneously

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These popular cameras stand out as real performers, especially when less than studio conditions prevail. Operation at 1lux is possible, with a sensitivity of F9.0 at 2,000lux and a 63dB S/N.

The company has long been a proponent of S-VHS and it reaffirmed that commitment with the GY-X3 camcorder. The X3 is a rugged, high-performance 3-CCD unit offered at a competitive price. Also shown was the GY-X2B, a full-sized 3-CCD S-VHS camcorder. This camcorder provides F8.0, 2,000lux, 62dB S/N operation with 750 lines of resolution and 380,000 pixels.

If you happen to be looking down the road (remember HDTV?) JVC offers the KH-100 3-CCD HDTV camera. When combined with the SR-W320 recorder/player and HV-M260 26-inch monitor, you've got yourself a complete HDTV production system.

JVC also displayed its Digital-S docking recorder, the BR-D85. It has a digital I/O and standard pre-read. It's designed to complement the entire line of Digital-S products, which include the BR-D80 editing recorder and the BR-D50 and D51 players.

The Canon Digi Super 70 is proving to be a hit with truck operators needing a good field lens.

Hitachi Denshi America surprised a lot of folks with a variety of new products this year. New this year included a CCD for the SK-2600W digital studio camera and KS2600PW portable camera and a digital microwave link.

The new CCD is easy switchable between 4:3 and 16:9 operation. With 640,000 pixels, it has significantly higher resolution in the 4:3 and 16:9 operation modes than previous dual-mode CCD blocks.

The Z-2000A digital 2/3-inch camera is an upgraded Z-2000 with fast data transfer between cameras for easy setup. An optional remote-controlled filter wheel, programmable battery warning signal and battery condition displayed on the viewfinder complete the feature package. The Z-2000A is available in multicore and triax configurations. Speaking of triax, the new Hitachi digital triax system is available for the SK-2600 series of cameras. The digital triax system ensures that the CCU output is the same as the camera. No more analog problems, such as group delay, phase distortion or drift.

ACTION CARD 186

Thru the lens

Angenieux was showing two new studio lenses. The studio 22x7.5 - f1.5 lens is designed for 2/3-inch CCD operation. It provides an extended range of F7.5 at 330mm, with a wider angle of 60 3/4°. It's fully 16:9 compatible and is available with an optional 0.8x minifier.

The company's Super 16 wide-angle lens provides 8-80mm operation at T2.4 aperture. The lens's wide-angle 84° aperture has a 0.6 MOD and is compact and lightweight, making it a fit for Super 16 productions.

Camera automation to the next plateau was shown by Canon. The company's Peopletracker is a Pentium-based software application that controls pan and tilt functions permitting the Canon VC-C1 camera to automatically track object movement within the camera's field of view.

On the more traditional front, Canon showed the 70X digital lens, which features a 70x zoom ratio. This represents a 33% greater magnification as compared to the popular Canon 55X series of field lenses.

The Canon IS-20B image stabilizer adapter incorporates vari-angle

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prism technology. It's designed to be front-mounted to the J20aX8B and 1/2-inch H20aX6ENG zoom lenses. Other models of the vari-angle prism lenses are also available.

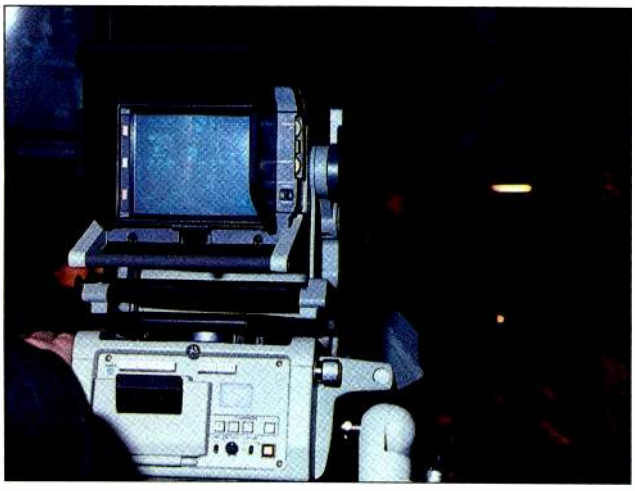
The J9aX5.2 IRS/IAS lens is designed for ENG-type application where wide-angle operation is needed. Especially appropriate for small halls and tight spaces, the wide angle allows camera operators to get 80.5° field-of-view at focal lengths of 5.2mm to 47mm.

Using the company's Aspheric Technology, Fujinon displayed the 18X series of hand-held lenses. They have the features of higher-priced lenses, but with Aspheric Technology and moderate cost.

The Fujinon AH70X9.5 is a high zoom rate EFP lens. Designed for sports and OB applications, it's popular with many sports truck owners.

Highlighted at the booth was the Fujinon A36X10.5RD and A36X14.5 ENG lenses. With long focal length and wide-angle coverage, they'll meet the needs of many news, sports and other EFP applications.

Nikon unveiled its S20X8 telephoto lens for 2/3-inch ENG/EFP



cameras. The lens completes the company's all new product line, which includes the S15X8.5B1-III standard lens and the S9.6X5.5Bi-II wide-angle lens. The S20 claims to have the shortest MOD (0.8m- 31.5 inches) among 20X zoom lenses.

The S15 is a third-generation lens, using Nikon's internal focus system and Aspheric Technology. It is the smallest, lightest, most compact and has the longest focal length in its class. The S15 offers a zoom speed adjustment, user-adjustable zoom torque and a 2.2X extender, which extends the focal length to 280.5mm.

ParkerVision demonstrated its CameraManSTUDIO auto-tracking system. The unique device is a broadcast-quality camera integrated with a complete studio package for automated camera tracking. Available with either a 1- or 2-chip camera, it provides broadcast-quality operation.

ACTION CARD 187

Video monitors

ASACA ShibaSoku was showing the CM207 and CM208 monitors. They come in 20-inch and 14-inch versions and provide complete digital control of all picture adjustments. The monitors use an on-screen setup menu display and are compatible with multistandard, multiformat analog and digital inputs.

Also shown was the CM205 and CM206 series of monitors. These 20-inch monitors provide true NTSC YIQ demodulation and auto setup. The YIQ demod feature is unique to ShibaSoku and the resulting picture image is really good.

Barco offered a new lower-cost 14-inch digital monitor, the DVM. The monitor is suited for general-purpose digital viewing applications that do not require sophisticated I/O and features. It has automatic alignment and optical digital loop features.

The company also premiered a nifty device called the Vivaldi. It allows a VGA monitor to display four digital broadcast-quality images at the same time. It provides auto setup, scan delay, blue-only, tally display, auto-alignment, pulse cross and a programmable under-monitor display of up to 10 characters of each of the four images. It's housed in a 19-inch rack 2RU package providing four serial, 10-bit component inputs.

If that's not high quality enough, Barco teamed with Discreet Logic to announce the MegaCalibrator, a 29-inch color-calibrated, color-accurate film resolution display. Designed for Discreet's FLAME and INFERNO systems, the monitor provides the highest of image resolution for high-end applications.

JVC was showing the BM-H1900 monitor. The new 19-inch color monitor provides 750 lines of resolution and PAL and NTSC operation. It even has an optional wireless remote control for those locations where you can't easily get to the monitor for setup.

Panasonic unveiled a 19-inch monitor, the BT-M1950Y. Compatible with NTSC and PAL operation, it also is switchable between 4:3 and 16:9 modes. A flexible I/O panel includes Y/C, composite video, RGB and Y, R-Y, B-Y configurations.

Want to build your own monitor? Sony is offering a BVM series of 14-inch to 20-inch evaluation monitors. The monitors allow users to "plug and play" with input boards, memory cards and RS-485 remote-control capability. Input configurations range from 12 composite digital to 24 composite analog, eight component or RGB or Y/C. Select your input configuration add memory or remote control and you're in business. (For more information, see *BE* Pick Hits, p. 30.)

High-end monitors from Sony included the PVM series. With 500-line resolution, the series features on-screen display in five languages for picture and setup adjustments. With quad-standard inputs and built-in audio monitoring capability, you're all set for viewing either 4:3 or 16:9 signals.

ACTION CARD 188

Camera accessories

Under the accessories department, Band Pro announced its FMG-6 focus/iris control motor for precision lens control. Manufactured by S.P.F. Ltd., the FMG-6 mounts easily onto Steadicams, studio cameras, robotics cameras and remote heads.

Displaying its line of accessories, Century Precision highlighted the 1.6x tele-converter.

Trompeter Electronics was showing its triax patching system. The patchbay allows patching directly from the camera through the panels with distribution to any location. The design accommodates coax jacks, as well as triax jacks, allowing for mixed panels or multiple panels with coax and triax.

ACTION CARD 189

Telecines

BTS was showing its new high-speed film scanner, the Spirit DataCine. The scanner creates a data file image of 2,000 x 2,000 pixels from every film frame. It's capable of doing this at 23fps, although current industry interfaces limit it to 6fps to 10fps. The advantage is that the resulting digital master is usable with no further conversion for all applications and can be stored on any digital storage device.

The BTS Quadra telecine is available with the SteadiGate Pin-registered film-handling option. The SteadiGate provides mechanically pin-registered pin transfers from 35mm film to a variety of recording devices.

Rank Cintel demonstrated the URSA Gold. The telecine was shown with the Klone, which allows users to select either 2K or 4K resolution. It operates at about five seconds per frame. Rank was also showing the TKG, an interface that provides exposure and color balance information on scenes as shot. Once the on-site TTEF film is shot and run through the telecine, the system automatically calculates the correct exposure for red, green and blue and expressed in either transfer points or camera stops.

Kodak was showing several new products in its booth. The first, the Cineon Genesis Plus film scanner provides 40MB per frame quality and can use either 16mm or 35mm film at 15 to 28 seconds per frame.

While not exactly a telecine, Kodak was also highlighting its alliance with SGI. New Cineon software allows real-time playback, real-time video I/O and a "time warp" speed-changing feature. This feature means users can change the speed or timing of a shot as though the camera had actually recorded it at the different speed.

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CAMERA ROBOTICS, SUPPORT AND VIRTUAL SETS

By Peter H. Putman
Pete Putman owns PHP Consulting/Keystone Media Group, Doylestown, PA.

About a decade ago, the Pointer Sisters had a hit song, titled "Automatic." It should have been revived as the theme of NAB 96, especially where cameras, support systems and virtual sets were concerned. A wide range of systems and solutions (and prices) are available for studio and field production, whether you're shooting from a tripod, jib, boom, crane or even a radio-controlled car.

Some product offerings are simple, such as precalibrated leveling readouts for tripod heads. Others offer full, 3-axis control of camera position, travel and speed. Still others are designed to operate unattended in any environment, with single-cable multiplexed control and video signals. It's a sure bet that many products will have applications far beyond those dreamed up by their designers.

Robotic and remote cameras

Treetop Systems showed its all-in-one crank-up tripod and remote-control system, which telescopes up to 21 feet in just 30 seconds, supports up to 75 pounds worth of camera and robotics control, weighs less than 200 pounds and has a footprint of less than six feet. The remote-control center offers hands-on or foot-pedal operation and uses RS-485 serial communication to control lens zoom, focus and iris, as well as camera pan and tilt. Position accuracy is claimed to be 0.1 inches.

Telemetrics demonstrated a full range of robotic camera controls and interfaces. Its TM-9250 triax camera control system snaps on to any Beta, M-II, S-VHS or Hi-8 camera head, turning it into a full-featured studio or field camera. The base station control unit occupies a half-size rack shelf and can be located up to 5,000 feet from the camera using triax or 2,000 feet using conventional coaxial cable. A companion product, the TM-9660 component triax system, provides Y, R-Y and B-Y output through triax cable only. All camera controls and pan/tilt/zoom/focus adjustments are made with serial commands.

For all-weather use, the Telemetrics TM-9400 offers a heavy-duty pan/tilt head, serial interface and dust/weatherproof housing in one package that communicates with the remote controller via a single multiplexed coaxial cable. Telemetrics also introduced People Tracker, a pattern-recognition software package for unattended camera operation that doesn't require an IR sensor or other tracking device to be worn by the user. All robotics can be controlled by the TM-CPS camera control software, which runs under Windows and features preview/live windows, frame grabs, set/preset and CCU/robotics displays, showing up to 12 predefined camera positions as still images.

ParkerVision continues to be a major player with a full-line of CameraMan robotic camera packages, including its General, Student, Presenter and Personal Locator systems. The CameraMan STUDIO system was demonstrated, which gives a single operator complete control of up to six cameras and four stereo audio pairs, using a Windows interface. A DVE unit is also included. Automatic tracking is accomplished through IR hand-held controls, a joystick or autotrack, which follows a combination IR source/wireless microphone worn around the subject's neck. More than 100 location presets consisting of pan/tilt position, zoom position and focus information can be memorized.

Vinten TSM has expanded its line of robotic support systems with the AutoCam HS-102P and HS-2010MH pan/tilt heads. The HS-102B supports up to 35 pounds, weighs only 17 pounds and uses a 24VDC, brushless motor with digital control. It's intended for low-cost studio,

field and conferencing applications. The HS-2010MH is a bit more hefty and will carry a 200-pound studio camera, lens, prompter and viewfinder. It retrofits with Vinten's AutoCam SP-2000/X-Y servo pedestal or its Fulmar/Quartz manual pedestals.

For preset camera shots, Vinten offers the LCP-8000 Control System, a Pentium-based processor that stores and recalls up to 11,520 combinations of pan, tilt, zoom, focus and CCU settings, from up to eight cameras. Individual memories can be triggered from an audio interface, graphics tablet, or directly from the LCP-8000's touchscreen.

Band Pro Film/Video showcased the CAMS (Computer Aided Movie System), which works with either boom/jib arms or rail systems. The camera operator executes conventional zoom, focus, pan, and tilt moves while watching a monitor on a standard tripod, and the system servo motors track these movements precisely, using serial communication. The monitor fits to either a Sachtler or Cartoni head, and has an angular resolution of 0.0018° in pan/tilt mode, with a maximum excursion of >360° in either axis.

Innovision Optics rolled out a tracking camera system and an R/C remote. The 4-Axis Mini Mover works with a joystick control and provides lateral, rotary, horizontal and vertical control of cameras with several support/track options. Combined with Innovision's tubular optics systems, camera shots with fluid motion can be achieved in and around small tabletop objects, with 100% repeatability.

For even more unusual perspectives, the RADCAM presents a wireless, self-propelled remote-controlled camera car that can operate up to 15mph, has remote control of pan and tilt and uses a 4-wheel independent suspension for stable pictures.

For virtual set applications, Vinten has introduced VideoScape, a pattern-recognition/HS-105P robotic camera head package using the Ultimatte 7 compositing system. The HS-105P

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can support a payload up to 75 pounds and will work with any tripod, pedestal or ceiling mount.

Speaking of Ultimatte, the company has introduced Ultimatte 8, a completely digital compositing system that works with either 4:2:2:4 CCIR-601 or 4:4:4:4 SMPTE RP-175 digital video formats. A new screen correction feature can more finely distinguish between uneven blue backgrounds and desirable blue, shadowed, smoked or smudged elements in the foreground. A reference frame can be stored in memory as the basis for any error correction. It works with either NTSC or PAL standard video.

RT-SET demonstrated new software developments to its virtual studio system. The improvements include new depth-of-field capability and a focus adjustment that clearly shows the appropriate distance between real or virtual object. Also included is a texture dissolve function with variable rates and the ability to move light sources in real time with objects.

ACTION CARD 191

Camera support systems

For applications where full remote control isn't required—such as on a fixed tripod in the field or at a business meeting/corporate event—other manufacturers are offering several useful, economical and time-saving camera support systems. Bogen Photo unveiled two fluid heads from Manfretto, the 316 HD for 13- to 35-pound payloads and the 510 for smaller, 9- to 19-pound cameras. The 316HD weighs 10 pounds and uses 100mm and 150mm bowls. The 510 has a 3-step drag system and works with 100mm bowls.

Cartoni and Sachtler demonstrated auto-balancing heads. Cartoni's Delta fluid head has a dual LED display that reads out balance and tilt drag, making it possible to remove and re-attach cameras quickly without having to re-balance each time. It can hold up to 37 pounds, tilts -50° to +70° and weighs nine pounds.

Sachtler's Video 18 and Video 20 sensor heads continue to be popular for quick-balance applications, using an LED bar graph to show the balance point and dynamically counterbalancing with an electronic measurement. Both heads allow tilts of more than 90° while retaining full counterbalance. There were also two new camera pedestals from Sachtler. The Vario Ped 1-90 and 2-75 are designed to support heavy-weight studio cameras while being extremely lightweight. Each shares a modular approach to construction and a low-pressure system with a safety pressure valve to prevent overinflation damage.

Vinten TSM introduced the Quartz pedestal, the first of a series of studio camera support systems from the manufacturer. The Quartz one and Quartz two are designed for use with lightweight digital studio cameras. They include a fully skirted base with a new cable guard system that allows smooth, rapid acceleration and repositioning without sacrificing stability and rigidity.

O'Connor Engineering Laboratories presented its wide range of camera support systems, including the 2575B and 2575BV fluid heads, which can handle up to 85-pound cameras with a tilt range of 90°. Also new are the 150mm Ball HiHat and Mitchell HiHat, as well as the 25L, 35L Baby and 35LC tripods. All of these tripods feature 60-pound capacity, quick deployment and lightweight yet secure design.

Finally, Miller Fluid Heads has upgraded its Projib product with Undermount, an adapter that attaches with a hi-hat to ensure the camera and fluid head remain centered in the jib bowl. Undermount cameras can drop right to ground level for low-angle steady or tracking shots. The Projib breaks down to 48 inches for transport and weighs only 25 pounds, making it useful as an inexpensive studio or location crane support.

ACTION CARD 192

VIDEO EDITING EQUIPMENT

By Jim Lodes

Jim Lodes is an editor for Tele-Business Communications, Lenexa, KS.

Editing equipment has been a hot topic at NAB for the last several years. The introduction of nonlinear systems, combined with the proliferation of computer-based desktop video devices, has left the field of editing wide open. GUI/time line systems compete side-by-side with the older (some would say more mature), CMX-style units. In many instances, the winner is based on the personality of the human operator. At this year's NAB, there was no shortage of new introductions in the video editing category.

Highlights in the editing arena showcased at the Avid booth included the Media Spectrum, Media Fusion and MCXpress. Media Spectrum is a comprehensive on-line environment for high-end post-production based on the Silicon Graphics Onyx. Software is based on the Media Composer editing model. Media Fusion provides noncompressed editing on SGI Onyx and Indigo2 IMPACT workstations. MCXpress is a PCI-based digital nonlinear editing solution.

BTS announced that it is taking on the name of its parent company, Philips and will use the Philips name instead. Other announcements included the Bravo NL, which will have multiple time lines, multiple video tracks and be capable of sync rolling tape and hard disks. The system is based on Windows NT, requires no rendering time and uses the Targa 2000 board. Also on display was the Bravo VE virtual editing system, which is available in on-line and off-line versions. The on-line system is a linear version, while the off-line unit provides nonlinear capabilities.

Chyron announced the release of version 14.0 software for the CMX Omni editing line. Among the new features are Lookahead auto assembly and improved DDR interfaces. Also included is the ability to easily edit device ports. Users can create specially tailored machine interfaces that can be assigned to any available port.

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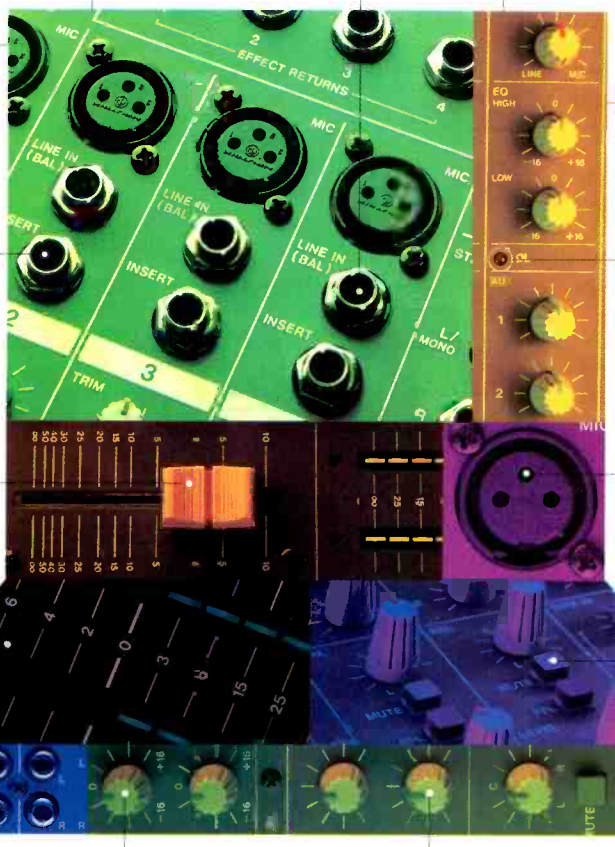

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D-Vision showed the Fxellerator-II and PCI Digital Video Board-II add-on options for the Postsuite family of Windows NT-based workstations. Fxellerator-II produces advanced real-time digital video effects on two simultaneous streams of CCIR-601 video within its open architecture. Postsuite workstations incorporating the PCI Digital Video Board-II can composite two CCIR-601 video streams, as well as an animated graphics layer with anti-aliasing in real time.

Data Translation showcased the family of Media 100 systems, complete with several new additions, as well as its latest version 2.6 software. Among the new additions is the Media 100 xs, its most powerful system to date. Also on the list is the Media 100 qx, which costs less than $5,000 and features Vincent and Adobe Premiere.

DNF Industries had its new ST300-S/SM slow-motion controller on display. Designed primarily for sporting events, the unit can store up to 100 cue points. The optional T-bar makes it easy to play tapes at speeds from -1x to +2x play speed.

The long-awaited Panasonic laptop editor was a hit with many at the show. Portable editing is finally here.

New from Editing Technologies Corporation is the Clip Cutter nonlinear editing system. Using technologies developed for the Ensemble Gold, Clip Cutter is designed for efficient and fast video editing in a nonlinear environment. Clip Cutter allows up to four editing suites simultaneous access and operation on one Tektronix Profile digital disk recorder. Also on display was the new Ensemble Pro "H" series, which adds nonlinear features to the Ensemble Pro. The Pro "H" series will control up to nine VTRs or DDRs, as well as audio and video switching and effects devices.

FAST Electronics launched its next-generation AV Master PC video editing and capture card. It's capable of capturing audio and video simultaneously, ensuring proper sync during record and playback. FAST's ANIMASTER allows animation files from any Windows 95 compatible program to be mastered directly to videotape. ANIMASTER is aimed at professional animators and provides CCIR-601 compatibility. Also new is the VM-Studio Plus, which works by rendering time line video tracks directly to disk. This allows unlimited layering through software rendering.

Intergraph, a relative newcomer to NAB, garnered considerable attention with its Studio Z RAX system. (For more information, see *BE* Pick Hits, p.30.) The Studio Z RAX is a rack-mounted media production system based on the Pentium Pro/Windows NT platform that offers up to 90 minutes of real-time D-1 quality video. Also on display was the Studio Z CGI/video authoring workstation for creating computer-generated images and high-quality video.

JVC announced its nonlinear Windows NT system. This multilinear hybrid editing system will handle four VTRs and have real-time effects processing and audio equalization. Additionally, JVC was showing its new RM-G820 edit controller that offers pre-read capabilities. The event memory can store 98 events along with all of the data needed for each edit. Other editing products include the Edit-Desk system, which this year got faster and easier to use thanks to the SF-KIT software upgrades. Features include 100X search speeds, a scene finder and frame grabber, as well as A/X roll and auto trim.

From the Lightworks division of Tektronix comes the Lightworks VIP. The VIP system features recording and playout via one to four video channels using the Profile PDR. Each of the video channels can be configured for component, composite or serial digital I/O. Also announced was the integration of Pinnacle's Alladin into the Lightworks VIP system. Alladin will be connected through a SCSI interface card and be controlled via Pinnacle's Windows NT driver software directly from Lightworks user interface.

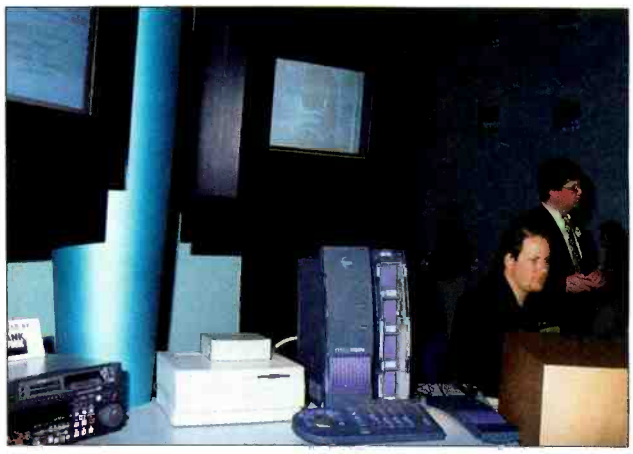
Matrox introduced several new products based on its Movie-2 bus, which was also new at this year's NAB. Products based on the Movie-2 bus include Incite, a real-time multilayer nonlinear editing platform and DigiSuite, a line of building block components that are compatible with the Movie-2 bus, Open DML and Microsoft's Quartz software. DigiSuite products include DigiMix, a multilayer digital video/graphics mixer and 2-D DVE unit, DigiMotion, a dual-channel motion JPEG codec/digital audio mixer/Fast SCSI controller and DigiVid, a multichannel analog video I/O interface with an RS-422 controller. DigiSuite-compatible products are also available from third-party vendors.

The miro company announced greater editing control and added capabilities with the miroVIDEO-Mouse, which adds the advantages of analog editing and device control to the miroVIDEO DC20 desktop editing system for Windows. The miroVIDEO-Mouse generates an EDL containing pointers to captured AVI files, as well as references to video clips on a source tape. It automatically lays down video frames and sequences from source tapes and assembles them with AVI files from the hard drive to a destination videotape. Also announced was a license agreement with Sony to enable development of IEEE 1394-based editing products for the PC.

Quantel's Editbox got even better with the release of Editbox 96. Editbox 96 offers improvements in editing functionality, mix/fx capability, paint-for-editing and connectivity. Other announcements at Quantel include the launch of Henry V8 and Henry V6. Both units add to the capabilities of the current generation of Henrys. Henry V8 offers enhanced color correction and keying, as well as eight full layers. All existing Henrys can be upgraded to either the V6 or V8 model.

Panasonic made quite a splash last year with the introduction of DVCPRO. This year, the DVCPRO laptop editor was larger than life in the company's booth as a twin screen mini-theater, but shipment of the real laptop is eagerly awaited by DVCPRO owners, as well as those waiting to see if the DVCPRO is really all it seems. Many of those at the Panasonic booth seemed to think so, because the laptop editor was a hot item. (For more information, see *BE* Pick Hits, p.30.) Also announced was Postbox version 2.0 software. Version 2.0 brings several new features to the nonlinear Postbox; among them are the ability to adjust compression levels, redigitization and consolidation of digitized data, as well as variable motion control at speeds ranging from -10x to +10x play speed.

Scitex Digital Video, which encompasses Abekas and ImMix, had new versions of both companies products. For editing, the Sphere line offered quite a range. Among the products offered are the VideoSphere, StrataSphere, MicroSphere and DigiSphere. VideoSphere offers two real-time video streams. StrataSphere, the top-of-the-line, adds two real-time key channels. MicroSphere is an entry-level system, while DigiSphere is designed for video acquisition, digitization and distribution.



Sony had its DV equipment models prominently displayed, and among them was the Edit-Station, which is designed to work with the DVCAM format. Two versions were shown, the ES-3 can control up to three VTRs, while the ES-7 can handle four VTRs. Configurations include linear, nonlinear and disk B-roll. Also at Sony was the DLE-100 and DLE-110 nonlinear editing stations designed for live applications.

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The DLE-100 is designed to provide highlights, clips/segments and slow-motion playback. The DLE-110 has the added capability to record and playback simultaneously, providing time-shifting capabilities. Other editors on display include the DNE-300 stand-alone news editing system that provides quick editing to newsroom environments, the DNE-1000 news editing workstation for newsroom server environments and the DNE-50 portable news editor/controller.

Among the products on display at Videomedia was the OZ-NLL, which is a linear/nonlinear editing controller. The newest addition to the Videomedia editor line, however, is the StudioHeart editing controller. Designed by Videomedia's Strassner division, StudioHeart offers high-end editing features in a 32-bit Windows environment. It bridges the gap between traditional CMX/GVG-style editing and Windows-based random-access technology.

News at Videonics included the recent purchase of Nova Systems and the addition of the NovaBlox products to the Videonics line, which includes the Edit Suite A/B roll edit controller. The Edit Suite can control four play VTRs and store up to 250 scenes. It offers time-code support and controls decks with Control-L, Control-M, RS-232 and RS-422 capabilities. In addition, Videonics was showing MediaMotion 2.6, which replaces the previous version of the VTK Plug-in-Pack machine control software. MediaMotion 2.6 adds control and automation capability to Adobe Premiere and Data Translation Media 100 video editing software.

ACTION CARD 193

CONTENT MANIPULATION FOR PRODUCTION

By Ed Fraticelli

Ed Fraticelli is director of engineering for Production Masters, Incorporated, Pittsburgh.

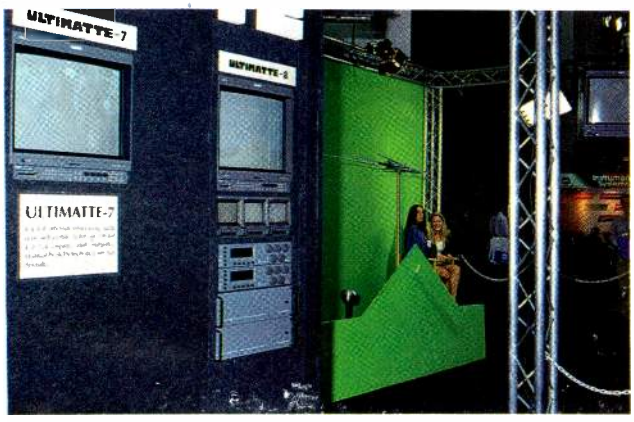
While desktop-based, nonlinear editing systems increase their share of NAB exhibit space each year, there are still plenty of choices in the area of dedicated, real-time production tools, with a range of costs to fit facility budgets. These devices, including production switchers, digital video effects devices and stand-alone keying/compositing systems, are overwhelmingly digital in their nature, although some analog video-processing devices still are being developed.

Digital production switchers

In the area of production switchers, the heart of any post-production setup, there were many innovations this year. Thomson Broadcast showed its 9000 series line of digital switchers. The 9200 is a compact device, while the 9300 and 9600 are the bigger, more capable relatives. This line of switchers ranges up to 12 live key layers and six independent framestores, with options that include color correction.

Video Gainesville featured the CV120, a small 10-input, single M/E unit, on up to the top-of-the-line CV332, with 32 inputs and two M/Es, six keyers and four framestores. Some unique options include Ultimatte keyers and integration of Video Gainesville's CV3300 DVE and CVDR-100/300 digital disk recorders.

Scitex Digital Video, a newly formed company that combined video powerhouse Abekas with nonlinear edit system developer ImMix, showed further development of the ASWR-8100 production switcher. This is good news to Abekas fans, indicating the new company's continued support of high-quality dedicated production equipment. The new ASWR-8150 consists of the standard 8100 switcher, with the addition of a single twin-channel of the new Dveous digital video effects system built in.



Sony's newer switcher offerings include the compact, but powerful, DVS-2000C and its big brother, the DVS-7000. Featured are tight integration with the Sony DME digital effects system and other Sony products. The strength of the Sony "Select Systems" concept is realized in this synergy.

BTS/Philips had the complete "Diamond Digital" series of production workhorses on display, ranging from the DD-10, with 16 inputs and three keyers to the DD-30, with 32 inputs and seven keyers. BTS's DynaChrome chroma-key system rivals the best dedicated matting systems, and the FXloop DVE control system integrates the most popular effects systems on the market. Other Diamond Digital options include framestores and texture matte stores.

The 4000 series of large-format production switchers from the Grass Valley division of Tektronix was shown in several different flavors. The 4000 is available with 16 or 24 inputs and two or three M/Es, each with two keyers. One hundred of Grass Valley's E-MEM registers are standard, as is a fully functional downstream keyer.

The 4000-series options include Grass Valley's "Chromatte" advanced chroma-keyers and separate video, key and mask framestores. One interesting feature is the 4000-3T's ability to split the control panel into smaller subpanels, allowing flexible installation designs, especially in tight spaces, such as production trucks.

ACTION CARD 194

Analog offerings

As mentioned earlier, digital switchers take the lion's share of the attention, but several companies have analog offerings. Ross Video seems to specialize in analog production systems, with six different levels from which to choose. The smaller models include the RVS-210A, 216A and 316. The larger 416, 424 and 630 offer more of the same features as the smaller siblings. Ranging from 10 to 30 inputs and different numbers of Ross Video's unique "multilevel effects" system or MLE's, you are sure to fit any facility's needs and cost considerations. Standard, across-the-line features include auto-transition functions and event memory systems. With such options as DVE control and component chroma-keyers, the line can be flexibly specified.

On the smaller, compact end of analog switchers is Panasonic's WG-MX50. Referred to in many video circles as a SEG, or special effects generator, the unit has a complete arsenal of tools for such a low cost. Also, Videotek continues to offer the Prodigy line of compact analog switchers.

Echolab showed off its latest addition, the 20-input MVS9. The 2-M/E unit provides for easy upgrade from composite to Y/C and component analog format, using the same control panel and chassis. A nonvolatile event memory saves and recalls complete panel setups plus 10 complex sequences with up to 999 steps each.

Videonics was showing its video switcher, the MX-1, which offers four composite or Y/C inputs, a frame synchronizer with dual TBC, a digital special-effects generator with more than 200 effects and key capabilities.

ACTION CARD 195

Digital video effects systems

Certainly the hallmark of any post-production suite is the digital video effects system (DVE). From the innovation of the Ampex ADO many years ago, DVE systems continue to advance to amazing levels, thanks to continued development of application special integrated circuits (ASICs). A peek inside any of today's DVEs will show many of these multihundred pin wonders, allowing users to enjoy the lower production costs associated therein.

Grass Valley/Tektronix showcased the Krystal 4300 system. The Krystal system can be comprised of one to four channels with up to two independent users. Grass Valley's "Kurl" nonlinear effects and recursive "trail" effects round out the repertoire of effects power. A unique and interesting feature is the ability for users to integrate existing Kaleidoscope channels into the Krystal control system, providing past customers with a "future-proof" feeling in the ability to continue using

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The Sony DME-3000 DVE is a compact and powerful effects tool. Using Sony's integrated system approach, the DME sends a Z-Axis signal in the digital video datastream to allow depth keying on Sony switchers. Also available, when Sony switchers are used, is the DME-WIPE function, which allows a DME effect to be called from the switcher as if it were a wipe pattern. Other new DME features include interesting texture effects, giving a "painterly" look to the video.

A newly introduced system from Scitex Digital Video is the Abekas "Dveous" 5100 DVE system. (For more information, see *BE* Pick Hits, p.30). The Dveous uses an interesting architecture where a single system can be used as a dual video, raster-keyed channels or as a video-plus-key channel, with a separately controlled shadow. Another stand-out feature is "Surface FX," which simulates a texture map using shaped light sources that can be derived from graphic images or live video images. The Abekas "Ultra-Warp" curvilinear effects, integrated combiner/keyer with intersecting planes and pre and post transforms, make the Dveous powerful. Optional features, such as "reTouch" color correction, target framestore, an additional twin channel and wide-range defocus take it to another level.

ACTION CARD 196

The Pinnacle Alladin was shown with new CCIR-601 I/O and Windows NT support.

Integrated production systems

Several integrated system approaches were spotted on the NAB exhibit floor. The Abekas 8150 was mentioned above, but other systems take a "workstation" approach to complete post-production functionality.

The much-publicized "Magic DaVE" system from Snell & Wilcox is more than a low-cost DVE system. DaVE's effects arsenal includes warps, shapes and image modulations, as well as light sources and dual-sided effects within a single channel. Additional features include integrated time-base correctors on the inputs, which include composite, component or Y/C video. Switcher functions, such as mixing, wiping and keying/chroma-keying are all part of the system.

The Pinnacle Alladin production desktop has gone to another level with the addition of two features. First, is the Alladin StudioPak software upgrade allowing a higher level of controllability and fast, 32-bit Windows 95 operating environment. Also, a CCIR-601 serial component digital input/output option allows for inclusion of the Alladin into the highest-end post facilities.

And going all the way with a big introductory splash was Play, Inc.'s Trinity all-inclusive production system. This system appears to do it all, offering DVE, switcher, editor, titling, animation and audio on a single Trinity system. Technically the system is flexible, using analog and digital video input and output and analog or AES digital audio interfacing. With a plethora of control options, Trinity can be configured to fit any system environment, from dedicated panels to GUI interfaces.

ACTION CARD 197

Stand-alone production tools

For more function-specific applications, an array of stand-alone production devices was also found. These devices can be used to extend the life of older, outgrown systems or to provide stepping stones for hybrid analog/digital systems.

Broadcast Video Systems (BVS) offers the Masterkey series of stand-alone keyer systems. The Masterkey 1 though 4 units are analog composite linear keyers. On the high end, Masterkey 4 includes four inputs and masking capabilities. The Masterkey 5 is a component analog linear keyer, offering Y, R-Y, B-Y inputs and outputs and a variable transition rate adjustment. The Masterkey 6 is a 10-bit serial component digital keyer, with auto-timing, variable transition rates and mask faculties. This unit can provide older systems with high-end digital compositing or telecine systems with the ability to perform keys, without the expense and space requirements of a production switcher. All of the Masterkey units are single-rack unit chassis with a small, remote-control panel.

Ross Video's CDK 104 keyer includes four CCIR-601 serial digital inputs, auto-transitions, fade to black and soft mask abilities. Another handy "hybrid"-capable unit, the remote panel looks good and offers separate gain and clip adjustments and wipe functions. Ross also offers the DA card-sized DSK-7522 composite analog keyer. Fitting into an RVS or Grass Valley DA tray, the unit offers low cost (under $1K) and flexible keying. Available with or without a remote control, this system could find use as a "downstream" ID keying device, setup as a "hands-off"-type of system.

The Video Gainesville CV60 mixer/keyer functions and looks like a tiny production switcher. Offering six multi-format inputs, auto-transitions, fade to black, mask, memory registers and shadows, the CV60 does quite a bit for a stand-alone keyer. The system consists of a 3RU chassis and a small desktop controller.

The newest offerings from Ultimatte include the Ultimatte 8. Using 4:2:2 or 4:4:4 inputs for the foreground and background, the Ultimatte 8 is the company's most powerful matting system to date. Ultimatte innovations, such as Screen Correction, framestores and shading, make the unit more attractive, as does its 525/625 switchover ability. Also, an Adobe Plug-In version of the Ultimatte keyer is now being released for Premiere and After Effects users, providing familiar Ultimatte matting and controls in a desktop package. It also includes such advanced functions as Screen Correction, Grain Killer and flare controls in an affordable form.

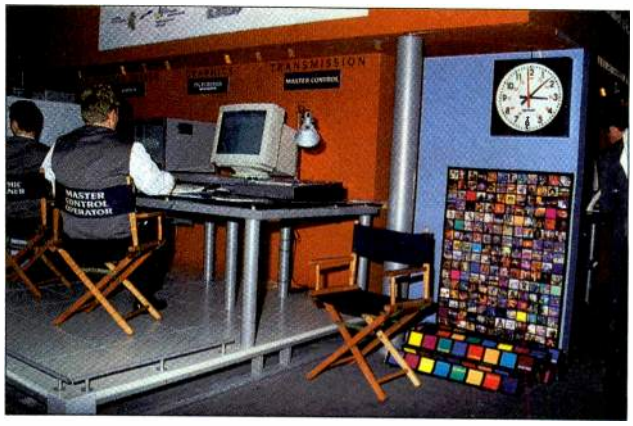
ACTION CARD 198

TITLE CONTENT GENERATION FOR PRODUCTION

By Marc Boeddecker

Marc Boeddecker is a director/editor for American Honda Video Production Center, Torrance, CA.

Before attempting to evaluate the many new systems available for graphics and title generation, an individual or facility must consider the immediate requirement they hope to satisfy with any purchase, as well as any additional business that could be generated with an upgrade of concept and/or equipment. This, of course, must be modified by budgetary concerns, but with PC/MAC-based workstations, as well as dedicated systems, upgrade paths are generally available. Usually, we need "the box" to start making money right away, but the chance to add an animation package or 3-D option down the line should enter into an evaluation.



Based on the original Antero CG, the Antero Ascent is optimized for the new SGI IMPACT workstations. It provides a full set of broadcast capabilities, and also makes the most of the IMPACT's digital video I/O option when generating video and key output with real-time effects.

Chyron's family of dedicated CGs features the iNFiNiT!, a dual user,

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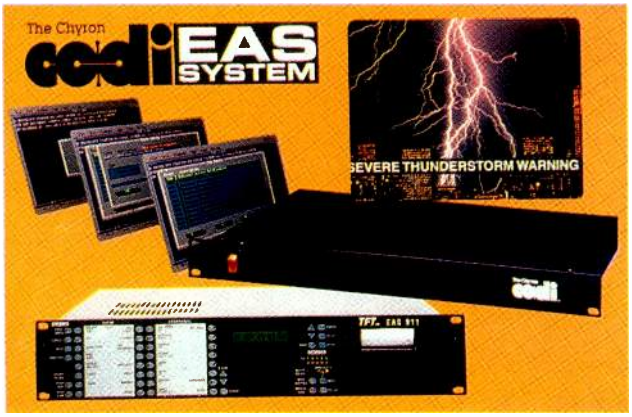
multiple-channel workstation. It shares basic operating software (parameters) and several new option packages with the MAX! and MAXINE! systems. Effective resolution of less than 1ns is also shared by all three systems, which provides high-quality broadcast video. Chyron debuted an expanded Asian language option, which should find favor with Pacific Rim customers, as well as U.S. facilities generating content for that market. Transform II is a new, optional transform engine that animates 2-D objects (characters, words or full-screen graphics) in 3-D space. An iNFiNiT! with dual "T2" boards can manipulate live video input. Among other uses, this feature allows the operator to sync iNFiNiT! graphics and transitions with DDR playback.

Each of these features is used within the Infinite Freedom-integrated graphics system, which allows multiple users to network any of the CGs with the new Liberty Paint and Animation tools, sync CG effects with DDR playback, and to access a networked still-store and graphics file server. The Liberty 32, a 32-bit design package, runs on an SGI platform, and the system is resolution-independent, with the Liberty 64, a 64-bit package, available for the film effects market. The complete system provides seamless file transfer and access to all users.

The Chyron CODI is a compact CG that is designed to be operated



The Chyron CODI EAS provides sophisticated graphics capability for broadcasters and cable systems needing to implement the newly mandated EAS rules.

remotely by a PC. It allows industrial users to generate high-quality text and graphics at an affordable price. A related product is the pcCODI, an ISA board that provides the same resolution, anti-aliased real-time graphics as the CODI, but at a PC price point.

Digital Graphic's TypeDeko is a broadcast-quality CG based on an open Pentium-based PC platform. The Microsoft Windows NT operating system assures compatibility with a range of applications and graphic file types, and system capability is easily upgradeable as faster Pentiums, or bigger budgets, become available. New to the product this year is an optional studio package that includes a dedicated keyboard, preload software and additional memory. Digital Graphix expanded its product line with the affordable WriteDeko, and PostDeko, which is a software-only off-line system that allows the user to generate titles on any Windows 95 computer, including the proverbial laptop at the beach. These titles can then be transferred to any TypeDeko system for final output, including their network solution, NetDeko, which uses multiple-user "Creation Stations" based on less-expensive PCs connected to a central high-powered Pentium for final output. TitleDeko interfaces with Type/WriteDeko to generate titles on the fly for nonlinear system playback, adding titles as a discrete, final process. It's also capable of exporting those titles back into the nonlinear environment as PICT files.

Many of us can only dream of the day when a moving van drops off an SGI Onyx. For those who don't worry about "how much," Discreet Logic has offered paint and compositing systems for SGI platforms with Flint, Flame and for film, Inferno. Based on real-time playback of uncompressed 4:4:4 digital video, these products have always been impressive. This year, Discreet Logic introduced the perfect complement to these systems with FIRE, an on-line, disk-based editing solution. (For more information, see *BE* Pick Hits, p 30.) FIRE's editing interface is picture-based, providing storyboard and time line editing. Full EDL I/O is supported for the major formats, as is OMF media import/export. Transitions and effects can be viewed or modified in real-time at full resolution, and this is uncompressed D-1. In addition to everything you could ask for in an editing system, FIRE also provides sophisticated color correction, true perspective 3-D DVE, compositing and character generation comparable to Flint and Flame, as well as pro level audio capabilities. The system can function as a stand-alone edit suite or as an element networked with other Discreet Logic products.

Utah Scientific demonstrated improved software for its Delta text and graphics system. Delta version 6.0 introduced features to the product, such as Dynamic Logo Size Control, which expedites the re-sizing of logo elements and enhanced Image Touch-Up for images captured from rolling video or faulty transparencies. Other enhancements include improved font conversion and the ability to force a title sequence to crawl smoothly in a specified time. Delta also has the ability to place characters anywhere on the screen, including typing at any angle.

With regard to graphics and title generation, HP's Series 7000 workstation is a cost-effective alternative to other RISC-based computing products. US Animation and Electrogig, among others, demonstrated products at NAB that offered excellent price/performance for animation and rendering based on the HP 7000. In early April, HP announced dramatically higher levels of performance for its PA-8000 chip, which in testing, outperformed its competitors by as much as 260%.

Well-known for packing the most bang for your buck into its time-code products, Horita offers a range of time-code generators, readers and character insertion devices at a price point that fits most budgets.

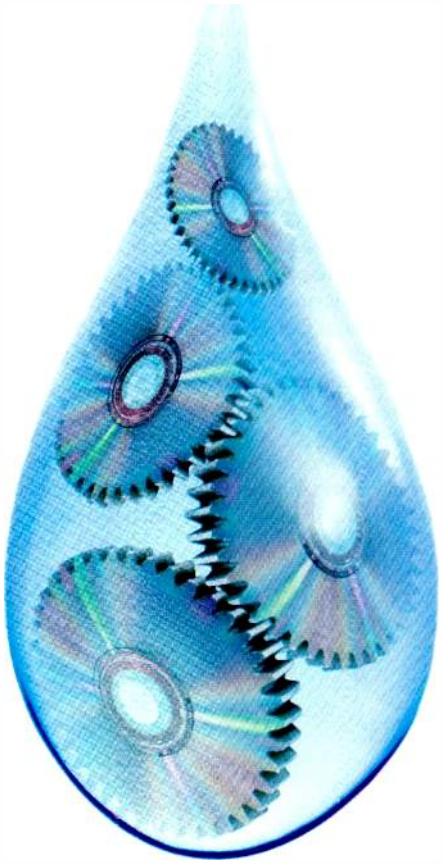
Knox Video was showing the Portac VFAX, an electronic bulletin board system for corporate communication and commercial information postings. Using 32 colors on a 13-line/32-character per line page layout, the VFAX 300 presents graphic information in two readable large fonts. Currently operating on DOS 5.0 or better on a 486/33 mini-tower, the VFAX can incorporate text, graphics, as well as audio and video recordings, into multimedia presentations that can be programmed as much as a week in advance. With the optional VCU4 video control unit, up to 24 VCRs can be programmed to play, stop, rewind or record at a specific time and date.

The Pixel Power Collage is a dedicated RISC-based system that combines CG, a still-store and a graphic paint program in one unit. New features include Cool Moves, which provides real-time animation of text and logos, and a 3-D animation option that further enhances the ability of Collage to animate text, shapes and imported objects. Also new is the ability for Collage to interface with newsroom automation systems, facilitating on-air applications, such as updating election results or financial news.

Introducing Graphic Paintbox 2, Quantel continues to upgrade "Paintpower" for the print industry. The Graphic Paintbox 2 allows production elements to be applied not only to the moving picture side of things, but also to print graphics. Brochures, flyers, print ads etc., can all benefit from the ease of image manipulation and graphic composition that Paintbox products have offered for years. If the process begins with film or high-resolution digital elements, print work in no way suffers from this association with broadcast production tools, and this is the best solution for integrating normal NTSC elements into a packaging or graphic scheme.

The union of Abekas Video Systems and ImMix to form SCITEX, has produced a host of exciting digital video products, among them is version 2 software for the Texus character generator. The dual-channel Texus features 4:4:4:4 internal processing, is switchable between NTSC and PAL, and includes networking with the rest of the SCITEX family, programmable macros and animation. Texus has a dedicated processor for networking, which allows other devices to access files without interrupting normal CG operations.

In the high-end world of visual computing, few do it better than SGI. With dozens of manufacturers pinning their hopes and (technical specifications) on the reliable family of Silicon Graphics workstations, it's difficult to go wrong if you can afford the price of admission. The Indigo2 Impact was honored for bringing high-end technology to a more affordable level. At the head of the Indigo2 Impact family is the "Maximum Impact." Its processing power provides a platform for the highest-quality 3-D graphics and image manipulation available for the



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desktop. Options for the system include a digital video I/O and a compression card that supports variable compression down to 2:1. The compatibility of this workstation with other SGI products allows access to a variety of content creation possibilities.

Getris Images line of workstations offers a modular, open architecture integrating real-time graphics, compositing and editing functions. In ascending order of capabilities and options, the Eclipse, Hurricane and Lightning Suite products offer DVE effects, paint and animation, and nonlinear editing, all in real-time D-1 quality. Multiple channels of graphic and paint composites incorporating live video, image stabilizing and motion tracking are all available as upgrades, and the editor allows the import of EDL and graphic files from other systems. The open architecture of the system makes it easy to network in a broadcast environment and offers an easy upgrade path. BROADNEWS from Getris is a system that controls graphic elements from a variety of sources for automated broadcast, which can include updating information from wire services without interrupting on-air activity.

Powerscript from Videonics functions as a stand-alone 2-channel CG or as part of a larger production network. It can use the huge library of Postscript fonts and is capable of importing and displaying graphics created by applications, such as Adobe Photoshop and Corel Draw. Two PC card slots are available, as is user-configured connectivity, including Internet access. High-resolution output, character animations and drawing tools, coupled with an internal TBC, make this an impressive product, especially at $3,000.

AccuWeather announced the UltraGraphix ULTRA weather broadcast weather system. The ULTRA work station provides enhanced capability and allows the creation of seamless animations of weather graphics. The sequences can be made and rendered in virtually minutes on any map base. Using SGI platforms and custom point-and-click software, multiday weather sequences can be created in about two minutes, then fully animated in about five more minutes or less.

ACTION CARD 199

VIDEO COMPRESSION AND FIBER PRODUCTS

By Les Brown
Les Brown is president of Les Brown Associates, Grass Valley, CA.

Fiber technology has been "emerging" for many years, but combined with maturing compression techniques, NAB 96 saw dramatic advances.

Scientific Atlanta, Panasonic and BellSouth used the occasion to introduce SCARLET, a video, audio and data distribution system for the 1996 Olympic Games. The system starts with hundreds of cameras at the various Olympics venues. Uncompressed video and audio from each is routed via BellSouth's high-speed synchronous optical network (SONET) to the Games' International Broadcast Center for editing. The edited program content, plus results data, is then compressed using Scientific Atlanta's PowerVu MPEG-2 system, multiplexed and returned to the venues. At each venue, the package is demultiplexed and each channel is decompressed. The signals, plus video and audio from up to 12 locations within the venue, are modulated onto a cable system for distribution to various press locations. Here, a journalist can cover one event personally and keep a close watch on everything else that's in progress, as well as access results. The end result leverages the abilities of writers, who otherwise would be hard pressed to jump between the many venues scattered across Georgia.

SCARLET demonstrated just one, albeit a major application, of compression in the real world. There were numerous other systems and even more applications than systems.

Video compression

MPEG-2 isn't a single standard, rather it's a bundle of standards built around a common core. The magic word is *scaleable*, meaning you can select compression levels and profiles to suit your purpose. For studio applications, Sony, Tektronix and others have committed to what's called the MPEG 4:2:2 profile@ML (main level). Unfortunately, that's not yet a standard. Rather, it's a proposed amendment to MPEG-2 to support extra spatial resolution, extended bit rates and chroma resolution for video production purposes. Still others contend that, given the realities of over-the-air transmission, a 4:1:1 or even 4:1:0 profile are perfectly adequate. It has become clear that higher bit rates don't always translate into the best-looking pictures. Results are strongly related to picture content, so the eye is the thing to trust, at least for now.

A buzz word around the various NAB booths was "asymmetry." It's related to the intended use of various compression schemes and has as much to do with money as it does with technique. A symmetrical system would typically be used in single-point to single-point transmission, as in getting a produced commercial across the country for further production or perhaps later distribution. Here, the relative quality of the encoder and decoder are approximately equal, as are the costs. On the other hand, a system designed to compress a signal for decompression by a large number of users would be asymmetric. The encoder needs to be capable of doing an excellent job of compression so the resulting datastream can be decoded to studio quality by an appropriate decoder or to acceptable quality by a inexpensive consumer-grade decoder. Figures being discussed for this application were in the $60k to $80k range for encoders, but in the $100 to $150 range for decoders.

DiviCom's display appeared to be the most highly developed system on the floor. An array of encoders, multiplexers and decoders was shown and demonstrated. Picture results were excellent, though the same can be claimed for almost all of the systems displayed when their intended application is taken into account.

Scientific Atlanta's PowerVu MPEG-2 encoder is designed to deal with composite or component input video. Output video data rates range from 2Mb/s to 15Mb/s. A companion multiplexer allows maximum use of the chosen transport channel bandwidth. The pair complements Scientific Atlanta's line of modulators and home and commercial digital satellite receivers, all of which feature strongly in the SCARLET transport and distribution system for the 1996 Olympic Games.

Sony and Toshiba displayed MPEG-2 systems that were reported as being priced in the "one-to-many" category. In each case, the encoders were displayed with limited systemization surrounding them. Literature suggested an emphasis on an intermediate role; perhaps best expressed as "one-to-several" as in distribution to cable head-ends rather than to thousands of homes.

Wegener Communications, strongly identified with satellite and terrestrial network transmission, displayed its DVE series digital video encoders, which were heavily influenced by the company's ongoing work with Comsat. Wegener offered a choice of encoders ranging from the analog input-equipped MPEG-1 model continuing through versions for half D-1 MPEG-2 and full D-1 MPEG-2. The focus is on network program distribution and satellite newsgathering.

Thomson Broadcast Systems displayed its new TER 8522 codec for digital satellite newsgathering. Compatible with previous generation Thomson decoders, the model offers exceptionally fast throughput. Thomson also displayed a complete system for one-to-many applications, complete with a selection of economical decoders.

Vistek introduced a multichannel MPEG-2 system that leverages the company's expertise in conventional encoding and decoding. Vistek's MV series is designed for main profile at main level MPEG-2 — the combination regarded as most-suited to NTSC and PAL transmission. Make no mistake, however, the Vistek system will also handle RGB, YPbPr and CCIR-601 digital inputs. Extensive input noise reduction and filtering ensure that the encoder doesn't waste a lot of effort — and bits — compressing noise or other undesired artifacts. The series also includes a professional-grade multichannel decoder, specifically designed for cable head-ends.

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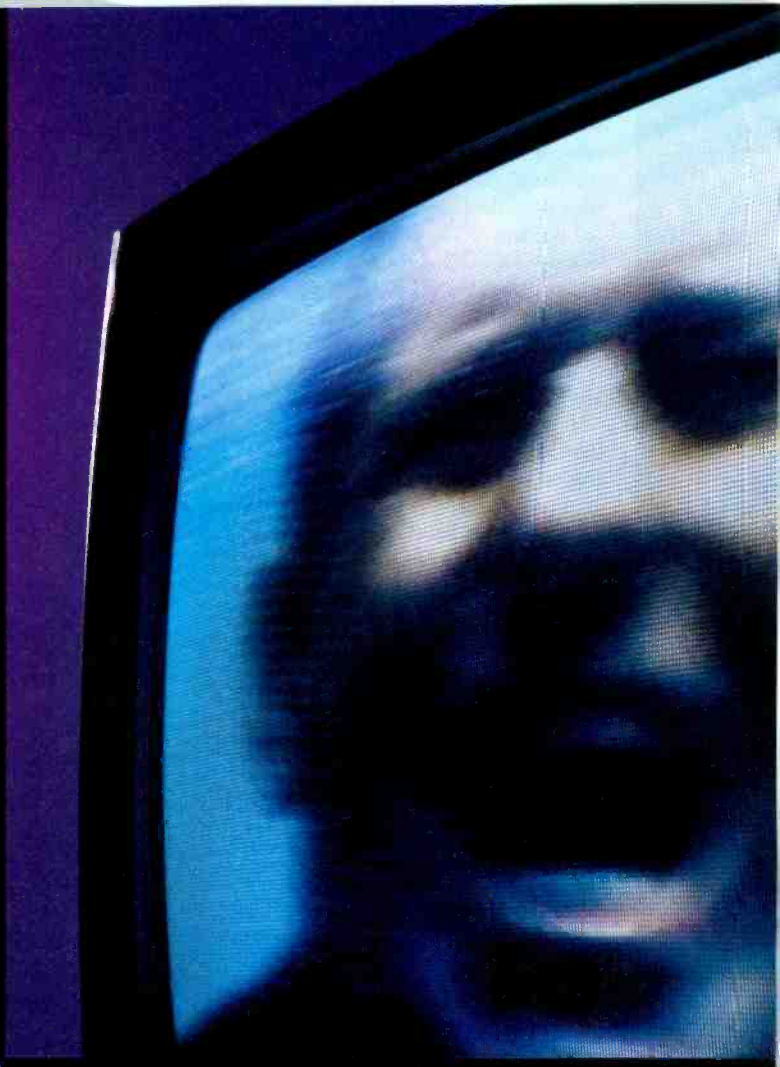

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Vistek also offers a companion multiplexer structured to allow separate redundancy for video and stereo audio channels.

Snell & Wilcox, while not offering encoders or decoders themselves, promises to be a strong player in the world of compressed video. The company's PREFIX range of preprocessors filters and analyzes video, removing undesirable artifacts and adding flags related to, for example, 3:2 pulldown. The company showed test and measurement devices aimed at MPEG-2. An outstanding innovation is the MSP100 transport stream player. Player? Not in any conventional sense. A major problem in troubleshooting compression systems is that any given piece of video is rarely compressed in exactly the same way, even by exactly the same system. The MSP100 outputs fully repeatable MPEG-2 transport streams, allowing immediate visual identification of problems in decoders.

Hewlett-Packard showed the HP E6276A MPEG scope DVB, a real-time MPEG-2 analyzer for digital video broadcast systems and networks. The MPEG scope is made up of an HP Vectra PC, an ISA analysis card and real-time software running under Windows. The analyzer is usually inserted between the encoders and modulators or between the demodulators and decoders in a DVB system. A 64-QAM demodulator is available for interfacing to 64-QAM cable systems. The system supports real-time testing of the MPEG-2 transport stream layer. It is used to facilitate systems integration, quality assurance and operational monitoring of MPEG-2 transmissions in the field. The real-time capabilities allow users to observe effects as they happen and enhance the troubleshooting efforts.

In the crowded Snell & Wilcox booth was a range of sophisticated offerings including the new compression series of products.

Along the same lines is the Tektronix MTS100 MPEG transport stream analyzer. The MTS100 can generate and analyze MPEG transport streams. (For more information, see *BE* Pick Hits, p.30.) An acquisition and analysis function provides detailed information about the stream's conformance to MPEG-1 and MPEG-2 standards.

Vela Research displayed a family of encoders and decoders that shows exceptional craftsmanship and unique design. But the company's NAB display is one of the few times you'll get to see it. Vela's products are designed to disappear inside computers or workstations so all you get to see are excellent results. The subsidiary of Home Shopping Network has been working closely with other manufacturers and end-users to produce a range of modules that may be offered separately or inside dedicated products. One impressive example shown at the Vela booth is the NBC high-speed data communications video trial. The system on display demonstrated how a news department may one day not have to record hours of news feeds to select a few clips for local use. Rather, summaries can be browsed, scripts read and clips previewed at high compression rates in near real-time. When the journalist has found exactly what's needed, it can be simply downloaded from a master server at a lower compression ratio for local use.

More PC-based compression solutions were found at Optibase. Here, the emphasis was on making quality MPEG-1 and MPEG-2 encoding affordable for the creative professional. Depending upon purpose, board sets were projected to cost between one quarter and one half of free-standing products for broadcast applications.

Broadcasters already have put FutureTel's single-board MPEG-1 encoders to on-air use, though many others put the product to publishing and distribution use. For the broadcaster, FutureTel puts VHS-equivalent video onto a telco T1 circuit. The tool has proven itself in delivering signals to remote cable head-ends and in bringing home video and audio from distant locations that frequently figure in news coverage. Examples include resort areas where extreme weather conditions often make news or freeway bottlenecks where a minor accident can cause city-wide gridlock.

Digital Vision was demonstrating its BitPack MPEG-2 authoring workstation. Operating at MP@ML, the system is targeted at applications demanding the highest picture quality in the mastering process. It features internal DVNR encoding pre-processing, scene change and 3:2 pull-down detector, scene-by-scene or automatic operation. Also shown in the booth was the TV345 broadcast video and audio codec and DMV16, a multichannel MPEG-2 video and audio codec system.

ACTION CARD 200

Fiber optics

"Fibre Channel" isn't dead, it's just gestating. Last year, NAB saw lots of attention given to the proposed networking standard for fiber-optics usage in broadcast and post production. Support for the system was reaffirmed at NAB by Hewlett-Packard, Avid, Panasonic, Silicon Graphics and Tektronix. The proposal is far enough along that a few companies have announced they're building Fibre-Channel capability into the products, yet there's still work to be done on the final standard.

A quiet announcement from Megadrive shows it's really happening. Megadrive's Aria RAID disk array uses Fibre Channel Arbitrated Loop architecture to provide connectivity with workstations via data loops without resorting to a Fibre Channel switch.

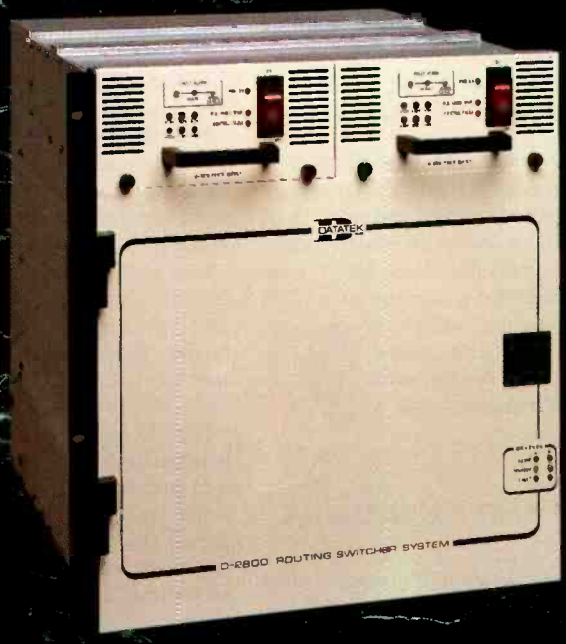
Equally quiet, and almost invisible at the Tektronix booth, was Grass Valley's quad transmitter/receiver pair. The modular system is designed for studio applications, accepting up to four digital signals of 1Mb/s to 360Mb/s per module and pumping each out on a separate fiber. The devices are in no way standards-dependent, so they may be used directly with AES/EBU audio, as well as video. Also at Grass Valley, the MCF/SVP families continued to grow. MCF is a multichannel system for contribution-quality digital video and audio, placing up to six channels of 10-bit video and 24 channels of 18-bit audio on a single fiber. The SVP series is oriented toward SONET/SDH networking. The two systems have much in common, including video/audio diplexer and input/output modules in analog or digital versions.

Pro-Bel, known primarily for routing and recently purchased by Chyron, showed a modular fiber-optic transmitter/receiver pair for SMPTE 259M applications, useful for component or composite digital video. While not specifically mentioning "Fibre Channel," Pro-Bel stresses that its design features compliance with proposed standards, which will ultimately make it possible to use transmitters and receivers from different manufacturers.

A new baseband fiber transmission system was introduced by Multidyne. The dual FM-carrier-based system is designed for analog video input with 10MHz bandwidth, accommodating video with multiplexed audio carriers at 4.5MHz, 5.8MHz and 6.4MHz. Multidyne offers the system in portable and rack-mount configurations. LED versions are designed for multimode fiber and laser versions for single-mode fiber.

Fiber Options brought a pair of new fiber products to NAB. The series 1121B/1121SB single-direction systems can be used over distances of up to 7km with multimode fiber or 20km with single-mode fiber. Distance performance is the same for the series 2031B/2031SB, which offers bidirectional video and audio. In both systems, video bandwidth is 10MHz, so audio or data multiplexed onto subcarriers is easily accommodated.

Force presented a multimode CATV broadband fiber link at the show. A companion to earlier single-mode systems, Force's model 1705 is designed to transport either five or 10 channels over distances of up to 3km. The system represents a significant savings for operators with requirements below those addressed by Force's previously announced 80-channel VSB/AM modulated systems.



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If routing fiber paths is your need, Lighthouse Digital Systems may have what you're looking for. The company displayed its range of versatile routing and control systems, which includes fiber capabilities. The company makes routers for video, AES audio, time code and data/machine control in sizes from 8x8 to 1,000x1,000. Fiber and coax running at multiple data rates can all be carried within the same router chassis.

Finally, some good news for the satellite distribution marketplace came from Ortel and Andrew, who announced that they have joined forces to make life simpler for L-band earth station operators. Ortel offers a rugged transmitter/receiver pair to address the need for a clean link between satellite dishes and rack-mounted receivers. The "L-band fiber-optic interfacility link" is designed for distances of 100 to 1,000 feet. For distances of less than 100 feet, cable remains an economical solution, whereas beyond 100 feet, signal degradation grows to noticeable amounts. Regardless of distance, the fiber link between dish and rack builds a strong defense against lightning strikes.

ACTION CARD 201

CD-ROM DEVELOPMENT AND MULTIMEDIA

By Steven M. Blumenfeld

Steven M. Blumenfeld is vice president, technology for GTE Interactive Media, Carlsbad, CA.

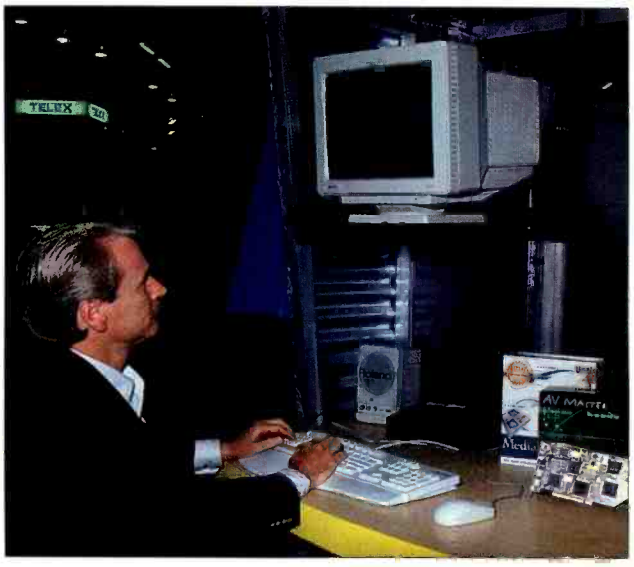
This year's NAB, like those of the recent past, was filled with multimedia offerings. This year, the multimedia pavilion was in the Sands Convention Center. However, having walked both large convention halls for four days, there was multimedia everywhere. New graphics software, new formats, MPEG-2 and DVD were found throughout the exhibit space. It seemed that every vendor had a new MPEG-2 product; some were ready for release, and others were just a dream.

On the multimedia development side, DVD authoring was all the rage. Sonic Solutions, Pioneer and many others showed authoring tools. This is important, because unlike Video CD or CD Audio, DVD requires an application to be on the disc for control, not just hardware controls. One exception is on the CD-I portion of a Video CD (White Book), an application to control the bitstream needs to be present.

The DVD application must have some smarts; it must know where the video is located and how many audio streams there are. It may need to know about subtitles/foreign languages/chapter stops and even alternative endings. This information, as well as any interactivity, is programmed with the DVD authoring tool.

Sonic Solutions, together with Daikin Industries, showed an interesting package called the Sonic DVD Creator. (For more information, see *BE* Pick Hits, p.30.) It's the first fully networked production system for preparing titles for release on DVD. This product takes your MPEG-2 variable bit rate (VBR) encoded video and audio files and with the assistance of the software prepares them for final DVD mastering. The system is broken down into three modules: the audio module, the video module and the DVD—Scenarist software. All functions can be networked together to form a complete DVD solution.

Barco introduced NOVA, a DVB-compliant MPEG-2 encoder with remote monitoring and backup capabilities. Handling analog and digital video and audio signals, NOVA includes an MPEG-2 transport multiplexer, a 64 QAM modulator and demodulator through to MPEG-2 decoding. A unique interface to the company's PC-based ROSA system management software makes complete remote monitoring and system control possible.



mFactory was showing mTropolis, an interactive multimedia authoring tool. mTropolis is not a time-line-based tool, it's an object-oriented environment. mTropolis's underlying architecture is suited to applications that are destined for network deployment. The authoring tool is based on a multithreaded, high-performance engine. It can manage large numbers of objects while processing many messages in a small memory footprint. mTropolis's flexibility also allows the author to incorporate additional customized functions written in C and C++. Each project can be built as a stand-alone, multidisc, network hybrid, and/or multiplatform title. This cross platform tool is available for Windows 3.1, Windows 95, 68K and Power Mac.

Sony made great headway into multimedia with the DVCAM-Edit Station combination. DVCAM is Sony's new format for lightweight digital acquisition that crosses the professional, semi-pro and consumer markets. A major advantage to this format is its playback compatibility with the consumer DV format. Its quality is excellent and its ability to mark selected takes on the fly will enhance video editing.

The Edit Station is a random-access video-editing system with an integrated software audio mixer. The system allows a faster-than-real-time transfer to disc (4 times speed) and high picture quality. This picture quality is maintained by the integrated systems common compression technology. From camera to editor to tape deck, the video is never decoded and re-encoded. What makes this system so interesting to multimedia professionals is its ability to input and output to Adobe Photoshop and Quicktime.

Here is one of those items that gets lost in all of the noise at NAB, although it's extremely important. Vyvx showed a new transmission technology called Burstware. Burstware was developed by Instant Video Technologies (IVT). It allows faster-than-real-time program transmission. That means a program transfer can be completed in less time than it takes to play back the material at normal speed. IVT's patented Burstware technology enables transmission of video and audio between locations via high-speed private or commercial networks. This will allow efficient handling of multimedia material over costly high-speed networks. This is a technology to watch.

From Mitsubishi Imaging comes an integrated system for MPEG-2 video distribution. The system is comprised of the DV-500U optical disk library, the DB-1000U MPEG-2 decoder and the EN-1000U MPEG-2 real-time encoder. The system digitizes, compresses, stores and retrieves video, sound and images over Ethernet and ATM networks, as well as analog cable systems. Applications include clip libraries, corporate training and entertainment, among others.

A big problem that is encountered by all multimedia producers is the archiving of the vast amounts of data that a project creates. These days, a single CD-ROM project can generate more than 100GB of data before it's pared down to the final 660MB product. Viewgraphics has come up with an elegant solution. It has introduced a line of serial digital adapters that turn D-1 or D-5 VTRs into high-speed, cost-effective data recorders. The SDA-51 adapter is designed to provide either data or 4:2:2 digital transfer modes making this a true data peripheral. It includes a scaleable dual-port memory, system controller, serial digital I/O, timing and gen-lock circuits and RS-422 control. In today's cost-conscious environments, this product, with an approximate $2 per gigabyte cost, makes effective use of equipment most facilities already have.

Truevision does it again with the Targa 2000 RTX real-time video system. This new video engine gives Mac O/S and Window's-based computers real-time DVE capability and broadcast-quality video. The system is designed for easy integration into broadcast and post-production facilities and includes a rack-mountable breakout box. The

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First Compressions Count

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Engineering with Vision

2000 RTX has the ability to work as a video graphics card with RGB and NTSC/PAL outputs. The engine supports Y, R-Y, B-Y, GBRS, composite and Y/C with software-selectable resolutions including square pixel and CCIR-601. The audio is handled by a 16-bit per sample, 22K to 48kHz ADC with balanced XLR inputs/outputs. This system, with the addition of multimedia software, can turn your computer into a professional digital video effects generator.

Pivotal Graphics demonstrated the PG-PROvideo, an MPEG monitoring and filtering product for nonlinear editing systems and video-encoding systems. A typical MPEG encoder cannot differentiate between a clean video signal and the unwanted artifacts that sometimes come along for the ride (multigeneration noise, etc.), and so processing is "wasted" on unneeded information. The PG-PROvideo minimizes this by analyzing the signal, then filtering out noise and time-base correcting the input before the encoding process begins. An integrated waveform monitor and vectorscope may be overlaid on the incoming video. Also shown was the Personal CDStation, a turnkey CD authoring system based on a 100MHz Pentium PC. Video capture and editing, 3-D animation, paint and graphics may all be combined for in-house presentations and training or for videoCD/CDI production.

Panasonic Computer Peripheral Company showed off its PD/CD-ROM drive and said it will be fully compatible with forthcoming Panasonic DVD-ROM players. The PD/CD-ROM is a 4x reader/writer using the PD optical cartridges. Its inherent phase change technology allows the drive and media combination to be compatible with the future DVD-ROM technology. This is an important feature because it allows users of the PD/CD-ROM a future-proof path to DVD and will allow their data libraries to be compatible with tomorrow's technology.

For Internet developers, Macromedia showcased its Backstage Studios line of web development tools. Among them are Backstage Designer, Backstage Manager and Shockwave for Director. These products provide WYSIWYG HTML development tools for multimedia development on the Internet.

VDOnet was demonstrating its new product, VDOLive, which provides for transmission of live video over the Internet. VDOLive uses VDOWave compression and with software plug-ins allows video to be viewed using standard browser software. The scaleable compression algorithm can provide transmission over phone lines ranging from standard dial-up to T1 connections.

On another front, Target Vision, which provides multimedia employee communication systems, announced several new products including the TVI Stock Ticker, the TVI Web Processor, WinTVOS and Banner Maker. TVI Stock Ticker allows users to display up to 10 selected stock quotes on their TVI Desktop images. TVI Web Processor is an intranet adaptation of TVI Desktop. WinTVOS is a Windows 95 version of Target Visions' proprietary messaging software. And finally, Banner Maker operates within Windows and allows end-users to create customized banners for display on company messaging systems.

ACTION CARD 202

DIGITAL AUDIO WORKSTATIONS

By Brian Sanders

Brian Sanders is senior producer at KNPR, Nevada Public Radio in Las Vegas.

Digital audio workstations (DAWs) are hardly the novelty they were when introduced just a few years ago, but they still are responsible for many clogged convention aisles. Portability, pricing and power were the themes in this spring's DAW wars. Hard-disk multitrack recorders, another means to a similar end, also drew crowds.

DAW platforms

SADiE has a big sister (and a few young cousins). New from the UK's Studio Audio is Octavia, a modular, expandable editor with six times the power of her older sibling. Using the new SADiE3 software, up to 10 8-track SADiE modules can be chained together for significant increases in processing power and storage capability. Also making her debut is SASCiA, a bridge to a real-time network capable of transferring multiple channels of digital audio between SADiE and Octavia workstations via ATM. Meanwhile, for engineers, reporters and producers on the run, the new SADiE Mobile stores field recordings in SADiE format on a portable, removable (or SCSI-interfaced) hard disk, thus eliminating the time-consuming uploading step of the editing process.

Roland introduced the VS-880, an integrated 14x8 mixer/recorder. Each primary track offers eight virtual tracks, for a total of 64 tracks per project. Storage is a built-in 540MB hard disk or optional 1GB removable Jaz drive from Iomega. Edit features include scrub preview, time compression/expansion and cut-and-paste editing with 999 levels of undo. Two studio-quality effects processors can be added using the on-board expansion slot. Roland also showed the DM-800, calling it the industry's only truly portable workstation. The 12-pound package integrates a 12-channel digital line mixer with an 8-track hard-disk (internal or external SCSI) recorder. Each track allows 100 additional layers of track recording. RS-422 video protocol, full synchronization, MIDI, onboard DSP and full dynamic automation are included. Also on hand from Roland was the PMA-5 Personal Music Assistant, a pocket-sized unit with sampled instrument sounds, digital reverb and chorus, 8-track sequencer and 100 preset styles — basically a music bed in a box.

One of the more popular DAWs is Orban's DSE 7000, which premiered some long-awaited hardware and software upgrades. Today's DSE ships with a 24-bit internal DSP board and version 6.0 software, including Orban parametric equalization, Optimod compression and Lexicon reverberation. Eight different digital effects modules — 16 additional with the optional daughterboard — may be inserted at any of 12 patch points in the DSE. Factory presets are designed with the broadcaster in mind: standard production EQs (telephone sound, for example) are included. Parameters are all adjustable and storable. Time-Fit will expand or compress audio up to 25% without pitch shift. The new software is automatically distributed to all prior DSE users; the new hardware is available as a retrofit.

Orban also announced that the DSE 7000 is fully compatible with the ENCO DAD system through a combination of software and a network card. A network adapter card is added to the DSE 7000, which makes it appear to the LAN as another DAD workstation.

Doremi Labs DAWN workstation version 4 is entirely new from hardware to software. The processor board is six times faster than the previous version and was designed to work in integrated media applications, nonlinear video, sound design, sampling and MIDI. Video post applications dominate the feature list, with CMX and Sony EDLs supported. DAWN workstations network over standard Ethernet, FDDI and others.

ACTION CARD 203

Software news

Avid Technology has addressed the new generation of Power Macintosh computers through its subsidiary, DigiDesign. It's the first DAW manufacturer to provide professional-quality recording, editing and mixing systems for the new series of Peripheral Component Interconnect (PCI) Macintosh computers. The company's ProTools III, ProTools Project and ProTools AudioMedia software family all run on the new systems. Owners of existing NuBus-based systems who wish to upgrade will be happy to learn of the company's exchange program.

DigiDesign also announced Audiomedia III, aimed at entry-level customers. Available in PC and PCI versions, the sound card offers 18-bit

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converters and 24-bit DSP based on the Motorola 56002 processor. Moving up a notch, DigiDesign's Session v2.5 software provides two to four tracks of hard-disk recording and eight tracks of simultaneous playback for the Windows platform. Eight bands of assignable, real-time parametric EQ, on-screen mixing, digital bouncing, user-definable cross-fades and synchronization with digital video are some features. For PCI users, ProTools v3.21 software ensures complete session compatibility as work is moved between various ProTools environments.

To help work your own ProTools v3.21 magic, ProControl from DigiDesign adds a tactile mixing surface to ProTools III systems. This new modular control surface features motorized moving faders, touch-screen LCDs and dedicated edit controls. The Main Unit can control up to four Fader Paks for a total of 32 faders. The Main Unit also operates control room, headphone and talkback levels. (Yet another interface is already under development: DigiDesign and Mackie Designs announced an agreement to create a low-cost hardware control surface for ProTools.)

ACTION CARD 204

Hard-disk audio recorders

The flock of videotape-based modular digital multitrack audio recorders has gotten some new competition from nonlinear, hard-disk systems.

360 Systems has added another hard-disk recorder to its product line, this one designed to allow fast, simple editing. The Shortcut is a 2-track recorder that can cut, paste, insert and scrub audio for phoners, interviews, news clips and promos, using dedicated controls and an LCD screen. Finished clips can be loaded to "hot keys" for instant playback to air. It even has built-in speakers and is small enough to be portable. Multiple users can each have separate, password-protected directories.

TimeLine's MMR-8 features 24-bit resolution, an unlimited number of recording tracks and will plug-and-play either magneto-optical (MO) or hard disks. It is compatible with TimeLine's PC-based Studioframe workstation (and any other OMF-compatible workstation) and boasts a built-in multimachine synchronizer, plus the ability to send and receive all types of sync and transport controls. It also features four biphase inputs and biphase master generator, time-code chase synchronizer, Lynx control and video, word clock and other digital audio references.

Akai introduced its DD8, a random-access recorder designed to record and play 2.6GB MO disks or removable hard disks and work directly with the DD1500 MO recorder/editor. Extensive I/O options include 8-channel balanced analog, TDIF, AES/EBU or optical ADAT. A meter bridge, VGA interface and a second SCSI port for PC or Mac are options. The company has also added to its DR family, introducing the DR8 and DR16 — multitrack hard-disk recorders with eight or 16 tracks. They are also able to address external drives for even more storage. Another introduction was the DL16 remote controller for the DR line.

The Fostex D-80 records onto a removable 3.5-inch 850MB IDE hard disk resulting in 18 minutes of uncompressed track time (16-bit, 44.1kHz). An optional plug-in 1.3GB drive raises that to 30 minutes. A program change function allows the hard drive to be divided into five independently recordable segments. Copy/move functions are allowed across different tracks and the D-80 can be cascaded to other D-80s (or the previously released DMT-8 hard-disk recorder/mixer) for up to 24-track recording.

ACTION CARD 205

MICROPHONES AND MIXERS

By Terry Skelton

Terry Skelton is an audio consultant and trainer based in Bucks County, PA.

This year saw the introduction of several microphones and many new wireless products, along with a number of mixing console innovations. Many of these items are particularly applicable for field operations.

Microphones

Following the January announcement that Audio-Technica (AT) had been selected to provide more than 800 microphones for the Atlanta Olympics, the company showed several new wired and wireless products at the NAB. The AT4041 cardioid condenser is an addition to the 40 series of high-quality microphones. AT's miniature hand-held hardwire hypercardioid condenser, the AT873R, also showed up in a new 1200 series diversity VHF wireless system. Omni, cardioid or subcardioid pattern capsules are also available for the mic. AT also showed the AT8446, a round, plastic-framed, double-layer nylon-mesh pop filter that bolts onto the shock mounts used for the AT4050 and AT4033 large-diaphragm condensers. NAB 96 also was the first appearance of AT's premier wireless 16-channel diversity UHF system, the ATW-7174.

Carl Countryman showed his new and small omni lavaliere from the "Broadway Series," the B3. Specially designed to withstand moisture and makeup, this mic is only 4.6mm in diameter and comes in black, white, light skin, cocoa and gray. The mics, which were displayed in a matchbox to emphasize their size, include a removable, cleanable screen, a Kevlar cable and a 10Hz to 25kHz frequency response.

Azden introduced its WDR-PRO portable VHF diversity receiver (for use with its PRO wireless mics) intended for on-camera mounting. This 2-frequency unit is available at an attractive price point.

Crown has been shipping its CM-700 condenser, designed for recording and sound reinforcement. This cardioid, phantom-powered black beauty will handle up to 151dB-SPL.

The unique look of the Stedman N90 studio dynamic mic is also available in the SC3 studio condenser version. Offering a published frequency response of 25Hz to 20kHz and a noise level of 13dB, this mic also includes a 2-position attenuator and three choices of response curves. The mics are being handled by LPB.

The Neumann U47 microphone was a legend, and after years of requests from customers, Neumann is offering the M149 large-diaphragm, tube-powered mic to fill that demand. Using the U47 capsule and a new tube, the company has created a sound it feels is similar to

the original. In the process, the company also made the world's first transformerless tube mic. The M149 has nine polar patterns and a 9-position high-pass filter.

Electro-Voice (EV) introduced three mics, including the CO2 mini-lavalier, designed to be painted any color with acrylic lacquers. EV also showed the RE1000 "true" condenser studio supercardioid with transformerless output and a low noise level of 14dB. This mic looks somewhat like the company's top-of-the-line RE2000 and is intended to provide many of the 2000's strengths at a lower price. Also new is the RE200, an externally biased cardioid condenser intended for home/project studios and instrument use in tight spaces. EV also displayed its classic 635A with a new long handle called the 635L for interview situations. The unit is available in fawn, beige or black.

Lectrosonics debuted several wireless products, including the UDR200B, a UHF 256-selectable-channel diversity receiver with a tracking front end. An AutoSearch feature automatically scans the local RF spectrum, detecting and displaying RF signals in the vicinity. A proprietary dual-band compandor system is used to reduce noise. The unit includes an RS-232 serial port to communicate with "LecNet" software for computerized operation. The new UCR195D is a small, camera-mount-style crystal-controlled UHF receiver using an antenna phase diversity operation. It's compatible with all 195 series transmitters. The company also introduced the QUAD 195 portable multicou-

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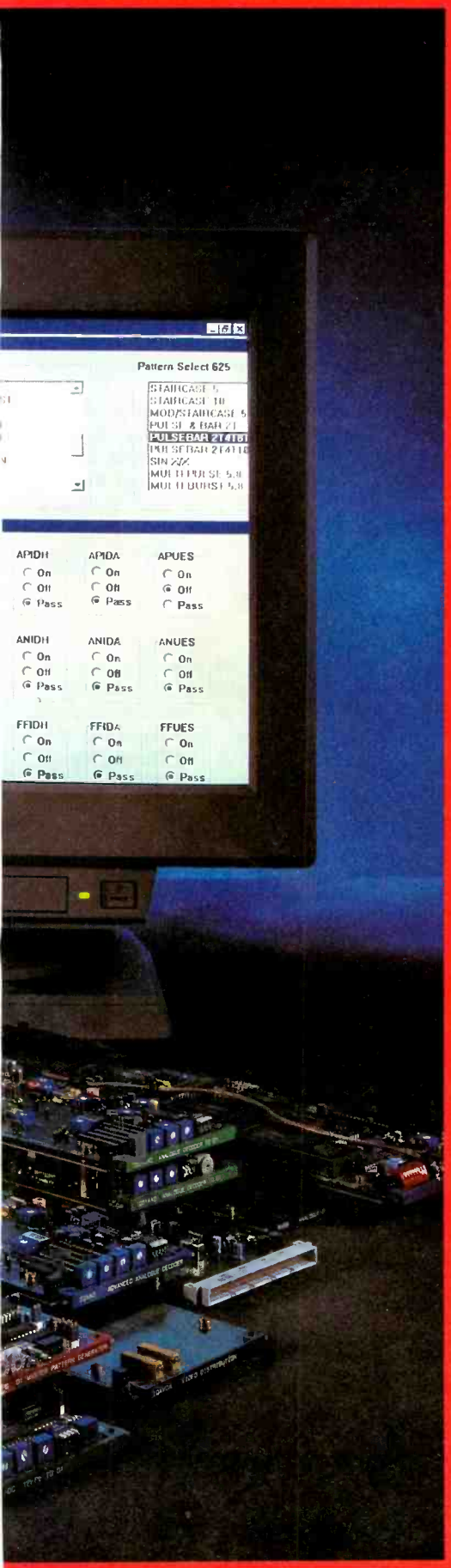

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pler and power supply in a machined aluminum housing.

Vega introduced the U2020, a UHF half-rack diversity wireless system that is frequency agile through 100 channels. Up to 22 systems can be operated simultaneously and their dual-mode squelch eliminates receiver squelch breaks when the transmitter is off. New hand-held transmitters and bodypacks are available, which have programmable multiposition input level controls rather than pots. A companion MC2020 multicoupler will feed four of these receivers and provide power. Vega also showed the R-672 receiver, designed to replace the R-662B. It is frequency-programmable via RS-232 with a tunable helical resonator that allows narrowing of the front end to minimize interference.

Also making an NAB debut was a UHF ENG wireless system from Telex based on a small rectangular transmitter, the UT-500, that plugs into the base of a dynamic or electret microphone and runs on a 9V battery. The ENG-500 receiver has all the controls on one side for the camera operator's convenience and is a true diversity receiver.

Shure Brothers' Beta microphone line has been expanded and enhanced. The Beta 52 and the Beta 56 have been added, and the Beta 57A and 58A have had their frequency responses improved (along with some mounting improvements and a new hardened grill on the 57A). The Beta line totals five microphones, including the Beta 87 condenser. Shure also introduced its new UHF diversity wireless mic system, available as either a single or double receiver in one rack space. The system is frequency agile through 191 frequencies. Two alkaline AA batteries provide 12 hours of transmitter operation, and battery fuel gauges appear on the transmitter and the receiver.

Sennheiser introduced "the world's smallest" cardioid lavalier mic, the MKE104, which is interchangeable with the MKE102 omni on various cables and clips. The MKE104 is highly immune to moisture and perspiration and the frequency response has been optimized for voice with a rise at 8kHz. Also shown were the HMD25, a lightweight combination headset with a supercardioid dynamic mic, and the NB2, a clever, plastic-covered wire headband for all of the company's small lavalier mics. It's available in flesh tone or black and is reversible. In new wireless systems, Sennheiser offered an entry-level UHF system, the SET 1081-U (hand-held) and SET 1083-U (lavalier), with 16 switchable frequencies in a diversity receiver. Another new diversity UHF receiver is the EM2004, which is tunable up to 24MHz. This allows it to be used anywhere in the world.

The new Sennheiser diversity receiver provides high-quality reception for wireless applications over 16 preprogrammed channels.

Sony's new UHF wireless receiver, the WRR-850A, displays a low-transmitter battery warning on the receiver's face. Two receivers come in a 1RU box, including tone squelch and headphone jack. Simultaneous operation on 42 frequencies is possible with the WD-880A antenna divider. The WRT-850A bodypack transmitter is one-third smaller than its predecessor and offers 20mW of output power across any of 94 channels. Sony's UHF WRT-867A operates on only one AA battery, has hidden channel selection and is one of the smallest hand-helds on the market.

Beyerdynamic had new hand-held transmitters to go with the NE 600 UHF diversity wireless receiver. The S 600 can operate on any of 16 frequencies, and an LCD panel in the transmitter shows battery status and frequency. Various dynamic and condenser heads are available. The SEM 600, on the other hand, has a fixed capsule and no LCD display, but equal RF performance.

Beyerdynamic has added computer interfaces to the NE 600 and the NE 700 wireless systems to allow viewing and selection of frequencies, muting and battery status. In addition, a one-minute "walk test" can be performed, stored and compared with other tests with antennas in different locations. A low-profile series of announcer headset/mic combinations, such as the DT 250 are now available, with a choice of omni electret or supercardioid dynamic boom mics. Also shown was the MCE 84 electret condenser cardioid mic. While primarily designed for miking strings and drum overheads, it also works well as a stand-up announce mic when used with an external windscreen. The MCE 84 will run off of phantom power or internal AA battery to allow for easy field or home studio use. The company also introduced two moderately priced microphone fishpoles, the MZA 717, 5.5 foot, and MZA 718, 10 foot, made of lightweight aluminum with felt-covered handles.

Ramsa brought the System 400 Broadcast Wireless Microphone line, offering diversity reception and 49 preprogrammed channels. The WX-TP458 cardioid wireless dynamic comes with a Shure SM58 and runs off of one AA battery. There are multichannel receivers, an antenna distribution system and cable-powered, pre-amplified remote antennas. The System 400 is cross-compatible with Ramsa's other UHF wireless and ENG systems.

The high tech "plastic" parabolic microphone reflector from Connectronics called "Big Ears" now has a son (or is it daughter?) called "Little Ears" that is only 14 inches wide. The Kevlar/Buterate/Acrylic combination that can be clearly seen through by the operator comes with padded vinyl grip bar and mounting plates for wireless-transmitter mounting.

Posthorn Recordings displayed the AEA Winkie-Blinkie, a portable, battery-powered LED stereoscope, along with the substantial AEA stereo microphone mounting bars. Posthorn also introduced Schoeps windscreens for its M-S and Blumlein mic pairs. Also new were the Schoeps MK4V side-firing condenser cardioid capsule and the CCM-U compact cardioid.

ACTION CARD 206

Mixers

Sony was showing its new Oxford digital audio console for recording studio and live broadcast use, expected to see its first U.S. delivery in July. The console can provide upward of 120 inputs in a limited amount of space with its "select to faders" operation. The EQ sections offer five bands of fully parametric, storable EQ that can be displayed on a graphic screen. Sony also presented an updated version of its MXP-700 broadcast console.

Logitek introduced Serial Sound, a 32-bit digital on-air console. It includes rate conversion on digital inputs, 20-bit conversion, assignable channels and 16-character LCD displays for identifying each input and monitor channel.

Auditronics debuted NuStar, a fully modular digital mixer for on-air use. The 22 universal positions on its control surface mainframe allow any module to be placed anywhere. The control surface frame is connected to a rack-mounted DSP frame and numerous standard and optional modules are available for both frames. Sample-rate conversion is standard on the console's digital inputs and optional on its digital outputs.

Henry Engineering featured a new product, the StereoMixer, which is an 8-channel utility audio mixer (it can also operate as four stereo channels), packaged in the familiar Henry "form factor."

Mark IV Pro Audio Group showed the DDA CS3 left-center-right (LCR) mixing console. Inputs may be panned through the left, center and right outputs — a big help for multichannel encoding.

Shure has improved its portable stereo field mixer, now the FP33, by adding high-precision input pots, internal headphone level adjustments for external program and seamless switching to battery backup. Price has been kept the same as the FP32A.

HHB showed an audio design digital mixer, the DMM-1, which mixes two stereo digital inputs to a stereo output. It incorporates on-board sample-rate converters, digital delay to help correct for video lip-sync problems, consumer or professional formats, aux sends, polarity reversal and high-resolution stereo LED meter, among other features. The device is only 11"x10.4"x3.4."

Lectrosonics displayed its microprocessor-controlled adaptive algo-

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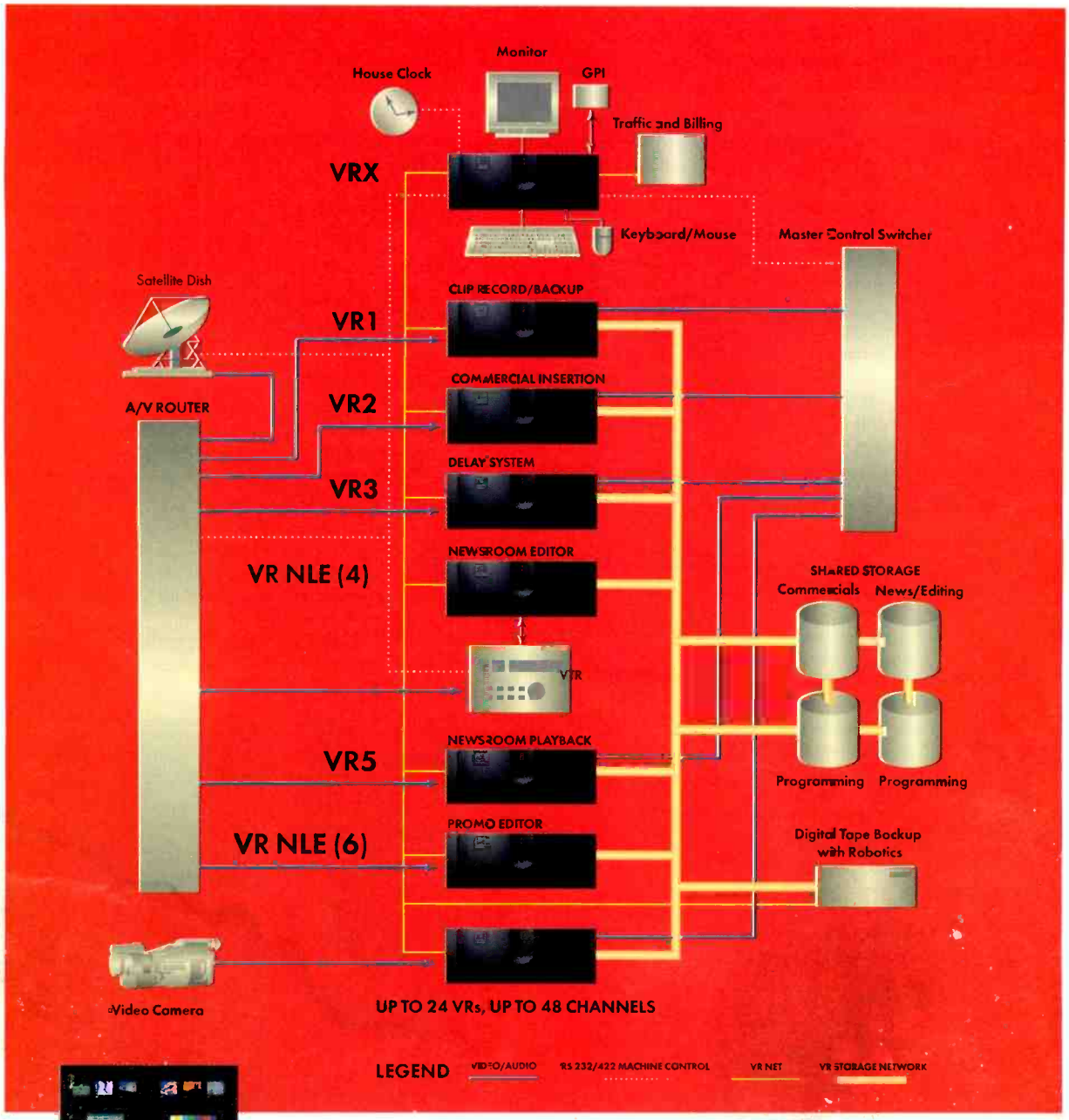

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rithm AM8 automatic microphone mixer, plus the MM8 matrix mixer, the TH2 digital telephone hybrid and the PA8, an 8-channel 1RU power amplifier that might be just the thing for all of those producers' monitors in the control room.

Tascam showed its new 1600 series 8-bus mixers, available in 16- and 24-channel configurations, with a full set of features, including direct and group outputs on each channel and eight XLR mic inputs. Twenty-five-pin D-subconnectors allow easy connection to tape machines. The series is intended to have an entry-level price. Tascam also had an 8-input stand-alone microphone mixer, the MA-8, designed to support its DA-88 digital audio recorder or for expanding the number of mic inputs on another console.

Ward-Beck introduced a line of audio problem-solvers called PODS with seven half-rack boxes designed to answer audio needs from headphone amplifiers to stereo peak/vu level indicators. The company also showed its Renaissance audio mixer for television. Available with mono input modules with mic pre-amps and stereo line input modules, the console incorporates VCA faders on each module and eight VCA submaster output channels with assignment to stereo master output channels.

For those who need to combine up to eight line-level sources into a stereo or mono mix, Henry Engineering offers its StereoMixer. A level control for each input provides adjustment from up to +10dB of gain and there is even a separate mono output that is a sum of left and right.

Intended for mid-market TV stations, Wheatstone's SP-8 incorporates many of the features of its higher-end consoles. The console includes four mix-minus buses, two mute masters, full EQ and eight submasters. All indicators on the board are LEDs. Wheatstone also had its new digital radio console, the D-500, which looks and acts like a high-end analog broadcast board, but accommodates analog or digital inputs and outputs. It includes on-board telephone processing, separate mix buses for speech and music to allow different processing and machine-sequencing functions.

Alongside its many ISDN codecs, Comrex displayed its Codec Buddy mixer. It includes a 4-channel mixer, four headphone outputs, a PA feed, a POTS telephone interface, DTMF dial pad and a POTS-line frequency extender.

Mackie introduced its version of the 1604, the CR1604-VLZ, and kept the price close to the original. Now you get four submaster buses, 16 mic pre-amps, a swept mid-frequency EQ and longer faders. The MS1402VLZ and MS1202-VLZ are also updates, which include the VLZ (very low impedance) circuitry, which reportedly helps keep noise and crosstalk down. Ultramix Universal Automation has been added to Mackie's line of audio consoles, although it will work on just about anything that has insert points. The new SR40-8 console is designed for sound reinforcement with a nod toward broadcasting functions like sports remotes. Among its features are 40 mono inputs, four stereo returns, eight submasters, full mute automation, an 11x4 matrix and an optional redundant power supply.

A couple of tiny but tough metal boxes from JK Audio might solve some of your audio mixing and interfacing problems. The RemoteMix C+ is a portable 3-input mixer with built-in DTMF dial pad and hybrid that runs a claimed 36 hours on two 9V batteries. The QuickTap plugs in-between a telephone handset and instrument and provides a solid audio output connection. The Pureformer is a 2-channel isolation transformer with RCA jacks used to cure ground loops and DC paths that cause audio problems, especially with computer sound cards.

The model 750 audio mixer from Studio Technologies Inc. is an extremely flexible and well-equipped rack-mount remote mixer. This stereo 2RU device seems to have every feature ever dreamed of by an engineer, including a digital ID recorder that can trigger a set of spot frequency tones, an AFL bus, dual analog meters illuminated by rows of white LEDs and three isolated line-level stereo outputs.

"Real iron for the real world" is Frank Miller's motto at Sescom and he has just brought out the 3.5"x1.5"x5" Mini-Mix with real input transformers, designed to mount underneath small camcorders. Special input circuitry reportedly cancels transformer distortion at low frequencies and the battery-operated 2-input unit has an aluminum case, phantom power and a headphone amp.

The Axiom digital console and production system from Solid State Logic has added several features. Center channel control allows the engineer to move any channel on the board to the center section for easy adjustment. The console can now have bilevel control capability for each channel strip, allowing the possibility to control more mix channels from a smaller control surface. Remote mic pre-amps can now be completely controllable from the console and they include limiting to protect against clipping the A/D converter.

Graham-Patten Systems (GPS) premiered the D/ESAM 200, the latest addition to the GPS family of edit suite mixers. It includes full 4-channel, 24-bit digital processing and integral sample-rate converters with a standard 8x4 configuration. Digital and analog outputs are included. Additional inputs are available via plug-in modules to provide a total of 16 digital and/or analog input channels. (For more information, see *BE* Pick Hits, p. 30.) The company also announced a development program with Play, Inc. GPS has designed a multichannel audio subsystem for Play's Trinity Video Production Studio.

ACTION CARD 207

AUDIO PROCESSING AND RECORDING

By Christopher H. Scherer, CBRE

Chriss Scherer is chief engineer of WMMS-FM/WHK-AM, Cleveland.

Audio processing developments at NAB 96 ran the gamut from tubes to DSP, while advances in removable-media recording seemed to favor optical technologies.

Studio audio processing

Aphex continues to implement its new tube technology called Tubessence with the introduction of the 109 Equalizer and the 661 Expressor. The 109 is a 2-channel, 2-band or 1-channel, 4-band equalizer and the 661 is a compressor/limiter that can be operated in manual (Expressor) or automatic (Easyrider) mode. The 108 Automatic Compressor was also shown. It is a solid-state unit that uses the same Easyrider circuit found in the 661.

Dolby Labs presented the DP503, a format converter that can handle analog, AC-2, AC-3 and MPEG Layer II. The DP561A is an AC-3 encoder capable of converting up to three stereo inputs simultaneously.

Eventide has added a new member to the Ultra-Harmonizer family with the DSP4000B multi-effects processor. A variety of presets and

effect storage locations allow extreme flexibility.

Lexicon announced the inclusion of its reverb circuitry in the Orban DSE7000 workstation platform. The company also released the PCM90 digital reverb and several upgrades for the PCM80 multi-effects processor, including pitch shift and a series of new effects.

Pixel Instruments had several new items. The AD3000 audio delay/synchronizer is designed for lip-sync correction up to 2.04 seconds and can accommodate delay changes with its built-in pitch corrector. The FD2900 is a high-quality, 20-bit delay up to 2.04 seconds. The FD1900 is a lower-cost unit, allowing up to 5.46 seconds of delay. The AD3100 digital audio processor does many of these functions and

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more, including time expansion and compression. The TC3100 digital audio transcoder and rate converter can convert analog, AES/EBU, SMPTE and S/PDIF inputs and outputs.

Roland had the SN-700 noise/hum eliminator, a stereo noise eliminator designed to identify, analyze, isolate and remove specific frequencies and noise. Also shown was the BOSS VT-1 voice transformer, an inexpensive, yet remarkably powerful, device for altering and effecting the human voice.

Superscope displayed the IS5022 and IS5021 A/D-D/A processors. Both of the units have 20-bit performance and analog and S/PDIF inputs and outputs; the IS5022 also has AES/EBU ins and outs. They include sample-rate conversion, jitter removal, varispeed, digital level indication and control, plus a variety of audio processes, such as de-noising, de-clicking, stereo image adjustment, compression/expansion and tonal adjustments.

Symetrix has made a small change to the 421 processor, now calling it the 421m. The AGC/leveler now has a built-in mic pre-amp. New to the line is the 422, a stereo version of the original 421, as well as the 620 A/D converter, capable of 20-bit performance.

ACTION CARD 208

Audio recorders and players (removable media)

DENON is continuing its support of the MiniDisc format with two new entries. The D-045R is a MiniDisc duplicator that copies audio cuts on a one-to-one basis up to 3.5 times faster than real time. It includes Windows software. The DN-1100R is a MiniDisc recorder that features 10 hot start buttons for instant access to any 10 cuts on a disc. Also shown was the DN-1400F and DRD-1400, both 200-disc CD jukeboxes for audio CDs and CD-ROMs, respectively.

Fidelipac continues its support of the DYNAMAX DCR1000 and

now offers two drive options: the already popular triple density (13MB) floppy and now a 230MB MO drive to allow up to almost two hours of stereo FM-quality audio.

Fostex showed its CX-8, an ADAT-compatible modular digital multitrack, along with the company's wide range of DAT recorders.

Nagra is shipping the ARES-C digital solid-state field recorder. This recorder has the similar size of the analog Nagra machines, but records on PCMCIA memory cards. It also can perform basic editing and can connect directly to an ISDN line for transmission.

Panasonic has added the SV-3800 DAT recorder to its line. It is based on the SV-3700, but adds some improvements. These include higher-quality converters, plus improved interfacing and cuing capabilities. The company also presented the MDA-1, an ADAT-format modular digital multitrack machine with XLR and RCA I/O on the back panel. It also features high-quality converters and many useful operational features.

Pioneer unveiled the CAC-V5000, a 500-disc, dual transport CD jukebox controllable through RS-422. Also shown was the CDJ500II DJ CD player and the PDR-99 CD recorder.

If you could get through the crowds at the Sony stand, you'd have seen the MZ-B3 portable MiniDisc recorder/player, which is about the size of a Walkman cassette deck. The CDP-L3 CD player is a consumer-style unit, but it includes balanced inputs and outputs.

Studer was also busy with several new items. The D741 is a second-generation CD recorder. The company also showed the D424-2 MO recorder.

Tascam has continued its additions to the digital recorder line with the MD801-P and MD-801R MiniDisc player and recorder. The DA-60 MkII DAT has time-code capabilities, while the DA-20 DAT offers many features at an economical price. The Portastudio line adds the 564, a digital mixer/recorder allowing 4-track recording on a MiniDisc. It employs the MD data format, providing 37 minutes of 4-track recording per disc. The 302 is a dual cassette deck with auto-reverse that features independent or simultaneous operation of the two decks and a host of other handy features.

Taber demonstrated the new PhaseCor model 8000 audio processor, which corrects phase distortion in analog audio recorders (including the analog audio tracks on VCR's). The unit operates on playback, so it can correct previously recorded tapes. The 8000 is an 8-channel unit, but the processor is also available in 2-, 4-, 16- and 24-channel versions. Taber also showed its new ME-II bulk eraser for Beta-SP and M-II tapes.

ACTION CARD 209

Audio storage media

Professional Label demonstrated its media-labeling software for Windows. Many templates are included for a variety of different styles.

Quantegy, manufacturer of Ampex tape products, has added a DTRS format (Hi-8 modular digital multitrack) cassette, the DA8, available in three lengths of 30, 60 and 113 minutes. They are also offering the CDR, a recordable CD for audio and ROM applications, available in 63- and 74-minutes varieties.

Sony has added to its already extensive line of recording media with the DARS-116 metal-evaporated tape for the DTRS format.

Storeel presented its space-saving storage designs for all kinds of recording and playback media, which are constantly being updated to accept the latest removable-media technologies.

ACTION CARD 210

AUDIO BACKHAUL, PROGRAM DISTRIBUTION SERVICES, MONITORING AND ACCESSORIES

By Kevin McNamara

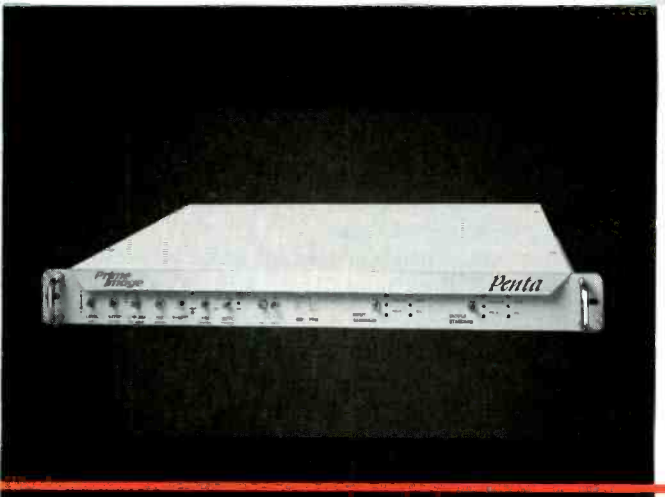
Kevin McNamara is president of Exegesis Technologies, a developer of applications for computer/telephone integration and computer-based mapping in New Market, MD.

If your station does frequent remote broadcasts, the cost of using one of the available codec/terminal packages on a single ISDN line for audio backhauling may be cheaper (in some regions) than using an analog frequency-extender unit on multiple "Plain Old Telephone Service" (POTS) lines. There is no lack of choices in this category.

The Comrex NEXUS ISDN audio codec is a small package that incorporates a bidirectional G.722 codec, a BONDING-equipped terminal adapter (TA) and an NT-1. It accepts mic or line-level inputs, and a mixer is provided to balance the send and return signals for monitoring at the remote site. Setup and dialing is accomplished with a front-panel keypad and backlit LCD display. A 10-number auto-dial feature is included. The unit will provide 7.5kHz audio at 56kb/s or 64kb/s and 15kHz audio (using Comrex's unique Turbo G.722 algorithm) at 112kb/s or 128kb/s.

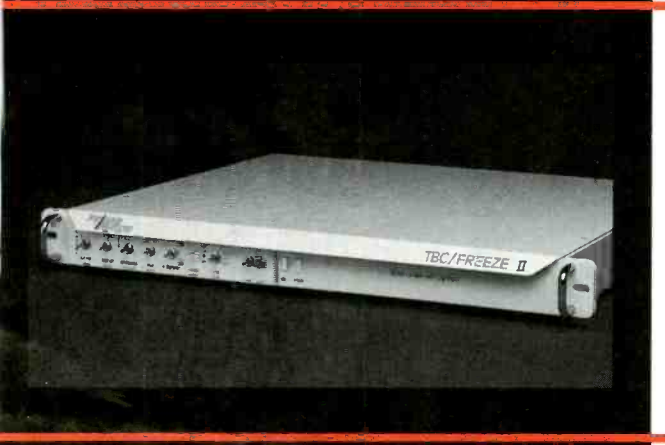
Intraplex is shipping its model 4464, a small, lightweight package that includes bidirectional MPEG-1 audio Layer 2 or G.722 coding, an ISDN TA with BONDING and S/T or U interface. It can be operated as mono or stereo, with setup accomplished through a modem, local PC or optional hand-held terminal. Setup parameters are stored in flash memory. The unit will store up to 10 configurations that can be accessed through a one-touch call setup. Auxiliary RS-232 data at rates up to 9,600b/s can be carried along with audio. The company has recently reduced the price of the 4464, making it even more attractive to broadcast users. Intraplex also introduced AES/EBU audio interfaces for its T1 and E1 audio multiplexers.

Telos introduced the ZephyrExpress, which takes the features of the



Penta

A/V Delay



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Circle (75) on Action Card

company's rack-mount Zephyr codec/TA and combines them with a mixer and audio limiter into a rugged field package. The unit boasts compatibility with MPEG audio Layers 2 and 3 plus G.722 coding. It can deliver up to 20kHz stereo using Layer 3 (in joint stereo mode). If compatibility or delay is a problem, the unit will provide dual 7kHz channels using G.722.

QEI has revised its earlier 902MHz-928MHz unlicensed spread-spectrum Quick-Link system and introduced Quick-Link II. This time, it's using the 2,400MHz-2,485MHz band (still no license required) for its direct-sequence spread-spectrum transmission of uncompressed digital stereo audio. The system consists of two terminals, an optional antenna and optional PC control software. A well-written manual accompanies the system.

Pacific Bell was highlighting its new business unit formed to provide high-quality, high-speed voice, data and video services for the entertainment industry in California. The division will market the FasTrak Video Services and FasTrak Data Services products. The interconnection technology allows production facilities and stations to exchange in real time video and collaborate on projects from different locations.

Cycle Sat and Pacific Bell announced a business alliance just before the show. Cycle Sat will make its fiber-based digital video circuits in New York and Burbank available to its local video loops to which Pacific Bell customers may connect. The system makes it easy to obtain high-quality video circuits from Burbank to New York. Also announced was Cycle Sat's agreement with General Instrument Corporation to provide MPEG-2 encoding/decoding equipment allowing the network full satellite delivered signal capability.

A.F. Associates was showing off photos of several of its new facility designs. AlphaStar, a complete digital direct-to-home satellite facility, is in the final stages of completion. The facility will provide 147 channels of compressed, digital signals to home viewers. A.F. Associates is also working on a newsroom for WNBC-TV, and a fully digital control room for ABC. The company received a lot of interest by building the FoxTrax, an electronic system that electronically highlights hockey pucks with graphics effects. The system is housed in a new Fox truck nicknamed the "Puck Truck."

ACTION CARD 211

POTS hardware

In the "how many bits can we push through a POTS line" department, there are several offerings of remote broadcast solutions that use standard analog dial-up lines. These products each include an audio mixer, a low bit-rate codec and a V.34 modem. They can produce between 5kHz and 8kHz of bidirectional audio, depending on the actual data rate of the modem connection. While a 28.8kb/s connection is optimal, some will operate satisfactorily at data rates as low as 14.4kb/s, at the expense of frequency response and/or increasing delays.

The FieldFone from Musicam USA (formerly CCS Audio Products), introduced last year, can provide 6.5kHz of audio in both directions using an enhanced version of the MUSICAM compression algorithm. New features incorporated into the FieldFone since its introduction allow it to work with connection rates as low as 14.4kb/s. Another new device from the company is the StudioFone, a rack-mount mate to the FieldFone for the studio end of the backhaul path.

Marti Electronics unveiled the SMARTI codec, also intended for POTS-line usage. It can operate in one of three modes: 7.5kHz audio, reduced frequency response with reduced delay and as a standard analog POTS hybrid. It provides a 4-input mixer (each mic/line switchable), a 10-number memory, plus two relay closures for remote device control. A handy LCD uptimer is included to assist the remote operator or talent in timing breaks and feeds.

The Scoop Reporter from AETA (marketed by Harris Broadcast) can provide up to 8.4kHz of audio with a 28.8kb/s connection, although the company claims a more conservative estimate of 7kHz based on a more typical connection rate of 24kb/s (especially for long-distance calls). Dialing is accomplished through a front-panel-mounted keypad or from a 4-number memory. Last-number redial is also provided. The unit accepts two mic and one line input and provides output to headphones and a line feed. It employs a special algorithm optimized for speech called Code-Excited Linear Prediction (CELP) that offers low delay and few artifacts at these very low bit rates.

Going mobile or need a simple solution for remote broadcasts or remote newsgathering? The Cellcast RBS400 integrates a 4-channel audio mixer, frequency extender and a 3W cellular transceiver into a neat package. The unit can provide a frequency response of 300Hz to 3kHz or 50Hz to 2,750Hz with frequency extension from a cellular or landline connection.

Gentner has enhanced its line of telephone interfaces. The TeleHybrid is capable of creating its own mix-minus and the TS612 is able to connect to additional units for greater line access.

ACTION CARD 212

Audio monitoring and accessories

Wohler Technologies is offering a versatile choice of options for its AMP series of powered rack-mount stereo monitors, which allow monitoring of digital audio in various formats including AES/EBU. The SADE-2 will monitor embedded digital audio in the serial digital video signal and the SADE-3 also derives AES/EBU outputs from the embedded audio source. The DIGI-2 digital input module provides D/A conversion and source selection switching for two AES/EBU digital signals. The company also debuted a line of audio alarms that can alert operators to such conditions as audio loss or inverted polarity. Up to 64 alarms may be fitted into a single rack unit.

Avitel presented its AMU range of audio monitoring devices in the Tektronix half-rack form factor and in standard 19-inch rack-mount (2RU) design. They accept multiple analog audio, AES digital audio or serial digital video with embedded audio signals, with front-panel selection among inputs. Bar graph or analog metering is offered, with the latter available in either VU or PPM style. They include power amplifiers with volume control for external stereo speakers, headphone jack plus AES error and phase error indicators. (A separate 3RU rack-mount stereo loudspeaker unit is offered separately.) The monitors provide reclocked serial digital video and analog line-level outputs, as well. Also available is a version with stereo analog audio inputs only and a mono analog unit with built-in loudspeaker.

Genelec presented its extensive line of high-quality, active monitor speakers, adding two new models. The 1037B is a 3-way, triamplified monitor designed for "mid-field" use. The 1039A is a large, triamplified control room system (pair), designed for soffit-mounting. It features dual 15-inch LF drivers (powered by 800W/channel), a 5-inch mid-range driver (320W/ch) and a 1-inch HF driver (120W/ch).

LPB announced that it will distribute the Australia-based Hayes line of near-field monitor speakers. They feature a unique fractal spatial system that provides stable stereo imaging at a price that is affordable for the typical radio station.

Logitek also had its complete line of audio metering and monitoring equipment on hand.

Studer presented an upgrade for the D827-MCH DASH recorders with a new 20-bit A/D converter. Its D19 series of pre-amps includes the MicValve, a tube mic pre-amp with two channels that has a variety of controls for affecting the sound of the pre-amp and the MicAD, which has eight solid-state inputs. Both have 20-bit A/D converters.

Also in the area of A/D converters, Apogee Electronics offered enhancements to its AD-1000, including the ability to apply its UV-22 encoding technique for presenting 20-bit signals to modular digital multitracks.

Benchmark Media Systems showed its new, high-quality A/D converter, the AD2004. It provides four channels of 20-bit conversion with

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DRASTIC VVCR

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metering in a one-third rack-unit space. The AD2004 has very low THD+N and ultralow jitter.

Beck Associates displayed a line of 1RU solutions for audio. These include a stereo tone generator called the LM STG, the SPK-2-powered stereo monitor with selectable listening modes (stereo, L, R, L&R, L-R) and the VU-2P VU and peak-reading meter that gives audio level and phase indications.

If you have a master clock system, ESE has introduced a "self-setting" analog clock. It can use SMPTE/EBU, ASCII or ESE time-code inputs.

K&H Products showed its range of soft cases for portable video and audio equipment, including the PortaBrace line. New products included shoulder cases, DYC 637 with DVV-3 and DVW 700.

Ergo Industries introduced the EICKS-1, a rack-mounted sliding shelf for a full-size computer keyboard. It includes a slide-out mouse/trackball-pad (adjustable to left- or right-handed operation) and a padded wrist rest. Its front door conceals the keyboard when the drawer is closed. Designed for quick installation, the unit takes up 3RU.

Nigel B Furniture presented a variety of racks and workstation configurations for broadcast and post-production facilities, in fixed and mobile applications. A number of unique, customizable elements are included among the company's wares for mounting everything from mics and cameras to mixing consoles and monitors.

The job of visualizing rack layouts has been made easier with the introduction of Winsted's WELS 2 (Winsted Equipment Layout Software) and Zero/Stantron's CAB CAD design software. Both of these products provide excellent layout and design capabilities using libraries of their respective product lines. They will also produce a detailed bill of materials "on-the-fly" for the items selected.

On a bit broader scale, VidCAD Documentation Programs debuted its VidCAD version 7.0, a communications system design and documentation program for contractors and engineers. Based on AutoCAD R13, the speedy software is linked to more than 20 engineering databases with specs for more than 10,000 audio, video, fire/security and telecom equipment devices and furnishings. It also tracks the project from planning through installation and maintenance.

ACTION CARD 213

VIDEO BACKHAUL

By Peter Zawistowski

Peter Zawistowski is senior engineer for Target Enterprises, North Reading, MA.

In today's world, it seems that there is no end to the number of feeds that must find their way back to the station. Luckily, in many ways, it has never been easier to move signals from point A to point B. Whether the distance is a few blocks or halfway around the world, plenty of products were on display at NAB 96 to help you with whatever backhaul problem comes up.

Television Engineering Corporation displayed the latest design features in an ENG-size van. The TEC-19 MICRO-SAT is a fully equipped ENG van with 2GHz transmit and 13GHz receive microwave system, as well as an analog and digital satellite uplink system. The uplink, complete with an installed Advent 1.2 meter antenna, STS Progeny analog/digital exciter and 300W HPA, is the approach CBS and WJZ are using to uplink from ENG trucks. Most TEC series 19 ENG vans can be retrofitted with satellite capabilities. Other options available are the Eagle Eye controller for the mast camera. This controller can be remote controlled via cell, 2-way radio to telephone. The TEC IFB-19A IFB controller is available with a SatCell interface. TEC also showed the TEC-16, a mini-van with a 30-foot mast, 5kW generator and one rack for those needing a smaller vehicle. The equipped TEC-16 is still under the original manufacturer's GVW, at 5,850 pounds.

Wolf Coach had its latest design in the main hall. The Benchmark B2 is the familiar Ford E-350 chassis with a custom-molded raised roof. The roof is capable of supporting the weight of several crew members or satellite uplink equipment. In the new design, the generator is located behind the driver's seat and the microwave mast behind the equipment racks. Wolf Coach also removed the roof-mounted air conditioner and placed it inside the rear of the vehicle, improving air flow and reducing noise. All Wolf Coach ENG and SNV vehicles are completely tested. Audio, video and RF/microwave systems are tested and hard copies delivered with the vehicle.

Frontline was displaying its new Super Truck. The 7-rack SNV has more operations space than its previous truck, as well as a reconfigured maintenance and generator area. The Super Truck is available as a 7- or 8-rack configuration. A medium-size uplink with a Vertex 2.4m antenna can be had with a GVW of less than 26,000 pounds. This allows drivers without a commercial drivers license to drive and operate. It has full standup height in the maintenance aisle and four separate areas of storage. Frontline had its 1.2m Ku-uplink/microwave van on display outside.

Harris had its latest S-15 satellite uplink with a 1.2m Vertex carbon-fiber antenna. The S-15 is designed on a Chevy/GMC Yukon base

vehicle with a rugged, fully integrated antenna platform. The S-15 reduces the size and weight of SNVs and removes the difficulty of operation. Harris has considerable experience in building small SNVs. The S-18, first built in 1985, was the first E-350-size satellite uplink. The S-23 SNV, a medium-size SNV, can be equipped with a triple path RF system. Allowing dual path analog video and simultaneously transmitting a digital video signal. The S-23 includes a 10-year warranty on the box and feather-touch positive latching personnel and compartment doors. Harris also displayed its M-1 ENG van. This van is configured with a full equipment package, mast camera and a choice of generators, but doesn't include rotating front swivel seats because they are not DOT-approved.

BAF exhibited its Centurian 1.5m antenna. This lightweight cable drive antenna is Eutelsat and Intelsat approved for transmission of digital and analog signals. The feed assembly is a low-loss type with three rotary joints, eliminating all twist-flex-type waveguide. The Centurion antenna can be installed in its SNV-19, an E-350 van for satellite uplinking designed for domestic and international use. The SNV-19 is powered by a 7kW generator and can be wired electrically to meet European or any world standard.

The newest model from ENG Mobile Systems, the "A plus K," offers 149 vertical rack inches of space with more than 70 rack inches above counter available. The gull-wing door, familiar on the "K" models, allows instant access to the rear of the racks while the "A" model allows easy access to the microwave transmission area from outside, keeping the edit and transmission areas separated. A rear sidelined battery box gives easy access for maintenance. Other options can include AC- and DC-powered compressors for the microwave mast and a 2kW sine wave DC to AC power inverter. One concern of many news operators is camera theft. The ENG locking camera mount is available as an option an any of the company's vehicles or from stock to add to your present ENG van.

The Custom Mobile Products Super Van XL was displayed in the outside exhibit area. Its new IFB controller can be custom modified for single-channel VOX IFB operation. A rack-mounted power control system with circuit breakers and digital meters is easy to mount and easy to work on. Custom can supply its vans with a Videotek router that can be remote controlled by the talent to switch between the mast camera and the talent camera. Malcom supplies its van in a 3-rack side-by-side configuration with an L-shaped counter, with shore power reel and cable reel mounted in the rear.

Phoenix ENG had its one-man-band van in the outside exhibit area. The van is an easy one to spot among ENG vans; a one-ton Chevy van with a shorter wheelbase than most ENG vans. Supplied with the minimal equipment to get the job done, this van has more storage than expected. Simplicity is the key. Inverter backup and DC-powered compressor as backup are standard items in this maneuverable van. Phoenix also makes a First-Response ENG truck. Built on a Chevy Blazer with a 42-foot mast and a power inverter, no generator is needed to operate as an immediate response microwave path. Both vehicles are under 10-feet tall, allowing these ENG units to fit inside service bays and garages.

LNR displayed its SAFARI digital video flyaway earth station as its latest generation of lightweight satellite newsgathering systems. Available as a Ku-, C-or dual-band allows transmission from nearly anywhere in the world. The SAFARI can be equipped with a 1.2m, 1.9m or 2.4m antenna and the Unifold pedestal, allowing for a fast, one-person 30-minute setup. The flyaway can by configured with any digital video encoder and is offered with its DVE 8400 digital encoder or the DiviCom MPEG-2-compatible encoder. LNR also showed its new 1RU Ku-band video exciter with RS-232C performance and its LDV series digital video exciters with built-in video compression, error correction and RF generation functions.

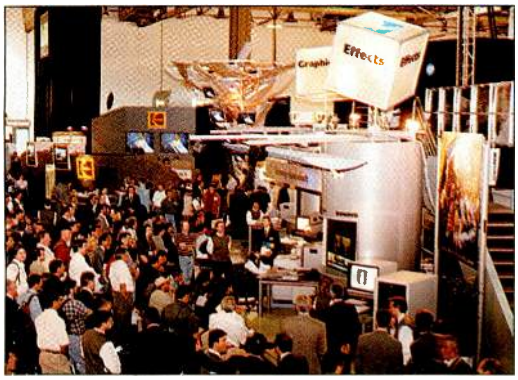
Canon Broadcast showed its Canobeam II. This bidirectional optical wireless broadcast transmission system features video and audio quality that exceeds any microwave, the sound is comparable to CD and has immediate setup. The system's built-in video camera feature provides remote aiming of the bidirectional HS-40B heads, while the CA-30N unit, which is attached by a coaxial cable, provides control and monitoring from any location up to 200m. Also, there's a built-in strobe for setup at longer distances, during evening hours or in inclement weather.

Hitachi Denshi America, Ltd. introduced its digital microwave link. It offers high-quality and highly reliable real-time digital microwave transmission of audio and video signals. The system combines a 16/32 QAM modulator/demodulator with an RF head and an MPEG-2 codec. It also incorporates powerful error correction and automatic waveform equalizing. HDTV signals can be accommodated by the transmitter and receiver sections, as well.

The transmitter operates in NTSC at 15Mb/s on three to four channels, and in HDTV at 45Mb/s or 60Mb/s on one channel.

Barco highlighted its new LUXOR Fiber Link, which offers users a secure method of transporting uncompressed analog and digital video, audio and data in all existing standards, over a distance of 20 miles. The LUXOR Fiber Link system also transmits digital and analog video and analog and data over the same link.

Advent had the largest display of international flyaway packages. Its Mantis flyaway is a C- and Ku-band system with analog and digital transmission capabilities. Equipped with a 1.5m, 1.9m or 2.4m axi-symmetric segment antenna, allowing individual segments of the antenna to be replaced if damaged or lost and restored to full specifications. Options can include redundant or phase-combined amplifiers, power conditioning and audio and video test and monitoring units. Also shown was the company's new NewSwift 1.2m and 1.5m packages. They consist of a fully compliant one-piece reflector, motorized positioning and weatherproof housing for the amplifiers in a compact, sleek design. This unit can be operated as a flyaway system or roof-mounted on a vehicle.



Andrew, a familiar name in SNV antenna manufacturing and known for its strong mechanical design, had its latest version of the 2.4m transportable antennas. The stowed height is reduced from 34 inches to 24 inches, and the new 2.4m is lightweight and is fully integrated and tested before leaving the factory.

Vertex showed prototypes of its latest lightweight 1.2m SNV antenna. The 1.2 SMK is a Ku-band antenna with carbon-fiber support structure and a single piece carbon-fiber reflector. Weighing less than 220 pounds and with exceptional rigidity, it's expected to be compliant under windloading conditions and meet Intelsat and Eutelsat requirements when ready for delivery this October. Vertex also had its 2.2m flyaway antenna displayed. The 2.2 Lite, also of carbon-fiber construction, has nine reflector segments, feed assembly and support structure that will fit into five IATA flight cases. Delivery is expected mid-October.

SSE Telecom displayed its preliminary design of the Earth Link. The SNG Tel-4 unit is geared directly to broadcasters, providing four circuits that can be configured for any combination of voice and data. The Tel-4 uses Direct Sequence Spread Spectrum (DSSS) technology and CDMA protocol to deliver high-quality, nearly nonblocking telephone service from an SNV, ENG or field operation. The system allows the users to enter and exit the network without precoordination of frequency and time. The unit will be supplied with a 0.6m antenna and the necessary hardware to provide the broadcaster with dedicated telephone service in the field.

DiviCom was the first company in January 1995 to ship a fully integrated MPEG-2 encoder. The MV20 is a 3-rack unit MPEG-2 compression system of video and two or more audio

channels (for more information see *BE* Pick Hits, p.30). The PV1100 series of Integrated Receiver Decoders (IRD) from DiviCom are DVB-compliant with error correction and descrambling. The rack-mounted PV1100 series architecture allows for network management control of small private systems, as well as large system users via the MPEG stream.

Tiernan Communications Inc. (TCI) manufactures the TE3 MPEG encoder. The 2-rack unit encoder digitizes and compresses a single video channel and up to four audio channels with full MPEG-2 capability at rates from 1Mb/s to 15Mb/s. It can support NTSC and PAL, and with a TTM-2000 option card the TE3 is DVB-compatible. A TD2-1000 option adds a built-in decoder. Tiernan has sold more than 50 MPEG-2 encoders since their release in early 1995. The TDR7 integrated receiver decoder (IRD) currently under development will be a DVB-compliant integrated satellite receiver for the broadcaster.

BMS announced the BMT125 series of transmitter line available for operation from 1,710MHz to 13,200MHz with 1W, 8W and 10W output power options depending on frequency range. The portable transmitters are frequency agile and include video and two subcarriers. The units are microprocessor-controlled and designed to operate from 11VDC to 32VDC power or 85 to 250 AC power.

Also introduced by BMS was the BMR30 series of low-cost, single-frequency receivers for video or telemetry applications.

Concept W Systems demonstrated its Camplex line of audio/video multiplexers. The system provides bidirectional multiplexing for composite video, audio, data and power. Also shown was the new VTU-320 and the "A" version video signal timing systems. The VTU series will automatically or manually (depending upon model) adjust the subcarrier and horizontal phase of any gen-lockable signal.

If you need satellite services, give PanAmSat a look. The company offers domestic and international satellite coverage and can let you design and control your own network. The company also can provide on-demand, specialized communications services on a global basis.

Standard Communications was showing its satellite receivers. New this year was the interactive "virtual look" CAM830 software. A Window's graphical user interface replicates a receiver's front control panel. This makes control and adjustments easy.

The Hughes Communications booth focused on the company's range of services. The company claims to be the world's largest private commercial satellite operator. If you want to know more, check out its home page on the web at http://www.hcisat.com.

Need a truck mast? Check out the Hilomast from Allen Osborne Associates. This series of telescopic masts are operated by a hydraulic ram mounted parallel to the mast. A series of pulleys are interconnected to raise and hold the mast at any height.

Telephone technology has evolved dramatically over the last decade. American Mobile Satellite Corporation displayed a portable satellite phone with coverage available over most of North America. The briefcase-sized package weighs only 28 pounds and features an integral antenna and transceiver. The built-in RJ-11 jack can interface a fax, modem or broadcast audio expander for transmission when POTS or cellular service is not available. Marketed as Sky-Cell, the portable satellite phone delivers nearly two hours of talk time at $1.50 a minute and up to eight hours in standby.

A new commercial-grade telescopic mast was introduced by Will-Burt. The design, similar to the military version, uses a stainless steel foil column that will raise 200 pounds up to 38 feet. The mast is coated with Lukon-24 for extended life and minimal maintenance. A new roof-mounted light bar also was shown.

For those who need to set up sports and news feeds, it's sometimes difficult to find all of the equipment needed. That is where News Sports Microwave rental comes in. If it's for remotes and backhaul, this company can provide it.

At the Communications and Power Industries (CPI, formerly Varian) Satcom division, they were showing various models in the VSTAR line. The VSTAR I is a Ku-band low-power amplifier, while the VSTAR II is a hub mount unit for C-band. Other models included a C-band solid state power amplifier rated up to 500W and the VSTAR 30 millimeter TWT amplifier.

ACTION CARD 214

INTERCOMS, AUDIO DISTRIBUTION AND AUDIO TEST EQUIPMENT

By Andrew McHaddad

Andrew McHaddad is an audio maintenance engineer at The Nashville Network (TNN), Nashville.

As broadcast facilities grow, routing audio and communications around the shop becomes increasingly important. Maintaining the larger facility with appropriate test equipment also becomes critical. It's, therefore, no surprise that NAB 96 presented numerous advances in these areas, typically based on digital and computerized systems.

Intercoms

Clear-Com showed the TEL-1000, a digital processing interface that features auto-nulling from a test signal generated from the interface. Other high-end features, such as auto-disconnect and auto-answer with ring selection for one or four rings, are available at a much lower price. The TW-20 radio interface is an accessory for the Clear-Com 2-wire systems that use a call switch. For the Matrix Plus line, a preliminary Windows version of the Matrix Plus software was shown, along with an improved IFB control panel, the AP-22. The latter provides 20 buttons for IFB activation, plus program-source selection functions into a 1RU chassis with LED alphanumeric displays. Up to four AP-22s can be daisy-chained together totaling 79 IFB sources or destinations.

RTS/Telex showed three new items. The long-awaited 803 2/4 wire master station maintains connector compatibility with previous 802 system architecture while increasing its capabilities. All of the listen levels and side tone adjustment are on the front panel. There is also a numeric keypad that allows for DTMF tone generation for telephone

interface dialing. Also, each of the 12 channels can be configured from the front panel for 2- or 4-wire configuration. The 803 also has a much simpler manufacturing process, which has reduced its cost compared to an 802. The KP-12 single-rack space digital matrix intercom station works with Telex's digital intercom systems. A unique multipurpose optical encoder is used for speaker and headset volume, as well as program level. A separate encoder is used for scrolling through the available ports in a system and assigning them to a key. A Windows-based virtual intercom station for the ADAM system was also shown.

Anchor Audio introduced a low-cost, efficient beltpack intercom system called PortaCom. All systems are supplied with a briefcase-type carrying case. The components are sold as complete systems including cabling. Anchor offers six different systems ranging from two to eight headset/beltpacks and one power supply. The PC-100 power supply can handle up to 20 beltpacks. Each user can access two intercom channels using a standard XLR cable.

ACTION CARD 215

Routing/distribution

Audio Technology Inc. (ATI) had a prototype of the newest of the Nano-Amp series, which is a stereo version of its 3x1 one-third rack-space mixer. Besides a headphone output and stereo metering, the mixer also has input-channel high-pass filters and a tone oscillator.

Opamp Labs, long known for press audio and video distribution systems, displayed an improved battery life unit for audio-only and audio/video mixed devices. The future may bring color LCD video

monitoring as an option and built-in audio monitoring, as well.

Leitch showed a variety of digital audio routing switches and routers. The VIA32 series of routing switchers gives the user several input and output options to provide a flexible method for switching the analog and digital signals in your facility (up to 32x64). Leitch also showed its modular audio converters, built on the same frames as its video systems. The ADC-6880 (A/D) and DAC-6880 (D/A) and AES-6880 distribution amp are all modular devices for the handling of AES/EBU audio. An option on the DA provides converted audio output for monitoring purposes. Both converters are 20-bit and available with either balanced or coax connectors. Leitch's line of AES Glue distribution amplifiers feature automatic cable equalization, data reclocking, jitter reduction and error correction. From the Digital Glue line, the ADM-6800 and 6804 allow for extraction and conversion of serial embedded audio. These devices also have analog audio outputs that can be routed from either of the four embedded channels for local monitoring with an amplifier/speaker. The internal routing features also allow the four channels to be remapped at the AES outputs.

Otari introduced the Lightwinder, a multichannel digital link that carries up to 64 channels of audio on a fiber-optic cable. Each input has a mic pre-amp, phantom power and mic gain-trim pot.

NVISION, after success with large-scale AES/EBU routers, has developed a smaller router for nonlinear production bays and smaller pre-production rooms. These routers are synchronous, allowing the individual signals to be clocked to a master reference. This is important if the switched output will feed a live destination as it's being switched.

ITC showed WIN-ARM2, a Windows software package allowing for almost unlimited control of its well-established analog audio switcher. Placing the control architecture in the computer allows for standard PC hardware to be implemented in the control system, such as modems, parallel control and timed operation with unlimited file quantity. This is an improvement over the 99 maximum files available with the embedded controller.

ACTION CARD 216

Wire and cable

ADC Telecommunications announced the completion of its acquisition of ITS, a manufacturer of MMDS and LPTV equipment. ADC also displayed its growing line of integrated solutions for audio, video and data networks, including a wide variety of wire and fiber patching, jackfields, labeling and cleaning products.

Gepco and CommScope have formed a strategic alliance combining the technology of CommScope with the marketing power of Gepco. Together, they have introduced the VA-1/3 video/audio composite cable. Most remote composite cables are a parallel bonding of audio multipair and a separate coax. The VA-1/3 uses an overall round jacket surrounding three 22-gauge shielded audio pairs and one RG59-equivalent coax. This jacketing makes the cable easier to coil, especially in cold weather conditions. Also from Gepco is a new superlow-temperature outer jacket material called GEP-FLEX, which can maintain flexibility to -60° C.

Audio Accessories showed its line of value-added wire assemblies. There are signs of heavy commitment to the area of patchfield pre-assembly with the Project Patch studio wiring and patching system. Audio Accessories can produce an entire facility's patching architecture prior to installation.

Switchcraft provided a sample of a PLJ 1/4-inch TRS patchfield connector that uses the same common and efficient connector scheme as the standard TRS connector that has long been the standard for in-line connections. Production should begin late this year.

Canare introduced a line of constant-impedance 110Ω cable for the distribution of AES/EBU signals. The cable is sold in larger gauges (for longer runs), smaller conductors (for punch-down), in multiconductor forms and with a foil shield.

Whirlwind introduced The Brick, a compact, battery-powered mic-to-line-level pre-amp with an independent headphone output. Housed in a rugged extruded aluminum chassis, the unit's input is adjustable over a 60dB range and it provides 18V phantom power. The headphone output has its own level control and the unit is powered by two 9V batteries.

ACTION CARD 217

Test and measurement

Tektronix presented the 764 digital audio test set. The 764 allows the monitoring of two AES/EBU signals with extensive analysis plus phase display and bar graph metering. In addition, there is a time-code input on the back that feeds a time-code analyzer. The time code is also used

for time stamping the hard-copy reports that can be generated using the serial port on the rear of the chassis. A handy feature is a headphone output on the front panel with an internal D/A converter that is switch selectable to monitor either of the two AES/EBU inputs. Also from Tektronix is a color LCD screen for its premier audio test set, the AM700. The AM700 improved in performance as well with the upgrade to 20-bit A-D converters and a redesigned power supply.

Audio Precision (AP) had on display the full range of test equipment including the PC-based System Two hardware and software. Audio Precision's multitone test signal is ideal for on-air audio path testing. This test allows the Audio Precision unit to be at the receive end of a chain as a recording of the Audio Precision generator's test signal is played back from any analog or noncompressed digital format. The 250ms burst is able to test for level, crosstalk, THD, IMD and phase with the results remaining in the test set at the receive site. If the PC is equipped with a fax/modem, the results can be automatically faxed to the remote playback site for analysis.

Neutrik had a new device called the Rapid-Test RT-1M. The 1RU chassis and attending Windows software can provide multitesting using a short burst of a calibrated test signal. Tests include level, frequency response, distortion, noise and S/N ratio. One unique feature is its ability to interface with third-party industrial control software, allowing the operator a great measure of creativity in designing the most efficient front end.

Leader displayed the 5836A stereo surround scope. The 5836A has three selectable sets of inputs. A balanced XLR analog, unbalanced RCA and AES/EBU digital input are selectable from an intuitive menu displayed on the CRT. This scope can display level, absolute and relative, for L, R, C and S inputs. The screen displays a vector for each input channel, as well as an alternate screen that displays six individual X/Y patterns at the same time, allowing simultaneous viewing of all signals relative to each other. The scope can be set to monitor 5-channel and 4-channel surround-sound encoding.

ACTION CARD 218

VIDEO TEST EQUIPMENT

By Philip J. Hejtmanek

Philip J. Hejtmanek is the director of technology, SIU Broadcasting Service, Southern Illinois University, Carbondale, IL.

Test equipment specifically designed to monitor and troubleshoot in the serial digital video environment moved to the forefront of the test and measurement arena at NAB 96. A number of manufacturers offered products designed to help TV engineers better understand and more easily analyze problems in these new and increasingly important systems. Complete serial digital test sets or test generator/monitor combination systems will soon become "must-have" items in the TV engineer's bag of tricks.

Serial digital test instruments

The SyntheSys Research DVA184 Video BitAlyzer is a versatile test instrument that combines the functions of several general purpose instruments, such as a video test generator, digital oscilloscope and spectrum analyzer in a single instrument capable of a wide variety of serial digital test and measurement functions (for more information, see *BE* Pick Hits, p.30). The DVA184 can generate and test serial digital signals in 270Mb/s and 360Mb/s formats and measure waveform parameters like rise time, fall time, amplitude and jitter.

The Tektronix WFM601 family of serial component monitors is designed for the 270Mb/s serial environment and fits into the standard half-rack wide frames that house standard analog waveform monitors and vectorscopes. An important new feature of this monitor is the Tektronix Arrowhead display of video signal composite domain gamut limits. This clearly shows how the component signal will translate to an analog composite signal suitable for transmission and highlights illegal luminance and chrominance values.

The AAVS DSA309 digital studio analyzer is the first half-rack mount analyzer to include component and composite digital video monitoring and testing for 525-and 625-line standards in a single package. It features a touchscreen display for ease of use, a wide selection of real-time measurements, extensive error logging on the LCD display, floppy disk or to an external printer and the ability to monitor component digital video in real time for RGB or NTSC/PAL color space infractions. The DSA309 automatically identifies the standard of the incoming digital video bitstream and can measure the amount of jitter present in the serial signal at 270Mb/s, 177Mb/s and 143Mb/s. The frame buffer option can freeze a frame on a specific error and dump it to disk. The unit is set up for easy software upgrade in the field.

The Leader LV 5100D is characterized as a "transition box" to meet the needs of mixed digital-analog component environments by supporting two serial digital inputs and one 3-wire analog component input. It switches automatically between 525/60 and 625/50 systems. Monitor modes include waveform, component vector, picture and a stereo audio phase/amplitude display. The monitor features full EDH facilities, and the operator can assign internal or external alarms to any or all of the status readouts.

ACTION CARD 219

Test generators, signal monitors and serial digital test equipment

The Magni WVM-720 automated video signal monitor provides accurate waveform, vector and measurement displays on a standard picture monitor screen. It works with all major analog video formats, including NTSC, PAL, component analog and S-video and is suitable for use in a broad range of applications. The unique PictureGuard display keys a warning indicator over the monitor picture if a video parameter should exceed preset limits. The WVM-720 can work in concert with Magni Logbook software, linking the unit to a PC-compatible computer. This allows full control and logging of video parameters and waveforms from a remote PC. The unit also includes full stereo audio level and phase monitoring.

The Kudos TPG21 test pattern generator from Snell & Wilcox provides approximately 500 resident line, field- and frame-based test patterns, in all analog and digital, component and composite standards and formats, including HDTV and EDTV. The TPG21 features 24Mb of flash PROM, which enables newly created patterns to be downloaded and saved. When the TPG21 is used with Kudos Pattern Master Software, the end user can create and preview customized line-based test patterns on a PC running Windows 3.1 or later. These custom test patterns can then be downloaded directly to the TPG21 or saved in PROM files for later use.

The Cable Clone, from Faraday Technology, can simulate the effect of coaxial cable in a serial digital system. It can be ordered configured to simulate any one of several popular types of cable found in serial digital facilities and allows variable cable lengths to be simulated, without having to have use real wire. It mimics cable loss and group delay frequency characteristics up to 360MHz. The Remote Operated Cable Clone version also features computer control for automated test applications.

Broadcast Video Systems showed its VITS 2 video analyzer that allows any single video scan line to be digitized and sent via modem to a remote PC. The waveform is displayed on the remote PC's VGA monitor or may be sent to the printer. NTSC and PAL versions are available.

Tektronix was showing its signal generation platform, the TG2000. This multiformat unit provides reference-quality signals in analog and digital formats (for more information, see *BE* Pick Hits, p.30).

Videotek offers the VTM-100 line of TV signal monitors. The VTM-100 is a composite/component analog test instrument that displays

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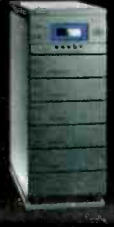

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traditional waveform and vector displays, as well as stereo audio displays, directly on a composite picture monitor. The VTM-100D model displays waveform and vector information for either 525/60 or 625/50 serial component formats at 270Mb/s. The output of the VTM-100D is formatted for display on an analog component or (optionally) on a serial digital monitor, has full-resolution 10-bit processing and features on-screen alerts of invalid or illegal values, when detected. Also at Videotek was the SDC-101 serial digital video corrector, which provides real-time user control over video parameters (for more information, see *BE* Pick Hits, p.30).

The Philips PM 5655 VITS generator and inserter is available in either an NTSC or PAL version. This versatile unit can insert internally or externally generated VITS or data into a program signal. It provides more than 30 high-precision test signals, including all forms of ghost-canceling reference signals. The PM 5655 is operated via menu controlled buttons and an LCD display and features security measures to prevent unauthorized access to programming or other operational functions. Also at Philips was the PM 5639/10 Color Balance Meter which makes precise setups of color projection units in a snap.

The Multidyne TS12 line offers up to 12 precision NTSC test signals in 8- or 10-bit resolution, blackburst, character source ID and stereo audio tone in a hand-held or rack-mount package. The hand-held version can be powered by four AA batteries for up to 12 hours, making it ideal for ENG or remote use. The rack-mount version includes a loopthrough of external video and stereo audio and can automatically insert a selected test pattern and ID upon loss of the external signal.

The TSG-50 from Horita is a low-cost portable NTSC test signal generator that provides 12 digitally synthesized video test patterns, such as blackburst, SMPTE, EG-11, 990 color bars with pluge pattern, NTC-7 composite and multiburst. The TSG-50B version adds five additional configurable blackburst/sync outputs. Both models also include 1kHz/400Hz reference tone output.

The TG21A modular video test signal generator from ASACA/Shiba-Soku can be equipped for NTSC or PAL operation, at 4:3 or 16:9 picture format, depending upon user requirements. It generates 12 standard test signals and can accommodate option cards that allow specialized output formats, such as Y/C and Y/R-Y/B-Y. The TG21A has a GPI interface and can be gen-locked externally for automated test applications.

ACTION CARD 220

Analog and serial digital video cable

Belden's new Brilliance Mini Analog/Digital 75Ω video cable 1865A is designed to provide excellent performance in applications where analog and serial digital signals are present. This cable is 30% smaller and 40% lighter than standard RG-59 video cable, and is, therefore, well-suited to applications where cable size and weight are critical, such as remote trucks and other mobile environments.

Canare showed a line of low-loss video cable designed to fulfill the needs of analog and serial digital facility designs. L-4CFB, an RG-59-sized cable and L-5CFB, an RG-6 sized cable, feature structural return loss of 26dB minimum, from 1MHz to 500MHz. Also from Canare was a crimp-on F connector, featuring a crimped center conductor pin for superior performance.

Gepco International featured a full line of Gepco and CommScope cables for video, audio and RF applications. The CommScope No. 5765 serial digital video cable is an RG-6 sized product designed specifically for the serial digital environment. It features a loss of only 3.1dB at 270MHz.

ACTION CARD 221

TV RF EQUIPMENT

By Don Markley

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

There is seldom a bell-ringing breakthrough in the RF world. Typically, the broadcast engineer sees new products introduced with minimum fanfare and production. This was not the case at NAB 96, where Westinghouse introduced an all-solid-state, silicon carbide transmitter. Not only was this a new solid-state transmitter, but it was a high-power UHF solid-state transmitter. Westinghouse presented it in a live, high-definition broadcast from KLAS-TV to the convention center, projected on a large screen by dual HDTV projectors. To prevent interference to area UHF stations, the demo transmitter used only one power module of the silicon carbide system, but that was enough to deliver a great-looking HDTV picture to the convention center viewing room.

Along with the broadcast demonstration, there was a hardware prototype of the transmitter on display. The prototype was capable of more than 20kW at UHF and Westinghouse engineers claimed it would be capable of 40kW shortly (for more information, see the *BE* Pick Hits, p.30). The design is completely modular, using a number of 500W transistors to power a 1.5kW plug-in module. The use of high-power transistors reduces the number of modules required, which in turn, reduces the size, weight and, therefore, the cost of the total system.

Westinghouse is a government and defense contractor and as such has applied its high-reliability knowledge to the broadcast transmitter. Power modules can be hot-swapped and a redundant power supply can also be replaced with the others operating. The transmitter used three blowers, but can operate with two. A defective blower can also be replaced safely without powering down the unit. The system includes a microprocessor-based control and monitoring system. Each module is operated at a conservative rating, allowing full power output to be

maintained with defective modules. AGC is sufficient to maintain 100% power automatically with failed components on board.

The silicon carbide transistor is sufficiently robust to allow mounting RF amplifiers on the back of panel antennas. This would allow the final amplifier(s) to be mounted at the top of the tower as part of the antenna. High-power transmission lines would then become unnecessary, with the resultant improvement in overall efficiency.

Acrodyne was showing its 60kW transmitter with the diacrode, as well as the 30kW tetrode system. The company also introduced a 4-channel MMDS TV transmitter, which operates with 50W per channel.

Advanced Broadcast Systems was showing the CST II IOT transmitter, which uses a Thyraton crowbar and filament black heat. These transmitters also are fully supervised by computer with intelligent interfaces to the transmitter.

Meanwhile, Comark also introduced its ATV transmitter. It is IOT-based and is capable of the expected power levels required for ATV. Comark's IOT transmitter is the first transmitter specifically designed to meet the requirements of the Grand Alliance digital standard.

Harris showed its UHF transmitter developed for digital terrestrial television. Tagged the SigmaCD, the new UHF transmitters are based on the CD 1 digital exciter, which is the first commercial exciter to implement the ATSC vestigial sideband system of ATV. The 8-VSB system provides digital linearity correction and 32dB S/N ratio. Built-in software allows setup, diagnostics and troubleshooting via PC, without expensive test equipment. The CD exciter drives a high-efficiency IOT power amplifier to the required power level. In addition to this new exciter, Harris has designed a new line of UHF/NTSC multichannel TV transmission antennas.

EMCEE Broadcast introduced a VHF TV transmitter capable of operating on any channel in the range of 47MHz to 230MHz with 1kW output. The transmitter was developed for the U.S. Special Operations

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Command and was designed to be transportable for worldwide deployment. As such, it is capable of NTSC, PAL and SECAM. All frequency and format selection is accessible from the front panel. It is 28 rack units high and weighs 325 pounds.

Larcan-TTC introduced a 1kW solid-state transmitter. This unit is a continuation of the Rocky Mountain series of equipment that was introduced at lower power levels last year. The sister firm, LDL Communications, was showing new antennas from Alan Dick and Company for either horizontal or circularly polarized facilities.

ITS had a solid-state transmitter on display along with some new low-power MMDS boosters. A new monitoring and control system was introduced that promises greater ease in handling multiple-channel systems.

Itelco Spa showed a solid-state 30kW UHF-TV transmitter that uses a cold-plate cooling scheme.

The new Advantage ATV transmitter from Thomcast-France/Comark features Digital Adaptive Predistortion (DAP) in its 8-VSB exciter. The transmitter control system uses advanced processing and an LCD graphical user interface to provide real-time operational status. The transmitter also features a solid-state IPA and Pulse Step Power Supply for added efficiency.

Astre Systems was showing its MSDC technology transmitters. Astre specializes in providing cost-effective retrofits from klystrons to MSDC tubes, which can reduce power bills. The company was also promoting its "Guaranteed HDTV compatibility," offering to modify any purchased transmitter once the HDTV standards are finalized.

Ready to go digital. The EEV digital IOT is compact, fully air-cooled and ready for today's new series of ATV transmitters.

Cablewave Systems introduced a 7/8-inch EIA-to-waveguide adapter named "N-Fire" for 2.5GHz MMDS wireless cable systems. In addition, a complete line of MMDS products including diplexers, combiners and antennas were on display. Jampro introduced a line of waveguide designed for use at UHF TV frequencies.

At Communications and Power Industries (CPI, formally Varian), a range of high-power klystrons and cavity amplifiers for UHF-TV were shown. The new K2 Klystrode IOT is half the size of the K1 predecessor, making maintenance and tube change-out much easier. The K2, ideal for HDTV service, delivers 43.5kW visual and 4.4kW aural in combined operation.

SWR displayed a new 2.5GHz MMDS antenna designed to handle 500W. Models are available beginning at four bays and may be vertically or horizontally polarized.

Dielectric was showing its new stacked HDTV/NTSC antennas (for more information, see *BE* Pick Hits, p.30). In addition, the company displayed a new elliptical waveguide called Elliptic, designed for MMDS and other microwave applications.

Andrew Corporation introduced its HMD antenna along with a high-power coaxial cable. The HJ9HP is an increased-power version of the older 5-inch heliax cable that should find wide use in replacing old 6-inch rigid systems or as low-loss cable for use in new ATV installations.

Trompeter introduced its "N" connector, which features solderless termination. These 50Ω connectors are compatible with standard flexible and corrugated cables up to 1.5-inch in diameter.

Russian tube manufacturer Svetlana is making quite a name for itself in the United States. The company's inventory of tubes is quite extensive, stocking everything from small triodes to massive klystrons. More than 100 years old, the company traces its roots to St. Petersburg, Russia, although it now operates offices in Alabama and California. It was one of the first large Russian firms to be privatized and it has since become a part of one of the first Russian-U.S. partnerships, employing about 3,000 people in both countries.

EEV was showing the new 8000 series of IOTs. These devices offer power levels up to 70kW. Low-power IOTs include the 8202R-rated at 20kW, plus 2kW common amplification and the 8300R rated at 30kW peak sync visual only. Also on display were enhanced IOT circuit assemblies that offer better linearity and reduced losses, which lower cooling requirements.

Thomson Tubes Electroniques had several new tubes on display. Starting with the lower-power devices, the TH 610 is designed for 10kW UHF common amplification. This air-cooled Diacrode offers a design life in excess of 10,000 hours and excellent linearity. The TH 680 is a liquid-cooled Diacrode that delivers up to 60kW in common amplification. Finally, the new TH 760 IOT delivers 60kW in visual-only applications and up to 40kW in common amplification mode. The simple plug-in design makes it easy to install.

The new EAS 911 Emergency Alert System encoder/decoder was presented by TFT. The unit is compatible with the NOAA Weather System SAME codes. Control and status signals from the EAS 911 may be remote controlled, and an LED message screen may be interfaced to provide visual information.

Sage Alerting Systems also presented its ENDEC line of EAS equipment. The products are being marketed by Harris Broadcast.

Belar introduced the TVM-230, a digital BTSC TV stereo monitor/analyzer. It is a microprocessor-controlled 1RU device that uses linear-phase FIR filters for accurate peak modulation measurement.

Superior Electric showed its array of STABILINE power-protection products. These include stand-alone and rack-mount voltage regulators rated from 2kVA to 1,680kVA, and three different types of UPS systems ranging up to 2,200VA. The company also presented its full line of transient suppressors, RFI filters and power conditioners.

ACTION CARD 222

GENERAL RF EQUIPMENT

By Marvin Born

Marvin Born is vice president, engineering for the Dispatch Broadcast Group, Columbus, OH.

A surprising number of new developments appeared in the area of RF support products at NAB 96. These advances spanned a broad spectrum, ranging from RF combiners and dummy loads to computer-based remote controls.

RF transmission line and components

MYAT has developed an interesting method of combining multiple high-power transmitters in phase. Its E-Star system can combine between 3- and 8-input ports in a more efficient manner than the conventional hybrid system.

The system operates on VHF, UHF and FM and is smaller than a conventional combiner. There are no moving parts and temperature changes do not affect performance. The big news is that there are no adjustments. MYAT claims an efficiency of 99.3%. Efficiency is so good for an E-Star 4-way VHF system that it provides as much power as a conventional 5-way system.

MYAT has one such system currently operating in Indianapolis, where seven 10kW Harris solid-state transmitters are used. Each transmitter provides 6.7kW visual into its 3 1/8-inch port for a combined

The GALLERY

visual of 48kW. A similar system is constructed of 1⅝-inch rigid line for the aural output. The aural and visual outputs are then combined in a notch diplexer and fed to the antenna. One complete transmitter can fail and the AGC system will still provide 100% power. If two transmitters fail, the station still can maintain legal output power. Because each port requires a reject load, MYAT has developed a dummy load "tub" that contains all of the resistive elements on one oil-cooled container mounted under the combiner.

Altronic Research showed an impressive array of dummy loads, air- and water-cooled, ranging from small (5kW) to large (300kW MW). Also on hand was the 3500 digital calorimetry unit that monitors rms power fed to a dummy load by measuring the energy turned into heat. The 3500 is available for air- and water-cooled loads.

Kintronic Labs had a variety of RF components on display. They were selected from the company's legendary inventory of devices for AM radio transmission systems, which includes ATUs, diplexers and triplexers, phasors, inductors, RF contactors and dummy loads.

Bird Electronic introduced the AT-800 antenna tester, a hand-held testing device for the 806MHz to 960MHz band. Rugged, battery-powered and portable, its menu-driven soft keys and digital keypad produce a crisp display on the backlit LCD screen. A self-contained RF source allows simple, precise testing of any antenna without an external transmitter. Its built-in antenna adapter jack mates with a range of standard RF connectors and a serial port (plus optional software) allows data upload to a PC.

ACTION CARD 223

Remote site control

Burk Technology showed its BDT-115 RF data link, a spread-spectrum wireless control link (902MHz to 928MHz) to its ARC-16 transmitter control system. No license is required and a frequency-hopping spreading code ensures robust operation. The system provides a 115.2kb/s bidirectional link across paths of up to 20 miles. Also on hand was Burk's BTU-4, a temperature and line-voltage monitoring system with a variety of sensors tailored for broadcast transmission sites. Enhancements to the ARC-16 were also presented, including multisite control, speech interface and control/display/logging software.

Gentner introduced a number of products. The largest crowd magnet was the GSC-3000, which is a Windows-based remote-control system. Point-and-click software provides similar features to the company's DOS-based software for its VRC-2000 remote control, but it's more user friendly. It does logging, time-of-day clock, plus the normal remote-control functions. The operator can dial up any one of 256 remote sites, with phone numbers and access codes stored within the program. Once connected to the desired site, up to 256 parameters can be monitored, with point-and-click commands used to make adjustments.

ACTION CARD 224

CABLE TV EQUIPMENT

By Peter Douglas

Peter Douglas is vice president of operations and engineering at TCI, Littleton, CO.

Each year when attending NAB, we see the previous lines between various disciplines with their related equipment being obscured. One example would be the number of computer terminals attached to equipment and equipment in which the computer is the central part. It's increasingly difficult to find broadcast equipment that is not in some manner connected to the computer industry. This is a relatively recent change. The same process seems to be taking place between broadcast and cable.

This should not be a surprise. Over the years, we have seen such major broadcasting companies as Tribune, NBC, Fox and others creating cable programming and joint ventures. I happen to work for a cable company that does more broadcasting than I ever was exposed to when I worked for a broadcasting company.

Many cable companies now operate or participate in studio production, satellite operations and other activities previously considered the domain of broadcast entities. As a result, a substantial number of attendees wore badges with nonbroadcasting company names. Another result is the encroachment of traditionally cable-only manufacturers exhibiting on the NAB floor.

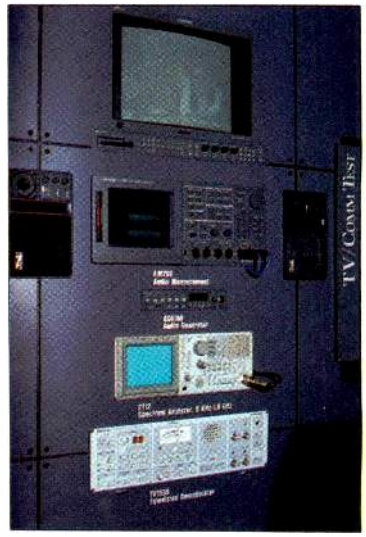
One interesting factor that indicates that the NAB show may not be quite sure of who is who in the cable equipment side of things, or that some manufacturers have an identity problem, is that when I pulled a file on "cable equipment suppliers," I received a list of about six companies, all of whom have ties to both industries. What I did not receive were the names of some of the most decidedly cable suppliers in the business: General Instrument, Scientific Atlanta and Compression Labs Inc., to name a few.

Most traditional manufacturers of test equipment, such as Hewlett Packard, Tektronix, Leader and Videotek all make specific items for the cable industry, most of which were not showcased at the NAB. It could be found, but was certainly not the focus.

I think the bigger story is what General Instrument, Scientific Atlanta, Compression Labs Inc. and others were doing at NAB.

The answer to that question is technology. The truth of the matter is that while many broadcast manufacturers have been intent on HDTV and its associated technology and politics, General Instrument, Scientific Atlanta, Compression Labs Inc. and others have been making the same technology a reality in a different form.

Currently, many systems for compression of cable programming are deployed by General Instrument, Scientific Atlanta and Compression Labs Inc. These systems have been in use for several years to deliver programming to cable head-ends and DBS providers. The technology and track record of these systems is what has the broadcasters interested. They are seeing things done by cable over the past few years with an entirely different mindset.



In the past, many broadcasters (myself included) tended to look at cable as a not quite serious technology contender. That time is past and now we find broadcasters looking to cable for leadership in some technology issues, with the result being the large crowds at the General Instruments, Scientific Atlanta and other "cable" exhibits.

Specifically, the most offered technology by all of the major companies, such as General Instrument, is compression. General Instrument showcased the MPEG-2 system, which is available in several configurations, such as MCPC and SCPC. This system is actually a 3-mode compression system offering MPEG-2-compliant, Dual Prime and a proprietary DigiCypher II mode. All modes have various compression rates and resolution levels. Also shown was the new digicable set-top terminal, which will be used for direct digital cable to the home. GI's encryption, access and control system is also part of the system.

Scientific Atlanta also has an MPEG-2-based system, as well as the traditional Scientific Atlanta products, such as dishes and satellite equipment. Compression Labs Inc. showcased its Magnitude compression system (as used in Direct Tv) and demonstrated compressed video via DS3 circuits.

Also present and selling products that began life as cable equipment were several makers of cable ad insertion systems. Sony and Channelmatic demonstrated their equipment to broadcasters looking for an economical solution to commercial playback over the air. Using bit rates from 1.5MB/s to 4MB/s, these units offer surprising video quality, as well as interfaces for automation.

When asked why they were exhibiting at NAB, General Instrument's Rick Segal commented, "It's the place people go to for end-to-end solutions." That sums it up. You have cable people who now are doing some form of broadcasting, looking for traditional broadcast and production equipment, and you have broadcasting folks out looking for distribution solutions from the traditional cable equipment manufacturers. ■

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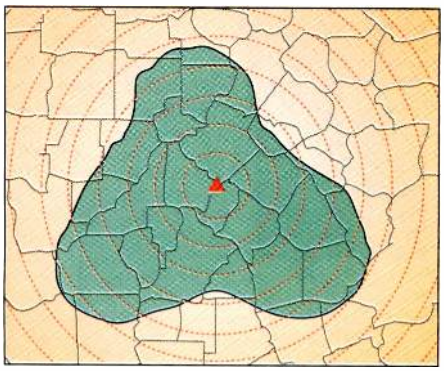
By Andrew Kreig

Bells are ringing for wireless cable



Equipment advances fueled by Bell buying power are transforming the wireless cable industry into a robust alternative to franchised cable systems and direct broadcast satellite (DBS). The industry's rapid expansion is bringing the benefits of competition to consumers, and opening new opportunities for engineers and other professionals currently working in traditional broadcasting.

Digital wireless cable

Contrary to the conventional wisdom only last year, wireless cable operators will roll out widespread digital transmission by the year's end more quickly than wired cable operators. Digital transmission is especially helpful to wireless cable because it helps overcome the two primary handicaps of analog transmissions: restriction to 33-channel maximum capacity and to only line-of-sight transmission paths.

Two new jumbo Regional Bell Operating Companies — SBC Communications/Pacific Telesis and Bell Atlantic/NYNEX — will deploy digital wireless cable late this year at prime locations, each offering up to 120 virtual channels. Because the receivers of these digitized wireless cable signals will need only about $^{1}/_{100}$ of the signal strength of their analog predecessors, the receivers will be usable under much thicker tree cover.

Defining wireless

"Wireless cable" is a generic term for today's multichannel broadcasting services that deliver cable network video. Almost all established systems worldwide transmit at 2.5GHz. Years ago, the Federal Communications Commission (FCC) designated (2.596GHz-2.644GHz) as multichannel multipoint distribution system (MMDS) spectrum, and the 2.150GHz to 2.162GHz portion as MDS.

The few other services worldwide transmit in diverse bands. A few (primarily in Latin America) transmit at VHF-TV (54MHz to 88MHz and 174MHz to 216MHz) and UHF-TV (470MHz to 806MHz), where some entrepreneurs have aggregated 20 or more low-power TV (LPTV) stations. Also, certain systems in Brooklyn and Queens, NY; Venezuela; Canada and elsewhere transmit at 27.5GHz to 29.5GHz, known as local multichannel distribution system (LMDS).

Usage of this band in the United States will accelerate later this year after auction of all remaining licenses. In addition, some will transmit in the United States at 37GHz to 40GHz, with services likely to focus more on data and telephony than on video. Soon, a few will also transmit in the 40.5GHz to 42.5GHz spectrum that many Europeans advocate for multichannel wireless video services.

Currently, there are about 850,000 wireless cable subscribers in some 200 systems, and nearly four million subscribers in 70 nations — all using analog technology. The highest big-market U.S. penetration is now in Philadelphia, with little more than 2% penetration of line-of-sight TV households.

Broadcast Engineering summarized capabilities and costs in "Wireless Cable Systems and MMDS" in the January 1995 issue, which included technical comparisons between MMDS and LMDS.

Recapping MMDS and LMDS

In the United States, MMDS wireless cable operators deliver video programs through a protected service area 35 miles in radius. To solicit subscribers, the operator typically first contacts all of those residences clearly within line-of-sight from the transmitter antenna, and later those slightly obscured by trees or buildings.

Where power levels are adequate, the crew erects a short tower above the residence and mounts on it a downconverter that is integrated into a receiving antenna. The team places a cable converter on one or more TV sets within the residence, and connects the latter by coaxial cable to the downconverter. The set-top cable converter incorporates a TV channel tuner and a signal descrambler. The latter is usually subscriber-addressable and channel-addressable.

Almost all U.S. commercial wireless cable operators share spectrum with instructional TV fixed service (ITFS) college and school operators who were granted educational licenses in the 2.500GHz to 2.596GHz and 2.644GHz to 2.686GHz bands for transmission of instructional TV programs. In 1983, the FCC enabled the creation of a viable commercial industry by reallocating 11 channels for commercial licenses and allowing noncommercial licensees to lease their excess capacity on 20 ITFS channels to commercial systems that previously had only one or two channels for all of their programming. Commercial operators have acquired other licenses outright by purchase, lottery and (most recently) by auction.

All U.S. MMDS licenses combined could have been purchased for less than $50 million in 1990, according to financial analysts. Until 1992, wireless cable operators could not obtain all CATV programming. Many popular CATV program networks were controlled by franchised cable MSOs who resisted competition. Financiers were reluctant to commit funds in those circumstances to wireless cable expansion. But in 1992, Congress enacted legislation that mandated fair access for all delivery systems.

Investment in wireless cable grew rapidly. During the past two years, some $2.5 billion in new equity and debt has been invested into operating systems. These investments are accelerating technical developments.

Top executives at PacTel, Bell Atlantic and NYNEX have stated that they regard wireless cable as the fastest and most efficient way to enter the multichannel video market, although they continue to explore other distribution platforms. This commitment was shown by their additional investment of $200 million to create a partnership called Tele-TV, which will implement their video and Internet strategies within their regions.

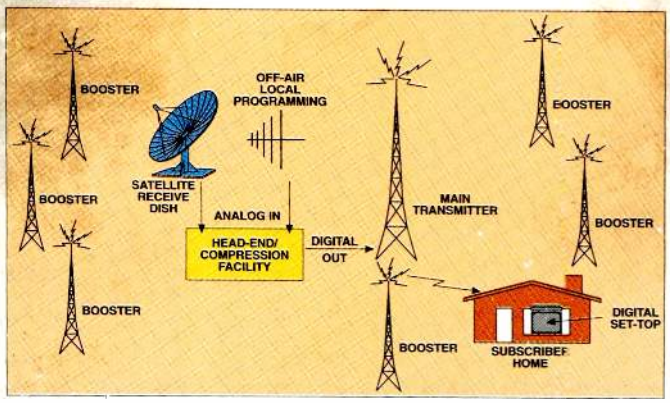


Figure 1. The basics of an MMDS system. A satellite receive dish and antenna receive programming at the head-end, which is then broadcast to booster units and homes.

Tele-TV partnership

Tele-TV Systems, the video systems integration unit of Tele-TV, signed a $1 billion contract with

Thomson Consumer Electronics in February to supply three million set-top boxes for use in the wireless systems that Tele-TV will begin rolling out this year. This March, digital compression at 10:1 was used for the first time in a system on an ITFS channel in Tampa, FL. The equipment was made by Decathlon Communications, Inc., which announced plans to use its equipment for commercial channels on other systems during the spring and summer. Other operators plan to purchase set-tops from General Instrument and Zenith Electronics for use at approximately the same time as the first Tele-TV deployments later this year.

Tele-TV's huge purchase order makes its box especially noteworthy. The specifications are demanding, and the price of around $350 per box was far below many experts' expectations. The set-top will have a Power PC processor, 4M of total memory to support an electronic program guide and other features, an 8-bit video graphics generator with 256 colors, an MPEG-II decoding device, an infrared hand-held control and a 2,400-baud modem. Tele-TV stipulated an open architecture to encourage other companies to manufacture the boxes. Thomson supplied its first "alpha" boxes to Tele-TV this April, showing that it was working effectively even before the formal contract signing.

Tele-TV Systems also has announced that it is taking bids on production of a universal set-top box compatible with a full range of digital TV transmission formats — not only wireless cable, but also asymmetrical digital subscriber line (ADSL), switched digital video, hybrid fiber coax and direct broadcast satellite. Tele-TV says that it expects to pay less than $300 per box for them, with deployment in late 1997.

Americast, the other RBOC programming consortium, also is taking bids for set-tops for all delivery systems, including MMDS. Americast is a partnership of The Walt Disney Company, Ameritech, BellSouth, GTE and SBC.

This financial background helps show why the 2GHz wireless cable industry is poised for a major lift-off beginning late this year — much like the 12GHz DBS industry underwent after its launch in 1994.

The technical and marketing transformation of MMDS wireless cable will soon include among other things:

• *Up to 120 virtual channels.* As described above, a major roll-out of digital service elsewhere is expected to begin later this year, expanding available channels beyond the current 33-channel maximum. Although the most specific announcements have been made by Tele-TV partners, their plan of up to 120 channels need not be the upper limit of channel capacity if higher (6:1 or 10:1) compression schemes are used.

• *CD-quality sound and DBS-quality digital picture.* Tele-TV has promised that its MMDS transmissions will give customers the same high quality as DBS, plus local off-air stations.

• *Expansion of coverage areas.* Access in many hilly and wooded areas may rise from 40% to +80%, both because of the advantages of the digital signal and because some systems will deploy repeaters on a systematic basis in their expanded service areas.

• *Internet access and other interactive services through new sectorization and cellular techniques.* Digital technology facilitates much more efficient use of available spectrum. The operators will deliver Internet services to several adjacent sectors independently, (different from the typical omnidirectional transmission) serving several hundred subscribers each, instead of an entire market area. Internet access over wireless cable at 10MB/s is being demonstrated this spring by the National Digital Network at a variety of educational and commercial sites in Washington, DC. Additional demonstrations will occur at the WCA Convention from July 10 to 12, in Denver, CO.

• *Much smaller and more attractive antennas and masts.* Some major systems are seeking manufacturers' proposals for antennas that are smaller than traditional wireless cable antennas (many of which are about the size of a backyard barbecue grill).

• *Marketing campaigns creating national branding and high-penetration.* Some telco and independent financial analysts predict that well-run wireless systems could obtain a 20% or even 30% market share in some locations, even though the industry's economics would typically make a company successful at less than 10% penetration.

All of the above advances are transforming wireless cable into an important and increasingly well-known platform in the communications industry. Now that the wireless cable auctions are over, a period of consolidation is expected to begin for MMDS incumbents, auction winners and well-financed new entrants. This will allow more efficient deployment of services through major regional or national aggregations of systems.

Stayed tuned: Bells are ringing. ■

Andrew Kreig is vice president and general counsel of the Wireless Cable Association International, Washington, DC.

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DIGITAL PROCESSING SYSTEMS INC.

PVR-2500 Digital Video Recorder

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

- The PVR-2500 is a full-length PCI card with a SCSI-2 interface that connects up to seven dedicated hard drives. Because the SCSI controller is integrated with the PVR-2500, video data never has to move over the PCI bus during playback. This avoids the bottlenecks found in systems which use the computer's hard drive for video storage.
- Designed to run under Windows NT 3.51 on computers employing Pentium, DEC ALPHA or MIPS processors. Perception's software utilizes NT 3.51's native support for multitasking and multiple processors, allowing use with-in the most powerful computers.
- Perception's multi-format virtual file system ensures complete integration with your existing Windows NT applications. Any acquired video or computer generated Perception video clips appear simultaneously in many different file formats including TARGA, SGI, BMP and TIFF. Also compatible with new NT versions of Lightwave 3D, 3D Studio, TDPAS 5.1, SoftImage and Elastic Reality.
- Video output section utilizes 10-bit 2x oversampled encoding and provides broadcast quality CCIR-601 (720 x480) resolution. Its dynamic range is in excess of D1 scaling so that images are brighter, have more color and greater spatial resolution. Outputs component, composite and S-Video via the included breakout cables.
- Use with any 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 perform real-time interpolation of 30 fps video to 24 fps film rates or vica versa.
- VCR-like controls on the Perception's GUI simplifies the task of batch digitizing and recording. In this mode, it reads SMPTE time code from the source deck.
- Drivers for Windows 3.1 are supplied as well, so third party editing software like Adobe Premier can be used. In fact, the PVR-2500 bundled with the AD-2500 capture card, a sound card, editing software and one or more SCSI hard drives becomes a non-linear editor of unparalleled performance at an unbeatable price.

AD-2500 CAPTURE CARD

- The optional AD-2500 is a video capture daughtercard, that transforms the Perception into a digital video recorder. It has component, composite and S-Video inputs for real-time recording, and storage capacity is limited only by the size and number of your hard drives. Captured video can also be exported as sequential RGB files for rotoscoping and other compositing applications.
- The AD-2500 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.

TRUEVISION TARGA1000/2000

PCI-based Digital Video Capture Boards for Windows

The TARGA 1000 and 2000 is an easy and affordable way to transform your computer into a powerful digital editing system. Along with their high-speed PCI interface, both the TARGA 1000/2000 incorporate all the functions you need to create spectacular multimedia content. They support NTSC and PAL video standards and let you capture, edit and playback full-motion, full-resolution digital video with fully sychronized CD or DAT quality audio. Designed for high performance IBM compatibles, their advanced architecture provides incredible processing speed for video and audio effects, titling and compositing capabilities.

- Allows recording and playback of video directly to/from hard drive at full motion, full frame rates (50 fields/sec - PAL, 60 fields/sec-NTSC). Video is stored and played back at the highest resolution for each format (768 x 576 x 24 bit - PAL, 640 x 480 x 24 bit - NTSC). Compression can be adjusted on the fly to optimize for image quality and/or minimum storage space.
- Genlock using separate sync input for working in professional video suites
- Equipped with composite and S-video inputs and outputs. Also available with component input/output (TARGA 1000 PRO).
- The audio is digitized at 16-bit resolution (at 44.1KHz or 48KHz sampling rates), yielding professional quality stereo sound. Since all audio and video processing is done by on-board DSPs, you are assured of perfectly synchronized sound and images.
- Optimized to work with Winsows NT-based software (Adobe Premiere 4.2, in:sync Speed-Razor MACH III)

TARGA 2000 Additional Features:

- Equipped with composite and S-video inputs/outputs Also available with component input/output (TARGA 2000 PRO).
- Accelerated Windows 3.11 and Windows NT display drivers offer integrated, true-color (24-bit), non-interlaced desktop up to 1152 x 870 pixels.
- Provides a large work area for displaying video, as well as editing application controls. Any part of the display (or even the whole image) can be recorded to tape (video-out-of-a-window).
- View your desktop and video-in-a-window on your non-interlaced high resolution desktop display while the processed video is output at NTSC or PAL resolutions to a video monitor and/or a VCR.

Turnkey TARGA 1000/2000 and PVR-2500 Perception Systems:

• Video capture board (specify) • 220-watt, 6-bay midtower case • PCI motherboard with 256K pipelined burst cache • Pentium 133 MHz processor • Diamond Stealth64 Video 2MB VRAM PCI display card • 32MB of EDO (Extended Data Out) RAM • Quantum 1.28GB IDE system drive • Seagate (Barracuda) 4.2GB SCSI-2 FAST/Wide hard drive • Adaptec AHA-2940UW FAST/Wide SCSI-2 controller card • 3.5" floppy drive • Teac CD-56e 6X EIDE internal CD-ROM drive • Altec-Lansing 300.1 three-piece deluxe speaker system • Princeton Ultra 17+high resolution 17-inch multiscan monitor • Focus 2001A keyboard • Microsoft MS mouse • MS-DOS 6.22 and Windows 3.11 or Windows NT 3.51 operating system software.

*PVR-2500/AD-2500 Windows System with Adobe Premiere 4.0a	$7295
*PVR-2500/AD-2500 Windows NT System with in:sync Speed-Razor MACH III	$8495
TARGA 1000 Windows System with Adobe Premiere 4.0a	$7795
TARGA 1000 PRO Windows System with Adobe Premiere 4.0a	$8295
TARGA 1000 Windows NT System with in:sync Speed-Razor MACH III	$8795
TARGA 1000 PRO Windows NT System with in:sync Speed-Razor MACH III	$9150
TARGA 2000 Windows NT System with AVID Real Impact	$11,250
TARGA 2000 Windows NT System with in:sync Speed-Razor MACH III	$11,250
TARGA 2000 PRO Windows NT System with in:sync Speed-Razor MACH III	$12,000

*PVR-2500 System Notes: 1) Does not include Adaptec SCSI-2 controller card (has built-in SCSI-2 port) 2) Includes Seagate Barracuda 4.2GB Narrow hard drive (doesn't accept Wide drives) 3) Includes Stealth64 Video 2MB DRAM PCI display card (Add $100 for 2MB VRAM card) 4) Requires sound card (DSP-equipped card preferably)–see "Expansions and Upgrades"

Expansions and Upgrades for all Systems:

Substitutions

Full Tower Case (10-bay)	add 100.00	Super Tower Case (12-bay)	add 200.00
Pentium 150 MHz processor	add 150.00	166 MHz processor	add 400.00
Seagate Elite 9.1GB Narrow drive (for PVR-2500)	add 1000.00	Seagate Elite 9.1GB Wide drive	add 1000.00
Matrox Millenium 4MB VRAM PCI Display Card	add 250.00	Matrox Millenium 8MB VRAM PCI Display Card	add 400.00
MAG Innovision MXP-17F 17" multiscan monitor	add 225.00	MAG MXP-21F 21-inch multiscan monitor	add 1100.00
Altec Lansing ACS-500 three-piece surround sound stereo system			add 140.00

Add-Ons

APC Smart Ups 650 power backup	349.00	Conner 4GB QIC/ Wide tape backup IDE/SCSI	439.00
Ensoniq SoundScape Elite DSP-equipped 16-bit audio card (for PVR-2500 systems only)			199.00
MediaTrix Audio Trix Pro DSP-equipped 16-bit audio card (for PVR-2500 systems only)			279.00
Elastic Reality for Windows/Windows NT (includes Transjammer-30 transitions)			349.00
Transjammer Vol 1 (with 100 transitions)			89.00

in:sync SPEED RAZOR MACH III

Digital Video Editor for Windows NT

The ultimate digital video editing software, Speed-Razor MACH III allows you to edit full screen, 60 fields per second, CCIR 601 broadcast-quality video. Designed for the DPS PAR DR-2100/ Perception PVR-2500 and Truevision's TARGA 1000/2000 video capture cards, Speed-Razor MACH III is the fastest and most powerful tool for editing and compositing video clips, animations, stills, music and sound effects. Experience straight cut editing in real time and effects which fly on the fastest machines out there. Alpha,Intel, MIPs-based and PowerPC-based workstations, making this the fastest, most flexible software you've ever seen. Running under Windows NT, it offers three times faster than Windows 3.1 on the same machine and up to ten faster when used on Alpha-based systems.

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

EDITING FEATURES:

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

COMPOSITING:

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

FILE FORMATS:

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

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

AUDIO:

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

EFFECTS:

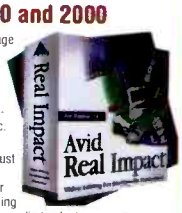
- Blur (circular, gaussian, fast), tint, brightness adjustment, chroma key, crop, displacement, emboss, freeze frame, glass texture, greyscale, invert, loop, matte, pixelate, repeat fields, scale, transparency, strobe, turn red/green/blue
- 3D DVE (translates and/or rotates an image in three dimensions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

TRANSITIONS:

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

Real Impact

Windows NT-based Video Editor for TARGA 1000 and 2000



With the introduction of Real Impact, Avid provides Windows users with the same professional image quality, intuitive cut/copy/paste editing, and instant random access capabilities that have won 2 Emmy awards—for thousands of dollars less than outsourcing an average video. Designed exclusively for Truevision's TARGA 2000, Real Impact lets you create professional-quality video with audio, graphics, animations, special effects and titles—with the speed, flexibility and creative freedom you need. Create sales, training and product videos right on your PC quickly and easily—without compromising quality. Produce video in 24-bit color, with CD-quality sound and perfect lip sync.

Easy to Use: A true 32-bit application (Windows NT 3.51), Real Impact's intuitive interface and extensive on-line help get you productive right away. It's powerful editing features let you work with video, audio, graphics, animations and titles with the simplicity of cut, copy and paste.

Video Capture: Digitize video and audio—without dropping a frame. Your video is full-screen, full-motion, 60 fields-per-second and your audio in sync. With its Dial-a-Quality image feature, Real Impact allows you to adjust image quality for differing system, storage and delivery requirements.

Create a Storyboard: Extensive media management with built-in media library and database let you easily find the video and audio clips that you want. Instant access makes previewing edits simple and immediate. And, with timeline editing, you just click and drag to experiment with different cuts, rearrange clips and assemble your story. There are 32 levels of undo/redo.

Add Graphics, Titles and Special Effects: Create and seamlessly incorporate audio, graphics and animations into your video using popular Windows-based applications. Real Impact supports AVI video files, WAV audio files, FLC animation files as well as BMP, JPEG, PCX, TGA and TIFF graphics files.

Add Audio: Polish your audio with music and narration. Adjust pan and volume in real time. Simultaneous playback of four audio tracks makes audio editing quick and easy. View your four audio tracks in sync with the video immediately, no waiting for tracks to compile.

Digital Media Interchange: Compatible with the Open Media Framework (OMF) Interchange, a file format for the seamless integration of digital data among applications and across platforms. Through OMF, you can import video and audio files from other OMF-compatible applications like Avid's Media Composer.

Output to Tape, CD-ROM or Over a Network: Gives complete control over video distribution. There's no long rendering process, creating professional quality tape is a snap. Embedding video in multimedia presentations for distribution on disk or CD-ROM is as simple as the click of a mouse. Supports third-party MPEG tools to create MPEG files for network distribution.

Avid's Support Advantage: Real Impact is backed by Avid's world-class customer service. Toll-free telephone support and bulletin board service are just some of the benefits.

FEATURES:

Video

- Real-time JPEG compression / decompression and playback at 60 fields per second
- Supports RS-422 control protocol and SMPTE time code.
- Edit two tracks of video for layered effects.

Audio

- Edit up to four tracks of 44.1 KHz, 16-bit CD-quality audio.
- Real-time pan and volume adjustments, digital audio scrub.
- Waveform for precise audio editing.

Import/Export

- AVI video files, WAV audio files, FLC animation files.
- OMF Interchange files.
- BMP, JPEG, PCX, TGA and TIFF graphics files.

Special Effects

- Filter effects with previews and adjustable parameters.
- Transition effects include wipes, dissolves, zooms, pushes and squeezes.
- Layered effects include picture-in-picture, luminance and chroma key.

Integrated Title Generator

- 32-bit processing (24-bit color and 8-bit alpha channel).
- Support for TrueType fonts and international character sets.
- Drop shadows, transparency and color blends.
- NTSC and PAL-safe color palettes.

Media Management

- Media library for organizing digital clips.
- Database with search capabilities.
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ELECTRONICS TECHNICIAN Experienced and entry level positions available. AA in electronics required. Work on broadcast MII video tape machines and camera. Some transmitter work. Drug screen required. WHAG-TV is a small market NBC affiliate. We offer a comprehensive benefit package, including 401(k) and section 125 plans. Send resume to Personnel, WHAG-TV, Dept. 2, 13 East Washington Street, Hagerstown, MD 21740. No phone calls. EOE.

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MAINTENANCE ENGINEER: Immediate opening for qualified professional with Nashville based TV production company. We produce a variety of radio and TV projects for national syndication, network and cable. Experience in component level repair of audio, video and digital equipment. Resumes and salary history to Steve Anderson, Operations Manager, Jim Owens & Associates, 1525 McGavock St., Nashville, TV 37203 or fax 615-256-7779. EOE.

TRANSMITTER TECHNICIAN Four years experience working with broadcast TV transmitters. Have a good understanding of high power RF. Some knowledge of translators and microwave systems. Send resume to Sam Tikkanen, Chief Engineer, KOB-TV, 4 Broadcast Plaza, S.W., Albuquerque, NM 87104. EOE/M-F.

WANTED CHIEF ENGINEER KVRR-TV Fox, Fargo, ND is looking for a Chief Engineer. Position requires knowledge of VHF/UHF and microwave transmission systems. Please send resume to KVRR-TV, Box 9115, Fargo, ND 58106 ATTN: Kathy Lau, GM. KVRR-TV is an EOE.

MAINTENANCE ENGINEER Immediate opening for experienced broadcast Engineer. Must have a minimum of 5 years experience in TV broadcast maintenance, including systems troubleshooting and repair of studio video and audio equipment, digital equipment and computer systems. Microwave and transmitter experience a plus. FCC General Class License or SBE Certification desired. Qualified persons should send a resume with references to Rich Lochmann, KFMB-TV, 7677 Engineer Rd., San Diego, CA 92111. E-mail: rlockmann@kfmb.com.

ASSISTANT CHIEF ENGINEER: Immediate opening in Washington, D.C. market. Five years minimum Broadcast T.V. maintenance experience, FCC general class license or SBE certification required, component level troubleshooting, computer literacy, transmitter experience a plus. FAX resume and salary requirements to (703) 528-2956.

MAINTENANCE ENGINEER Hollywood Post Production Facility seeking engineer for day/evening shift. Min. 5 yrs post/graphics/telecine experience. Sony dig/analog VTR's, GVG, Abekas, Quantel, Avid, SGI, PC. Fax resume to CCI at 213-466-2392.

BROADCAST ENGINEER: 17 WJKS, ABC Network affiliate is seeking a Maintenance Engineer. Requirements include at least 5 years of troubleshooting studio, ENG and SNG broadcast equipment to component level. Betacam experience required. SBE certification and SNG operations preferred. Send your resume to Personnel, WJKS-TV, P.O. Box 17000, Jacksonville, FL 32245, EEO M/F, Drug Testing required.

TROY STATE UNIVERSITY, Troy, Alabama is seeking a Director, Department of Radio and Television. This position provides the daily administration and technical management of the Southeast Public Radio Network (WTSU, Troy/Montgomery; WRWA, Dothan; WTJB, Phenix City/Columbus, Georgia), the TSU Microwave System and TSU-TV, educational access television. The ideal candidate will have both an engineering/technical and a management background in television and radio. A B.S. degree is required. Send letter of application, resume, transcripts and three professional references to the Office of Personnel Services, Troy State University, Troy, AL 36082. Troy State is an AA/EEO employer and encourages applications from females, African Americans and other minorities.

CHIEF ENGINEER: WXOW-TV, La Crosse, Wisconsin has an opening for the position of Director of Engineering and Operations. This position is responsible for managing all engineering, maintenance and technical operations of WXOW. Interested candidates should possess experience with RCA transmitters, ENG operations, equipment maintenance, computer systems and general studio/production operations. SBE certification, FCC General Class license, management experience and five years in broadcast engineering preferred. This opportunity will provide the right candidate with the chance to join a "winning" station and be a part of an outstanding management team. Send resume to: Chuck Roth, VP/General Manager, WXOW-TV, P.O. Box C-4019, La Crosse, WI 54602-4019. WXOW-TV is an Equal-Opportunity-Employer.

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RF MAINTENANCE ENGINEER Oklahoma PBS affiliate has an opening for a Network Maintenance Engineer. Component level trouble shooting skills required. Ideal candidate will have UHF and VHF translator and transmitter, and a good working knowledge of microwave systems. In state travel required. Comprehensive benefit package. Please send resume with salary history to Personnel, OETA, P.O. Box 14190, Oklahoma City, Oklahoma 73113. AA/EEO.

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B & H Photo - Video	133-135	79, 80	800-947-9928
Broadcast Microwave Services	52	29	619-560-8601
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Canon USA Broadcast Lens	19	8	201-816-2900
Cipher Digital, Inc.	127	69	301-695-0200
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CPI	51, 53	28, 37	415-424-4515
Datatek, Inc.	95	52	800-882-9100
Divi Com	119	83	408-944-6700
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D/Vision Systems Inc.	125	87	800-D-VISION
EEV, Inc.	81	49	800-DIAL-EEV
Ergo Industries Inc.	66	45	800-635-9297
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Florical Systems Inc.	22	16	352-372-8326
Force, Inc.	82	59	540-382-0462
Fujinon, Inc.	45, 47	22, 23	201-633-5600
Full Compass Systems	46	66	800-356-5844
Harris Corp./Broadcast Div.	1	4	606-282-4800
Hewlett Packard	29	35	800-452-4844
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Its Corp.	85	60	412-941-1500
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Louth Automation	27	19	415-843-3665
Maxell Corp. of America	11	13	800-533-2836
Mountaingate Data Systems	123	84	800-556-0222
Multidyne Electronics	127	73	800-4TV-TEST
Musimatic	127	70	770-484-8434
Myat	127	72	201-767-5380
Nucomm Inc.	74	31	908-852-3700
Odetics, Inc.	65	43	800-243-2001
Opamp Labs, Inc.	82	82	213-934-3566
Pag Ltd.	67	46	+081-543-3131
Panasonic Broadcast & TV	42-43		800-524-0864
Philips Broadcast Television Systems Company	5	10	800-962-4287
Pinnacle Systems Inc.	109	64	408-720-9669
Pixel Instruments Corp.	12	15	408-354-9122
Prime Image Inc.	111	75	801-272-5352
Quantel Inc.	13	6	203-656-3100
QuVis	71	54	415-457-3005
Rane Corporation	58-59	41	206-355-6000
Ross Video Ltd.	121	67	613-652-4886
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Sony Business & Professional	62-63		800-635-SONY
Standard Communications	79	48	310-532-5300
Steadi Systems	76	25	800-451-6920
Tascam/Teac America, Inc.	83	50	213-726-0303
TDK Electronics Corp.	91	63	800-TDK-TAPE
Tektronix/Grass Valley	37	32	800-998-3588
Tektronix/Profile	39	33	800-998-3588
Tektronix Inc	57	9	503-627-2830
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By Paul McGoldrick

Compressing video

Many video engineers find the idea of compressing a signal and losing information hard to swallow; others find it a technical challenge to minimize transmission bandwidth while fooling the viewer to the maximum degree. Given that "broadcast quality" is a meaningless statement — whatever is broadcast, is broadcast quality — just look at "America's Funniest Home Videos!"

Bit-rate reduction

It is apparent that the viewer will tolerate a lot more (or less) in the video signal than a professional. And there can be no argument that compression is here to stay, making recording on disk not only possible, but often desirable. In technology terms, it may be more accurate to avoid the word compression, which suggests elasticity and, therefore, full recovery and talk of bit-rate reduction. The compression ratio is the ratio between the original and the final bit rate.

Nearly all of the compression standards being used in professional video today are centered on the discrete cosine transform (DCT), Fourier transform technology that has been around for a couple of decades (the targeting system of the Patriot antimissile system, for example). It would probably not be the choice of the 1990s, but we are in a conservative industry and having taken so long to find DCT, we are going to be living with it for quite a while. You will see, however, an increasing number of uses for wavelet and fractal techniques in video applications more specialized than our small information section. If my mailbag suggests it, we can cover the basics of these other technologies in a later column.

DCT — the beginning

DCT is the starting point of the compression standards and is reversible; there is no loss through the transform. There is no compression inherent in the transform itself. DCT is based on the understanding that any waveform seen in a time frame can be broken down into frequency components. Adding all of those components together will restore the original waveform. Typical systems for video look at areas of 8x8 pixels and the transform gives us 64 coefficients (based on frequency) to consider.

Discrete cosine transform (DCT) is the starting point of many compression standards.

What happens to the output of the transform then depends on the compression standard being used. Decisions must be made as to whether particular coefficients are ignored, where redundancy can allow the omission of some, whether coefficients can be sent with fewer bits and so on. The major system differences occur on the identification of redundancy within a single picture or from picture-to-picture (forward or backward).

The coefficients can also be "weighted" as to their visibility in a restored image, such that less concern can be taken on some coefficients that may be ignored and schemes can be devised that use prediction techniques based on standard, average picture material. The result can then be subjected to standard data-compression techniques. Figure 1 shows a compression/decompression channel in its basic form. The stage preceding DCT is a loss stage and basically predistorts the signal so that unwanted coefficients are never produced in the first place, reducing processing needs.

The decompression part of the system is basically the reverse process; the data is decompressed, reversing whatever scheme was used, the weighting that was applied is inverted and the transform is inverted by summing all of the coefficients.

Answering your questions

Next month, without excruciating detail, we will look at the differences between JPEG, Motion JPEG and the MPEGs, but here we need to end with some housekeeping. Those of you who have contacted me now know that I respond to every courteous E-mail I receive. In the last month, there have been some interesting questions about component sourcing for serial (SDI) and about the Sony SSDI standards (for advanced television). The latter will be covered in this column. On the former, there have been two suppliers of parts for serial applications: Sony and Gennum. Another player has now entered the arena, Comlinear (part of National Semiconductor), with two recent product announcements for the receive end of the serial path and more to come.

If you need more information or if you have any questions or positive criticisms, drop some bits off to me through 74672.3124@compuserve.com. ■

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

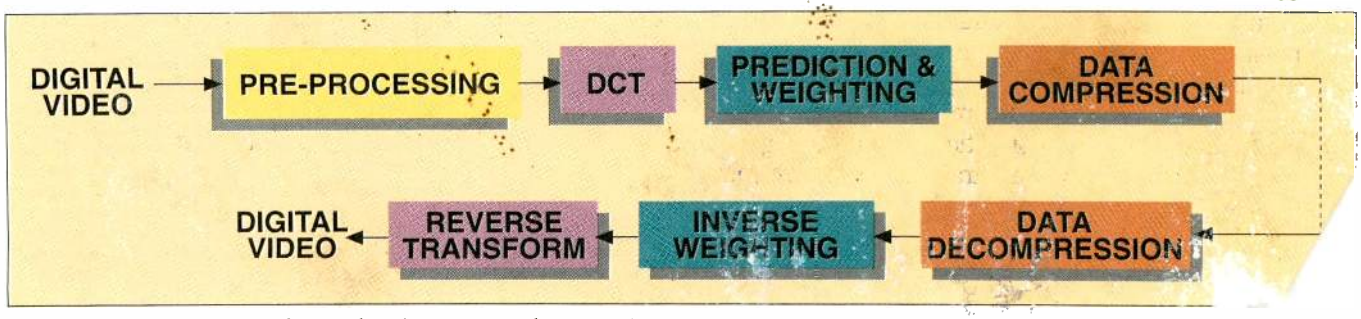

Figure 1. Basic block diagram of a DCT-based compression/decompression system.

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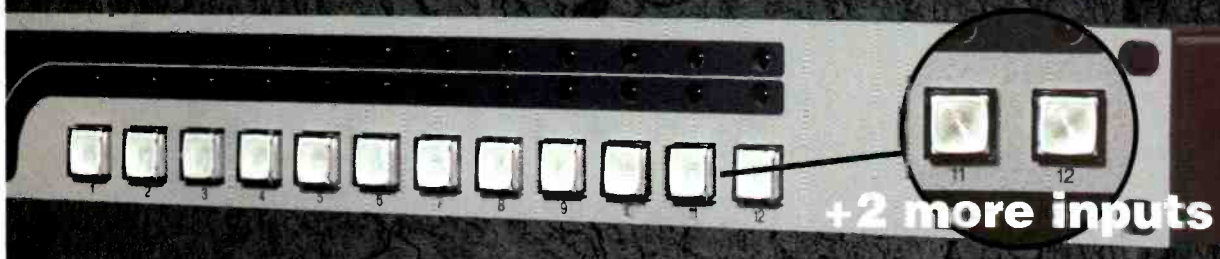

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