While Wheatstone is best known for its major market clients, we have tailored this console specifically for the local facility. It has everything operators need, yet it's straightforward and easy to operate.

The SP-8's fast mix-minus system allows individual foldbacks to talent, anchors and technical crew to keep your live programming moving smoothly. Four auxiliary pre or post send controls provide even more powerful foldback options. Its channel group muting feature lets you energize and de-energize banks of channels with the push of a single button, so break/live transitions become error free. A sophisticated internal logic system has bus assignment dependent monitor mutes to prevent accidental studio interruption during live segments. The console has plenty of monitoring capability and can feed a control room system as well as multiple studio outputs—perfect for separate morning and evening setups.

The SP-8 has all the flexibility of its larger predecessors. You have a selection of mono mic/line modules, dual mic modules (for studio one and studio two), and stereo input modules. You can even get this console with a preselector overbridge, to increase its input capacity eight-fold. It's available in countertop, through counter, or furniture stand versions to fit any architectural theme.

Take advantage of Wheatstone's experience and contact our sales engineers. We've got the knowledge!

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Circle (1) on Action Card
The race for the first HDTV transmitter is over!

Harris is first in HDTV transmission.

While others scramble to develop ATV/HDTV transmitters, Harris has already crossed the finish line. And that's no surprise, considering our vast experience in every type of television broadcasting.

From installing the world's first HDTV antenna, to delivering the world's first HDTV-specific exciter and Harris HDTV test signal generator, Harris has led the way for years. Now, with the successful demonstration of our high-power IOT ATV transmitter, we've proven once again that Harris is uniquely positioned to help you make the move to HDTV.

Grand Alliance compatibility.

With decades of systems integration experience in UHF, VHF, satellite and wireless cable technology, Harris understands the importance of compatibility with equipment from other manufacturers. That's why we've developed our equipment to meet the anticipated standards of the Grand Alliance ATV system.

In fact, since 1989, Harris technology was even used to evaluate every HDTV system proposed to the Advances Television Test Center.

Up and running with Harris.

As with most leaders in digital-ready and full-digital broadcast systems, Harris knows that you need a top-quality signal delivered with your bottom line in mind. With literally thousands of successful Harris-designed-and-built broadcasting systems operating worldwide, we have the know-how — now — to help make your transition to HDTV as efficient and profitable as possible.

If you plan to be competitive in HDTV tomorrow, why not put the resources of the proven HDTV winner to work for you today. Call Harris to learn how you can win your race.

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Circle (4) on Action Card
THIS MONTH...

30 Pick Hits of NAB 96
By Steve Epstein, technical editor
The BE judges looked high and low to find the hottest products at this year's show. This year’s Pick Hits represent the changing needs of technology managers.

48 NAB Playback
The NAB 96 convention was the largest on record and it took an army of reporters to bring you this in-depth coverage direct from the convention floor.

DEPARTMENTS:

10 FCC Update: FCC adopts Grand Alliance ATV standard
12 EAS Update: This is only a test
14 Transition to Digital: When does analog make sense?
18 Management: The foxhole
20 Production: Audio for post
24 Interactive: What is interactivity
26 ATV Update: Washington, DC – site of the model HDTV station
130 Transmission Technology: Bells are ringing for wireless cable
140 Digital Basics: Compressing video

COLUMNS:

4 Editorial
6 Reader Feedback
8 News
136 Classifieds
139 Advertisers’ Index

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.
Introducing
The DSA309
Digital Studio Analyser

All Format Digital Video Analyser: Tests component and composite serial digital video signals in both 525 line and 625 line formats.

Real Time Measurements: Continuous real time, on-line measurements of all key parameters permits live monitoring of:

- Serial Jitter
- Signal Amplitude
- Color Levels
- Non-Recommended Value Errors
- EDH Errors
- Parity Bit Errors
- TRS Errors
- Bit Activity
- Reserved Code Errors

Real Time Color Level Monitoring: Monitors component digital video in real time for RGB or NTSC/PAL color space infractions.

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Circle (5) on Action Card

For a comprehensive information packet, call 1-800-769-AAVS (2287).
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 many 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, editor
We’ve put our best name forward

Welcome to Philips Broadcast Television Systems. As the legendary Philips name comes to our trusted products, we will introduce even more world-class solutions in television technologies. We still have all the great people you know. Today, more than ever, their aim is to make television even better.

Circle (10) on Action Card

© 1996 Philips Electronics North America Corporation
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.
Leading edge performance has been a defining feature of Audio Precision products since the inception of our company in 1984. Thousands of our System One audio analyzers are in use worldwide, selected by design engineers for high performance and by test engineers for our comprehensive programmable analog and digital audio measurement capabilities.

Now our System Two true Dual Domain audio analyzer joins the System One, setting a new standard for performance and flexibility in audio-frequency test & measurement.

System Two is a true Dual Domain analyzer. Other test instruments may have both analog and digital inputs and outputs ... but they’re not true Dual Domain! They rely on performance-limiting converters to pass analog signals back and forth to a DSP core of digital-only hardware. Passing signals through A/D or D/A converters for every measurement robs the test instrument of performance. System Two includes separate, independent hardware for direct audio measurements in both domains, plus additional and extensive interface measurement capability including jitter measurements, eye patterns and all other parameters described in AES3, the serial audio interface standard.

The new standard of System Two is represented by performance specifications such as guaranteed analog generator and analyzer residual THD+N -108 dB, guaranteed analog signal flatness of +0.01 dB for the generator and analyzer; and 24 bit digital signal generation with 48 bit FFT dynamic range.

From aircraft to automobiles, satellites to cell phones, headsets to hearing aids, System Two represents a new standard for audio frequency test & measurement applications. Compare for yourself -- our worldwide force of representatives will be pleased to provide comprehensive specifications and a true Dual Domain on-site demonstration.
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.

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 newspapering 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 newspapering 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 transmission at their respective locations. This process represents a departure from current, satellite-based technology that makes newspapering a reactionary process for affiliates.

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.
You deliver the story at the top of the hour. Period.
The story is everything—and the tools you use to
deliver it must be proven: Flexible. And fast.

Avid can help you beat the clock. Letting you air
consistently high-quality broadcasts while the compe-
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Our disk-based editing system, NewsCutter®,
is, quite simply, a better way to edit news. Just like
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the control and flexibility that digital-cm-disk does.

Avid’s newsroom computer systems, Avid
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Imagine the impact on productivity and efficiency.

And our unique Digital News Gathering (DNG)
system integrates our news editing and playback
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system. No more waiting. No more missing the
deadline.

Avid’s field-tested systems are scalable, modular
and open. They can be integrated into your existing
analog or digital facility and will grow with you.

Sci-fi? Look again. Avid’s systems are in use in
more than 900 broadcast facilities worldwide. Today.
That’s a lot of broadcasters who can react to late-
breaking news faster—and better—than you can, if
you’re relying just on tape.

For more information on Avid disk-based news
editing, newsroom computer systems or Digital News
Gathering, call 800 949 Avid. You can’t control
time. But you can make better use of it.
FCC adopts Grand Alliance ATV standard

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.

The FCC also has proposed a new fee schedule for fiscal year 1996 that would be in place by the end of fiscal year 1997. The new schedule would include a fee for construction permits (CPs) and auxiliary stations. The proposed fees would be in addition to the existing fees for TV stations.

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.

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

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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.
Who Says It's Lonely At The Top?

Maxell is ALWAYS at the TOP with the Exacting digital performance of its D-2 and D-3, Digital BETACAM and BETACAM SP videocassettes. Using advanced magnetic tape technology, featuring Ceramic ARMor Metal particles, Maxell has produced the perfect product on tapes for every recording application from ENG/EFP to broadcasting. Maxell's "top line" videocassettes feature unmatched error rate and consistent quality, even under severe operating conditions. Add an incredibly strong binder system for increased durability and lower error rates, and you'll be using the superior digital videotapes that keep Maxell creating innovative tape technology for demanding professionals.

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Circle (13) on Action Card
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.

Keeping Video in Sync

Serial Digital Synchronizer & Proc Amp

The DS4200 Frame Synchronizer and Processing Amplifier from Pixel Instruments synchronizes “601” serial digital signals to a composite analog or a digital reference signal. The built-in digital processing amplifier provides local or remote control of video levels, output timing, presets and freeze functions.

• Auto standard detection for input video and reference
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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 retrospective 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.

Even today, these "analogs" cannot be converted directly to their digital representations. First, the signal must be transmitted 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 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 dig-

---

When does analog make sense?

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

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 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.

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 ¾-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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Imagine this scenario. You have had the same job 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 do 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 the foxholes are being rolled in and your company's managers are sitting in the foxholes.

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.

### 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 cashouts), 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 short-term memories regarding gratitude than they have for being at the butt end of your actions.
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For more information on the IS-20B, please call 1-800-321-4388. (In Canada call 905-795-2012.)
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 "prestripe" 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 is possible.
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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, autpunching can help mute tracks to eliminate unwanted audio. Many of these units can edit with single-sample resolution (1/10,000s).
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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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-R)?
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 television 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 used to be able to sleep nights. But over the last ten years things have changed. Today's television systems are now so complex and demanding that, at times, they resemble your worst nightmare.

To succeed, you need the combination of experience and vision provided by Vistek. A company at the heart of television's technological revolution throughout the last ten years. Vistek, whose innovative Emmy Award winning products have set the standards to which others aspire.

Vistek's comprehensive range of standards and format interchange products unravel the complexities of digital processing in multi-channel environments for which the company also provides a well-proven range of automation solutions. And routers and switchers from Vistek are to be found in installations of all sizes throughout the world.

The modern broadcaster's requirements for high performance MPEG-2 and ETSI codecs for contribution and distribution over satellite and communications networks, are served by Vistek to the same exacting standard that has brought peace of mind to some of the best known names in broadcasting.

It doesn't have to be a nightmare.

I want to sleep better. Send me more details.

Circle (18) on Action Card
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 between the ATTC.

**Washington, DC — site of the model HDTV station**

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

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

Now, whether you call it enlightened self-interest or investment spending, the fact is we didn’t give the Louth Protocol away for nothing. We were looking ahead.

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

We believe in working with anything. Even when it’s hard.
True Transparency.


ShibaSoku monitors provide incomparably precise image reproduction—with the highest color and luminance fidelity available anywhere. Their remarkable durability means less downtime and lower maintenance costs in the long run.

ShibaSoku's 40 year tradition of accuracy is also reflected in a wide range of superior test instruments. That's why leading electronics makers choose Asaca/ShibaSoku equipment as the standard by which to measure their own products' performance.

For true transparency, unparalleled accuracy, and the most precise analysis, look to Asaca/ShibaSoku. The clear choice.

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.

READER FEEDBACK

CompuServe: 74672,3124
Internet: be@intertec.com
FAXback: 913/967-1905

Circle (20) on Action Card
Looking for a broadcast server to get you on air today — and keep you there? You should give the HP MediaStream broadcast server a shot. Our bulletproof architecture is engineered to maximize dependability today. And minimize problems adapting to a changing industry. A single server provides 6 channels and nearly 30 hours of storage. And HP servers can be easily networked — allowing you to add even more channels and storage as you go. Plus, our open-systems approach ensures compatibility with a wide variety of third-party hardware and software vendors. Combine all that with HP's 24-hour service and support, and you're looking at the most reliable server money can buy. But don't just take our word for it. Ask the engineers at KCRA in Sacramento. Or MTV Europe in the U.K. Because from Arizona to South Africa, broadcasters around the world count on the HP's broadcast server every day. And it hasn't let them down. It's engineered to meet your broadcast needs well into the future. But at $100,000, it's priced to fit your budget today. For free product literature with more information, call 1-800-FOR-HPTV Ext. 1632 today. You'll find out what HP's broadcast server can bring to your station, both now and in the future. If you're looking to invest in a server you can count on, take a look at the HP MediaStream broadcast server. Then give it your best shot.

There is a better way.
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*
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.

Circle (152) on Action Card

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 4x3U 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

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
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.

Circle (156) on Action Card
The new Sachtler Vario Pedestals offer unique features for studio and OB operation:

1. Continuous column stroke, for shooting from sitting to standing person's height — Vario Ped 2 - 75.

2. Rock steady and 50 kg/110 lb lightweight, to carry equipment up to 90 kg/200 lb — Vario Ped 1 - 90.

3. Carriage and column can be disassembled in seconds — compact modules for ease of transportation.

4. Quickfix, allows instant change of fluid heads for flexibility — included.

5. Track width, narrow and wide, symmetric and asymmetric — set in no time and you well can expect precise, easy steering and crabbing, smooth and jerk-free column movement thanks to the patented Sachtler pneumatic system. Test for yourself the optimum camera support for all compact Studio/OB cameras, now!
What do you get when you cross the legendary performance of the Sony BVP-700/750 Studio/OB/EF cameras with the quality and affordability of the new BVP-500/550 cameras? A sibling rivalry where you come out the winner. That's because each studio camera shares accessories not only with its companion portable, but every camera in the family as well. Which means you can adapt, adjust, customize, configure, modify, mix and match your way to a whole new level of flexibility, efficiency and economy in both the technical and creative aspects of your program origination. By mixing and matching lenses, CCD imaging blocks, video control panels and camera control units, you can create...
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. Mix & Match. And find out more about the most functional family you'll ever meet.
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-D700 camcorder

The AJ-D700 is a full-size DVCPRO camcorder. It features three 1/2-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

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
STILL... Grass Valley

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

http://www.tek.com/VND
**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

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**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

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**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
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.

© Tektronix, Inc. Profile is a trademark of Tektronix, Inc.
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

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

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

40 Broadcast Engineering June 1996
"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, spoofs, 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!

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.

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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Try Instant Replay Free! Call 818-991-0360

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.

360 Systems Instant Replay is a registered trademark of 360 Systems. ©1996 360 Systems.
The News is

Marcus Solis.
NY1 News Reporter

For more information call: 1-800-528-8601 (upon request enter product code 16) One Panasonic Way, Secaucus, NJ 07094.  The NY1 logo is a registered trademark of Time Warner Entertainment Company, L.P. © 1996.
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.
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
Our AT lineup: the lightest, sharpest zoom lenses in the field.

Ever 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.

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 ultralong 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.

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.
No Matter What Your Direction...

Compass Systems carries over 400 brands of professional equipment to all of your needs, so if you need or any other audio, video or lighting device—and want quality at rock prices—then the friendly at Full Systems.

A step in the Right Direction.

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
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DAVID C. FELLAND
Director of Engineering and Operations
WMVS/WMVT, and Director of Engineering
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RICH SCHMELTZ
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PETER ZAWISTOWSKI
Senior Engineer
Target Enterprises
North Reading, MA

Circle (66) on Action Card
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.
Take 7,000 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 15th 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
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 MediaServe, 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 disk 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 disk 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 scalable.

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 scalable 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-4.990 automated video cassette library interfaced to a Tektronix Profile for digital spot playlist caching. Spectrum is scaleable to 2 or 4 entry-level 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.

June 1996 Broadcast Engineering 49
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 petabytes 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!

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.
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52 Broadcast Engineering June 1996

Sony's DVCPro 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-term 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. Scitec 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 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 BW-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 Discovery, SCSI-framer, 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 Jack-Hammer for Windows NT systems. The Jack-Hammer 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 Jack-Hammer'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 Queuing 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 1GB 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 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 500, 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 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 DS VTR. Also announced was the ability to use the Viewgraphics Da-View with the AJ-D580 to record data at high speeds rather than video.

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**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, scalable 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, switches, 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.

Leitch has introduced a 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-
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+NTSCand 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 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 I.CD 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 Mil).

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 quaduplers for displaying 325- or 625-line signals on large-screen displays.

Folsom Research showed its model 9600 VIP, which allows four
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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 itsgLink 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. Analog composite and component outputs are also available.

Sonic showed its new DSC-1024 digital scan converter. The DSC-1024 converts PC and workstation resolutions (up to 1,280x1,024) to 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.
Teknische 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 6034 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 6034 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 offered many standards converters, including the new 7830 on the type of card. Single rack-unit interfaces are also available. These cards 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.

**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

![Image](image_url)

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

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Circle (41) on Action Card
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
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.

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.

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, Unifil Mobile Video, Channels 2 and 13 Buenos Aires, and TV Globo, Brazil.

Shoot your stars, with the HK-377. Call the nearest Ikegami Regional Office.

The HK-377/377P cameras have the Skin Tone Detail feature which received the Engineering Emmy Award for technical achievement.
Zimbabwe - 1985

YOUR STORIES AREN'T WRITTEN ON THE PAGE. THEY'RE WRITTEN ON THE STREETS, UPON THE WALLS, AND IN THE MUD. AND MORE OFTEN THAN NOT, THEY'RE WRITTEN ON SONY BETACAM® TAPE. THE ONE USED BY MORE OF YOU THAN ALL OTHERS COMBINED.

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TIME FOR PEACE

Northern Ireland - 1994

WHAT WE FEEL, WE REMEMBER.

Alaska - 1989

Soviet Union - 1989

South Africa - 1993

SONY

Each day the history of the world is written on Sony Betacam tape.
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 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 NVI 1200 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.

Teletics' compact PT-CP pan/tilt mechanism delivers all the speed, smooth movement and versatility you need for today's applications. With all the quality and quiet operation you've come to expect from the leader in camera remote control systems.

The PT-CP supports virtually every motorized lens, control system, single and 3-chip camera available. It can also be configured with either a side or top camera mounting platform. And mounts right side up, or upside down. Additional features include aluminum construction, heavy duty cross roller bearings and precision motors.

Any way you size it up, Teletics' PT-CP will make your head spin. For more information, call 201-848-9818, or fax 201-848-9819.

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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.

**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 E.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.

**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-
The roof is about to collapse...
Quick!
How Long's 10% of 66 Watt Hours?

When the action's breaking, a fuel gauge display of your battery's charge isn't good enough. That's why PAG invented System RTI - the world's first accurate read-out of time remaining on a battery's charge. No more bar graphs to interpret. No more missed shots due to inaccurate information.

Down to the Second.
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.

Direct From Paglok To Finder.
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.

Upgrade Your Camera.
The Paglok connector with System RTI fits any popular broadcast camera.

No More Guesswork.
Not knowing precisely how many minutes you have left on a battery can cost you the shot you came to get. When every second counts let PAG System RTI account for every second.

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Circle (46) on Action Card

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SYSTEM RTI
RUN-TIME INFORMATION

PAG USA
2755 Alamo Street, Suite 103,
Simi Valley, California 93065.
Tel: 805-520 4911 Fax: 805-520 7342
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.

**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 3Ah 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 timecode reader, a stand-alone clock or a master 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.
Course: How to get a perfect picture

Course Instructor: Dr. Dish

Experts like Dr. Dish, also known as Ray Conover, agree the Faroudja DFD-U Digital Decoder and D1 converter is the ideal bridge between the analog world of PAL and NTSC and the digital world of D1.

"We use the new Faroudja equipment as a front end to our digital encoding equipment to improve the quality of the signal that we provide to subscribers. The bottom line—it takes our picture and makes it better and gives our customers the highest quality picture available.

"The biggest consumer electronic success is based upon digital transmission of television signals via satellite. Digital compression systems operate in the component domain. However, most available program materials are in PAL or NTSC format and must be properly decoded. Faroudja's DFD-U provides the necessary link between the PAL/NTSC analog world and the digital world of compression. It does not degrade image quality. We are proud to say that Faroudja and U.S. Satellite Broadcasting together have set a new standard of picture quality."

Call to arrange a demonstration and learn how you can get a perfect picture.

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

The DDA-144 is a component serial digital distribution amplifier with composite analog monitoring. The input signal is equalized and serially relocked 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.

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.

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 9000SR 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 9000SR 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...
Meet QuBit

The intelligent digital video recorder

- D-1 resolution video recording 4:2:2
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bandwidth, ease of use, and versatility.

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computer animators, QuBit's the answer.

Affordable. Seriously.

See us at SIGGRAPH
Booth #2061
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, Duhner 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.

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 1/2-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 VW-E590 is capable of operation under extremely low light conditions, down to 0.0035lux.
You can achieve powerful results with the Vinten Vision Series of fluid heads and tripods.

Featuring our exclusive Infinitely Adjustable Counter-Balance System, users can enjoy absolutely perfect balance over a full 180° range of tilt. The competition’s step adjustments fall short.

Another Vinten advantage, the LF (lubricated friction) Drag System, provides infinite drag adjustment that can be set even while on-air. For rough terrain, stadium steps and uneven surfaces, Vinten has a Mid-Level Spreader which allows the user to adjust one leg at a time. Other innovations include our patented Torque-Safe Leg Locks featuring one turn for maximum clamping efficiency every time.

To meet and exceed even the toughest requirements, Vinten uses composite graphite, reducing weight even further, while enhancing durability.

Discover what our ENG/EFP, Film, industrial and corporate customers already know: For Powerful Vision and benefit-oriented technology, nothing measures up to a Vinten.

For the Vinten TSM dealer in your area, call today.
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 1013 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 LDK 10/10P 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 1/3-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.
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 wave, 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.

Not just digital, Hitachi digital.

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
- Single LSI does RGB processing for ultra-pristine image
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Circle (53) on Action Card
These popular cameras stand out as real performers, especially when less than studio conditions prevail. Operation at 1 lux is possible, with a sensitivity of F9.0 at 2,000 lux 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, 2,000 lux, 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.

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 1/3-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.

Thru the lens

Angenieux was showing two new studio lenses. The studio 22x7.5 - f1.5 lens is designed for 1/3-inch CCD operation. It provides an extended range of F7.5 at 330mm, with a wider angle of 60°. 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 stock market

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But it's just the beginning. Comark is the first manufacturer to introduce a transmitter designed specifically around the requirements of the Grand Alliance digital standard. A system engineered from the ground up, it will set new technical standards as well as provide ease of use, simple maintenance and no-hassle installation.

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prism technology. It's designed to be front-mounted to the J20aX8B and 3½-inch H20aX6ENG zoom lenses. Other models of the vari-angle prism lenses are also available.

The J9aX3.2 JRS/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 Fujino 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 3½-inch ENG/EFP cameras. The lens completes the company's all new product line, which includes the S15X8.5B1-III standard lens and the S9.6X5.3B-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.

![Image](https://via.placeholder.com/150)

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 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 and 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.

**Video monitors**

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**Camera accessories**

Under the accessories department, Band Pro announced its FMG-6 focus/siris control motor for precision lens control. Manufactured by S.P.E 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.

**Telescines**

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 TTFE file 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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There is much more you should know about the Intercontinental - and Standard Communications - than we can tell you in a single ad. Call us or fax us. We'll send you more information showing you how to get the best performance and peace of mind. Link up with our new Intercontinental.

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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-11, 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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Subsidiary of the General Electric Company plc of England
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.

**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 Manfrotto, the 316 HD for 13- to 35-pound payloads and the 510 for smaller, 9- to 19-pound cameras. The 316 HD 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 -30° 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 2SL, 351, Baby and 351 Classic. 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.

**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), MXM-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 MXpress. 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 uncompressed editing on SGI Onyx and Indigo2 IMPACT workstations. MXpress 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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Bright LEDs so you know what's going on.

Stereo Buss/AUX SUB Inputs
Signal routing designed for flexibility and expansion.

Dedicated Stereo Tape Input
No need to waste a precious stereo channel for your master recorder. Assignable to L/R buss or monitor.

EQ on Every Input
Hi (12kHz) and Low (80Hz) ±16dB on each.

2 AUX Sends
Take your signal: Pre or Post

4 Effects Returns
Use your imagination

Overload/Peak Indicators
No guess work here. You get them on every channel and for PFL.

4 XLR Mic Inputs
Complete with 48V phantom power for using the highest quality condenser microphones.

40mm Master Fader
What's a mixer without a master fader? Greater visual reference of your mix.

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No guess work here. You get them on every channel and for PFL.

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Complete with 48V phantom power for using the highest quality condenser microphones.

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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 ST-300-SM slow-motion controller on display. Designed primarily for sporting events, the unit can store up to 100 cue points. The optional T-bar controller is aimed at professional animators and provides CCIR-601 editing and capture card. It's capable of capturing audio and video simultaneously, ensuring proper sync during record and playback. FAST Electronics launched its next-generation AV Master PC video editing and capture card. It's capable of capturing audio and video simultaneously, using technology 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 Dalters, as well as audio and video switching and effects devices.

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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 nonlinear 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 AUX roll and auto trim.

From the Lightworks division of Tektronix comes the Lightworks VIP. The VIP system features recording and playback 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 multi-channel 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 Edibbox got even better with the release of Edibbox 96. Edibbox 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 company's 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.
ITS, the wireless transmission market leader, introduces the new ITS-5520 series of digital transmitters that offers an endless number of superior features to help you achieve successful system implementation. As the chosen supplier for the first major digital wireless cable systems in the United States, ITS has the expertise to engineer, produce, and install the highest performance transmitters available today.

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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.

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.

**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 ultimate 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.

**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 RS-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 switches 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 formats, 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.

**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 Scitec Digital Video is the Abekas "Dveous" $100 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/wipe function, which allows a DME effect to be called from the remote-control panel.

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 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.

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

Integrated production systems

Integrated production systems

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 Ultimate include the Ultimate 8. Using 4:2:2 or 4:4:4 inputs for the foreground and background, the Ultimate 8 is the company's most powerful matting system to date. Ultimate 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 Ultimate keyer is now being released for Premiere and After Effects users, providing familiar Ultimate matting and controls in a desktop package. It also includes such advanced features as Screen Correction, Grain Killer and flare controls in an affordable form.

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,
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 graphics system, which allows multiple users to network any of the CGs feature allows the operator to sync INFiNiT! graphics and transitions with DDR playback.

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 Electrosoft, 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.

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 graphically information in large readable 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 paint 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 Texas team character generator. The dual-channel Texas 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. Texas 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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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 scalable, 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 an 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 2Mbs to 15Mbs. 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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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 outputsfully 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 I/C, 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.

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.

**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 Snell & Wilcox booth, was Grass Valley’s quad transmitter/receiver pair. The modular system is designed for studio applications, accepting up to four digital signals of 1Mbit/s to 360Mbit/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 Multi- dyne. The dual FM-carrier-based system is designed for analog video input with 10MHz bandwidth, accommodating video with multiplexed audio carriers at 5.5MHz. Also offered is 5.8 MHz and 6.4 MHz. 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 can accommodate up to 7km with multimode fiber and 20km with single-mode fiber. The dual FM-carrier-based system is designed for analog video input with 10MHz bandwidth, accommodating video with multiplexed audio carriers at 5.5MHz. Also offered is 5.8 MHz and 6.4 MHz. Multidyne offers the system in portable and rack-mount configurations. LED versions are designed for multimode fiber and laser versions for single-mode fiber.

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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.

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. As it seemed, 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.) This is 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, multisite, 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 station offers a faster-than-real-time transfer to disc (four 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-100U 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 selectable 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 OS and Windows-based computers real-time DVE capability and a true-real-time quality. 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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DIGITAL AUDIO WORKSTATIONS

By Brian Sanders

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 SADIE 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 Jazz 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.

Doremis 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.

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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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 systems.

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 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

MICROPHONES AND MIXERS

By Terry Skelton

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, dual-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-714.

Carl Countryman showed his new and small omni lavalier 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 10kHz 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.

Crowns has been shipping its CM-700 condenser, designed for recording and sound reinforcement. This cardioid, phantom-powered black beauty will handle up to 15dB-SPL.

The unique look of the Seeadman 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 black beauty with up to 15dB-SPL.

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Circle (86) on Action Card
The new Sennheiser diversity receiver provides high-quality reception for wireless applications over 16 preprogrammed channels.

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 mixing console.

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 equalization performance is high.

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 sonner headset/mic combinations, such as the DT 350 and 450, are now available, with a choice of omni-electret or supercardioid dynamic boom mics. Also shown was the MCE 84 "lecture condenser cardioid mic. While primarily designed for broadcast console, Logitec 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.

Auditortronics debuted NutStar, 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."

Lectrosunolos displayed its microprocessor-controlled adaptive algo-
Because you can never be too safe. The VR disk-based broadcast system incorporates multiple redundancy strategies — including RAID fault tolerance technology — which eliminate any single point of failure. And that means an integrated digital solution with total redundancy and absolute reliability. Is it possible to have too much of a good thing? Choose a VR system and you won’t ask twice.

What digital ought to be.
with seven half-rack boxes designed to answer audio needs from 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/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-processing 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 busses, 16 mic pre-amps, a swept mid-frequency EQ and longer faders. The RS1402VLZ and MS1202-VLZ are also updates, which include the VLZ (very low impedance) circuitry, which reportedly helps keep noise down and cross talk 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 Quick Tap plugs in-between a telephone handset and instrument and provides a solid audio output connection. The Purifier 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 level-line stereo outputs.

"Real iron for the real world" is Frank Miller’s motto at Sescom and he has just brought out the 3.5"x1.3"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 bivel 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.

**AUDIO PROCESSING AND RECORDING**

By Christopher H. Scherer, CBRE

Audio processing developments at NAB 96 ran the gamut from DSP to DSF, 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 reverber circuitry in the Orban DSE7000 workstation platform. The company also released the PCMG90 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.

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Still handling stills and clips the old fashioned way?

Say goodbye to juggling images the old fashioned way. Using FlashFile, your on-air operators, producers, directors and graphic artists can quickly access thousands of stills and clips from any networked location. That's because FlashFile uses a database system designed for Broadcasters—by Broadcasters. You'll start with a simple FlashFile system that easily stores thousands of full-quality still images with associated keys. And when you need mass storage or networking, FlashFile's PC based open architecture easily enables you to expand and connect as your station grows. Interested in managing and playing back clips? That's easy, too. Because FlashFile controls several leading video server and video disk recorders in the same way it controls stills, giving you an affordable solution that meets all your still and clip management needs. To get more information, call Pinnacle Systems today. 1-800-4-PINNACLE (1-800-474-6622). Because if you're still handling stills and clips the old fashioned way, it's just a matter of time before you drop the ball.
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.

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 can also 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.

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.

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 micor 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 ST/UT 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 Zephyr Express, which takes the features of the
Four ways to fix your video.

And there are more where these came from.

Prime Image offers a full line of digital video processing equipment. So, if your video is in one standard and you want it in another, one of our standards converters—like the Penta, with five-field interpolation—will fix it. If you need to delay audio—or video—or both—to make things work, you need Prime Image’s A/V Delay. Out of sync? A time base corrector/synchronizer like the Model 5011 will make sure all your video plays from the same page. And if you want to mix component and composite sources, the Xpon—an inexpensive plug-in board for any AT bus—transcodes, synchronizes, and time base corrects to make it all work together. If what’s on this page won’t fix your video, don’t worry—call Prime Image for information about our other fully digital video processing products.
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 FastTrak Video Services and FastTrak 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."

**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 standard analog dial-up lines. These products each include an audio mixer, and offer the option of realizing quickly in a small space. They are designed to be used in a variety of applications, from remote broadcast to remote editing or monitoring.

**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 SD-2 monitor embedded digital audio in the serial digital video signal and the SD-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 analog audio, AES digital audio or serial digital video with embedded audio signals, with front-panel selection among inputs. 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 soft-fit 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).

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 typical connection rate of 24kHz (especially for long-distance calls). Dailing 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 Collavatis RBS-400 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.
VVCR  The smart high quality Digital Disk Recorder that meets the needs of professionals today and tomorrow.

VVCR has the smarts to provide a standard, fully functional front panel and industry standard rear panel connections.

The standard RS-232/422 serial connections allow VVCR to be plugged into any standard edit controller, animation controller or desktop video production system. Optional LTC, MIDI and GPI control also help VVCR integrate into any environment.

Of course, what is inside is smart too. VVCR plays and records in PAL or NTSC Composite, Component, S-VHS, or D1 video, at full CCIR 601 resolution, along with two or four channels of balanced audio.

VVCR delivers a visually-lossless image at a compression ratio of 2.5:1. Ratios of up to 20:1 are selectable for rough cut editing and to maximize storage.

VVCR combines the familiar aspects of a traditional VTR with the freedom of a nonlinear recorder. With smart features like nonlinear playback, still store, and variable play speed and loop record, the applications are limitless.

For South American sales contact:
Gendra Broadcasting Corporation
Tel: (305) 372-8845
Fax: (305) 372-0757

For all other inquiries contact:
Drastic Technologies
37 Kodiak Crescent #6
Downsview Ontario Canada, M3J 3E5
Tel: (416) 636-4444   Fax: (416) 636-4454

Circle (76) on Action Card
metersing in a one-third rack-unit space. The AD2004 has very low THD+N and ultralow jitter.

Beck Associates displays a line of 1RU solutions for audio. These include a stereo tone generator called the LMSTG, 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 EICCS-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/Stanton’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.

**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 GVV, at $5,830 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’s 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 stand up 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 carbonfiber 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 Inelsat 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 side-reel battery box gives easy access for maintenance. Other options can include AC- and DC-powered compressors for the microwave mast and a 2kHz 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 on 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 be 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 a 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 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...
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 1/4 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.

**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 switches 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 relocking, 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 pre-amp, phantom power and a 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.

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 superlow-gauge shielded audio pairs and one RG59-equivalent coax. This jacketing makes the cable easier to coil, especially in cold weather conditions.

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 products. 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 preamp 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.

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 site for analysis.

Neutrik had a new device called the Rapid-Test RT-1M. The 1RU chassis and attending Windows software can provide multitersting 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 S836A stereo surround scope. The S836A 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, Card 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.

**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 BitAlzer 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 270 Mb/s and 360 Mb/s formats and measure waveform parameters like rise time, fall time, amplitude and jitter.

The Tektronix WF6601 family of serial component monitors is designed for the 270 Mb/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 gain 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 AAWS DSA309 digital studio analyzer is the first half-rack mount analyzer to include component and composite digital video monitoring and remote player 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 infringements. 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 270 Mb/s, 177 Mb/s and 143 Mb/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 LV5100D 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 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.

**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 360 MHz. 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...
We're Not Just Promising a Revolution in Digital Video Editing and Storage; We Can Back It Up.

Introducing, a mind-altering line of uncompressed digital video disk recorders from MountainGate, the world leader in high-end storage.

Unlike other digital disk recorders, which typically hold just 30 to 120 seconds of uncompressed storage, the MountainGate VDR holds over 50 minutes of uncompressed D-1 and over 100 minutes of D-2 video. Now you can preview long-form programs such as music videos and television shows without first converting them to tape. And, you can search through tens of thousands of frames quickly and easily. No more pre-rolls or shuttling VTRs. No more tape degeneration. And that means faster and more cost-effective sessions.

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Circle (84) on Action Card
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 270MHz. The output of the VTM-100D is formatted for display on an analog component or (optionally) on a serial digital monitor, with 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-cancelling 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.

**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.

**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 diacorde, as well as the 30kW retode system. The company also introduced a 4-channel MMDS TV transmitter, which operates with 50W per channel.

Advanced Broadcast Systems was showing the CST 110T transmitter, which uses a Thyatron 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
Edit Video At The Speed of Sight.

D-Vision PostSUITE™ and D-Vision OnLINE™ our Windows™ based digital video editing software and systems, give you the instant gratification of non-linear editing with network approved, broadcast quality pictures. No need to go on-line.

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And D-Vision’s OPEN architecture gives you more tools to choose from and more room to grow.

What are you waiting for? Another on-line session to finish? Pick up a phone and get more info on D-Vision digital non-linear editing. open your eyes to the possibilities.
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.

Tritelco 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 2-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.

Cablewave Systems introduced a 3½-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 a boat 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 TTT. 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 ENDECline 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 IRU device that uses linear-phase FIR filters for accurate peak 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.

**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 3¾-inch port for a combined...
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visual of 48kW. A similar system is constructed of 1½-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 Electronics 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.

**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 115.2kbs 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.

**CABLE TV EQUIPMENT**

By Peter Douglas

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 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 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 MCCP 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 looking for distribution solutions from the traditional cable equipment manufacturers.
On May 9th, the FCC accepted the Grand Alliance standard for broadcast TV. Advanced TV is almost here. What should technical managers do?

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Yes, the transition to digital technology has been slow, but the approval of a new ATV system is sure to shift the process into high gear. Broadcasters and production facilities will need to move quickly to implement digital systems. Digital technology offers many advantages including the ability to upgrade to ATV operation.

The forefront of this movement starts at Advanced Television '96: Building for ATV. Mark your calendars today for November 20-22 and send this coupon in for complete information about attending this leading-edge conference.

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E
tertainment 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.

Recapping MMDS and LMDS
In the United States, MMDS wireless cable operators deliver video programs through a 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.

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 50%, 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.
**NEW! Sachtler Caddy Systems**

**Vision SD 12 and SD 22**

Pan and Tilt Heads with Serial Drag

Vision SD 12 and SD 22 are the latest in the line of the popular Sachtler Pan and tilt systems. Vision features a new, unique 7-step damped Caddy head, which is the future of high-performance serial drag tripod heads. The main 7-step, damped Caddy head is designed to provide an incredibly smooth and very stable fluid drag system that can be adjusted for quick counter balance and the optional Sachtler Touch and Go System.

**HOT POD TRIPOD SERIES**

Especially developed for use in ENG, the Hot Pod tripod is the fastest in the world. The central locking pod is activated on all three legs at the same time. While the pneumatic center column easily moves to the top of the tripod, the lens is at a height of over 1.8m. The elevation force of the center column is balanced by the pan and tilt gravity, which can be easily adjusted in the system. The leg position can be changed by the operator.

**ENG TWO-STAGE TRIPOD SERIES**

Sachtler two-stage tripods have an increased height range (lower bottom and higher top position) so they are more universal. Legs can be locked in seconds with Sachtler’s quick clamping. There is a nice heavy duty version for extra stability. The heavy duty aluminum tripod has a 200mm diameter tube and 3314-3 Heavy Duty Calibrated Floor Spreader as well as situations which require a wider angle of view and the ability to zoom.

**Vision Two Stage ENG and LT Carbon Fiber Tripod Systems**

The ultimate in lightweight and rugged tripod, the tripod is available with durable lightweight alloy (Model V3515) or the stronger and lighter, highly-rigid and virtually indestructible fiber construction (Model V3515F). They incorporate sturdy lightweight carbon fibers to provide fast, safe and self-adjusting leg clamps. *GenuFlex 91* requires no attachment, its unique design allows legs to close completely when not in use, which makes it perfect for long and narrow storage areas. The tripod system is very stable and provides a very fast and self-adjusting leg clamp.

**Vision Three Stage ENG and LT Carbon Fiber Tripod**

All three vision models feature V3515F-3 Heavy Duty Calibrated Floor Spreader and 3314-3 Heavy Duty Calibrated Floor Spreader to provide fast, safe and self-adjusting leg clamps. The tripod system is very stable and provides a very fast and self-adjusting leg clamp.

**Vision 22 Systems**

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All vision 12 systems feature V3515-3 Heavy Duty Calibrated Floor Spreader and 3314-3 Heavy Duty Calibrated Floor Spreader to provide fast, safe and self-adjusting leg clamps. The tripod system is very stable and provides a very fast and self-adjusting leg clamp.

**Vision SD 22**

Pan and Tilt Heads with Serial Drag

Vision SD 12 and 22 are the latest in the line of the popular Sachtler Pan and tilt systems. Vision features a new, unique 7-step damped Caddy head, ultra-smooth and rugged damped counter balance. The Caddy head does not have an adjustable pan spreader and either a soft bag or cover. The Caddy system is activated with a quick adjustment for counter balance and the self-locking Sachtler Touch and Go System.

**CADDY SYSTEMS**

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**PRO PAC FLUID HUMAN**

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Completing the line is the BR-D50 Player and the flexible BR-D51 Player with S-VHS playback (Available Oct.96). Both players feature advanced digital audio recording technology and offer a wide range of playback options, making them ideal for use ina variety of applications. The BR-D50 and BR-D51 players are designed to provide the highest quality audio and video performance, allowing users to create professional-quality content with ease.

Digital Video Workstation

The BR-D50 and BR-D51 players offer advanced editing features and workflow, enabling users to easily create and manage video content. With on-board editing capabilities, users can quickly and easily create professional-quality videos with ease. The players also offer advanced digital audio recording technology, allowing users to capture high-quality audio in a variety of formats.

Digital Editing

The BR-D50 and BR-D51 players are designed to provide advanced editing capabilities, including multi-generational editing, special effects, and more. The players are also equipped with a built-in TBC, allowing users to easily create and manage video content in a variety of formats. Additionally, the players offer a range of advanced digital audio recording technology, allowing users to capture high-quality audio in a variety of formats.

Operational Conveniences

The BR-D50 and BR-D51 players offer a range of advanced operational conveniences, including an integrated TBC and a wide range of advanced processing capabilities. The players also offer advanced digital audio recording technology, allowing users to capture high-quality audio in a variety of formats. Additionally, the players offer a range of advanced digital audio recording technology, allowing users to capture high-quality audio in a variety of formats.

Powerful Multiple Effects

The BR-D50 and BR-D51 players offer a range of advanced processing capabilities, including advanced processing and workflow, enabling users to easily create and manage video content. The players also offer advanced digital audio recording technology, allowing users to capture high-quality audio in a variety of formats.

High Performance Switcher

The BR-D50 and BR-D51 players offer advanced processing and workflow capabilities, enabling users to easily create and manage video content. The players also offer advanced digital audio recording technology, allowing users to capture high-quality audio in a variety of formats.

Powerful Character Generator

The BR-D50 and BR-D51 players offer advanced processing and workflow capabilities, enabling users to easily create and manage video content. The players also offer advanced digital audio recording technology, allowing users to capture high-quality audio in a variety of formats.

Color Monitors

The BR-D50 and BR-D51 players offer advanced processing and workflow capabilities, enabling users to easily create and manage video content. The players also offer advanced digital audio recording technology, allowing users to capture high-quality audio in a variety of formats.

Why pay $10,000 to $15,000 for a BROADCAST QUALITY CHARACTER GENERATOR when you can get it for only $2995?

Introducing the new "POWER-Script"

An animated Postscript character & graphics generator for Unix or PC. A revolutionary solution to the problem of creating high-quality graphics and characters for broadcast, video production, and computer graphics.

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**PVR-2500 Digital Video Recorder**

**PVR-2500 - Digital Video Recorder for Windows NT**

The PVR-2500 is a complete, all-in-one digital video editing system. It is fully Windows NT-based and includes everything you need to get started:

- **Video Interface:** PVR-2500 provides a complete video interface, including real-time video capture, playback, and monitoring.
- **Audio Interface:** PVR-2500 includes a complete audio interface, including real-time audio capture, playback, and monitoring.
- **Hardware:** PVR-2500 includes a complete hardware interface, including real-time hardware capture, playback, and monitoring.
- **Software:** PVR-2500 includes a complete software interface, including real-time software capture, playback, and monitoring.

**PVR-2500 Features:**

- **Integrated Hardware:** PVR-2500 includes a complete integrated hardware interface, including real-time hardware capture, playback, and monitoring.
- **Software Interface:** PVR-2500 includes a complete software interface, including real-time software capture, playback, and monitoring.
- **Video Capture:** PVR-2500 provides a complete video capture interface, including real-time video capture and monitoring.
- **Audio Capture:** PVR-2500 provides a complete audio capture interface, including real-time audio capture and monitoring.
- **Hardware Interface:** PVR-2500 includes a complete hardware interface, including real-time hardware capture and monitoring.
- **Software Interface:** PVR-2500 includes a complete software interface, including real-time software capture and monitoring.

**PVR-2500 Specifications:**

- **Video:**
  - Real-time video input: NTSC or PAL
  - Real-time video output: NTSC or PAL
  - Real-time video monitoring: NTSC or PAL
- **Audio:**
  - Real-time audio input: 16-bit, 44.1kHz
  - Real-time audio output: 16-bit, 44.1kHz
  - Real-time audio monitoring: 16-bit, 44.1kHz
- **Hardware:**
  - Real-time hardware capture: NTSC or PAL
  - Real-time hardware playback: NTSC or PAL
  - Real-time hardware monitoring: NTSC or PAL
- **Software:**
  - Real-time software capture: NTSC or PAL
  - Real-time software playback: NTSC or PAL
  - Real-time software monitoring: NTSC or PAL

**PVR-2500 System:**

- **Hardware:**
  - Real-time hardware capture: NTSC or PAL
  - Real-time hardware playback: NTSC or PAL
  - Real-time hardware monitoring: NTSC or PAL
- **Software:**
  - Real-time software capture: NTSC or PAL
  - Real-time software playback: NTSC or PAL
  - Real-time software monitoring: NTSC or PAL

**PVR-2500 System Notes:**

1. **Does not include Adaptec 29400 controller card (has built-in 2x2 port)
2. **Includes Sisapex (Barrett) 2x2 hard drive (doesn’t accept Wide drives)
3. **PVR-2500 includes an MRTM PCI card (Add $100 for 2x2 VMR card)
4. **Requires sound card (DSP-equipped card preferable) - use “Expansions and Upgrades”

**Expansions and Upgrades for all Systems:**

- **Substitutions:**
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  - Percom 1600 PCI card (DB-9)
  - Sisapex PCI card (DB-9)

- **Upgrades:**
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  - Percom 1600 PCI card (DB-9)
  - Sisapex PCI card (DB-9)

For more information, please visit our website at [www.pvr-2500.com](http://www.pvr-2500.com)

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June 1996 Broadcast Engineering 137
ENGINEER-IN-CHARGE needed for mobile production unit of new, dynamic, entertainment/broadcast company. Exceptional opportunity for an experienced engineer to maintain, transport, and operate state-of-the-art digital mobile television equipment and systems. Successful candidate will be experienced in all types of equipment used in association with remote television production as well as experience in driving and emergency road repairs of vehicles used to transport remote television facilities. This position will properly and professionally represent Speer Productions to its clients and requires an accurate record keeper and a great deal of travel. SBE certification is required. Must be willing to get CDL if not already held. Position will be based in Nashville, TN. Competitive salary and benefits. Please indicate position applied for and submit resume to Director of Human Resources, Speer Communications, Ltd., 3201 Dickerson Pike, Nashville, TN 37207. Or Fax to: 615-650-6293. We are an Equal Opportunity Employer. NO PHONE CALLS PLEASE.

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ELECTRONICS TECHNICIAN Experienced and entry level positions available. AA in electronics required. Work on broadcast Mill 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.

SENIOR BROADCAST ENGINEER Cutting edge educational television station is looking for a Senior Broadcast Engineer who can trouble shoot, repair, install and operate 80 kW UHF broadcast transmitter, 1000+ line TV production systems, Alamar automation and applicable peripherals. Tape formats include D-3, BetaSP, 1", 3/4" SP, SVHS, and ENG/SNG and remote experience a plus. Must be energetic, highly motivated, strong team player. FCC General, or SBE certification, and computer experience with Macintosh and IBM. Filing deadline 6/28/96. Maximum entry level salary $3911. For a job flyer and transcripts and three professional references to: Kathy Lau, GM. KVRR-TV is an EOE.

TRANSMITTER TECHNICIAN Four years experience working with broadcast TV transmitters. Have a good understanding of high frequency 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 a background in all types of television 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, 7767 Engineer Rd., San Diego, CA 92111. E-mail: rockmank@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/graphic/television experience. Sony dig/analog VTR's, GVG, Avid, Avid, SG, PC. Fax resume to CCT at 213-466-2392.

BROADCASTER: 17 WJKS, ABC Network affiliate is seeking a Maintenance Engineer. Requirements include at least 3 years of experience in troubleshooting studio, ENG and SNG broadcast equipment to component level. Betacam experience preferred. 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, Baxton; WTJB, Phenix City/Corpus, 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.

TECHNICIAN ENGINEER Two years experience as broadcast TV bench technician. Must be familiar with 3/4 inch, 1/2 inch broadcast video tape machines and small cameras (CCD and tube types). Some knowledge of microwave and satellite operation. Should possess or qualify for a state driver's license in order to operate company vehicles. (Some auto mechanics ability preferred, but not mandatory). Send resume to Kenny Brown, Chief Engineer, KOB-TV, 4 Broadcast Plaza, S.W., Albuquerque, NM 87104. EOE/M/F.

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 transmitter and translator, 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/EOE.

TELEVISION BROADCAST MAINTENANCE ENGINEER KMVT Broadcasting, Inc. has an opening for television broadcast maintenance engineer. This position requires at least two years experience in maintaining studio, control room, and transmission equipment used in a television broadcast environment. Expertise is required in computer, equipment repair, video, and digital equipment. A valid drivers license is required and a FCC general class license and SBE certification is preferred. Individual must be willing to work any shift that may be required. Qualified candidates should send their resume and salary history to the attention of the chief engineer, KMVT Broadcasting, Inc. KMVT is a drug-free workplace and an equal opportunity employer. Minority candidates are encouraged to apply. For a complete job description contact KMVT, 1100 Blue Lakes Blvd. N., Twin Falls, Idaho 83301 or call (208) 733-1100, FAX (208) 733-1619.

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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 anti-missile 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.

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 a standard data-compression technique. 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.

Discrete cosine transform (DCT) is the starting point of many compression standards.

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 Genum. 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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Quick, easy, and with total control. Videotek's new SDC-101 defeats any threat to your video images. It lets you correct picture errors and alter video levels in serial component digital video inexpensively, with controls and functions familiar in the analog world. 10-bit digital processing guarantees optimum signal quality. And, it does it all without relying on expensive outside services.

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