

BROADCAST engineering

An INTERTEC® Publication

November 1995/\$5.00



Cover Story: Avoiding the digital cliff



Also featured:

- Selecting lenses
- Grounding systems

KCAL-TV/California 9 Wins Edward R. Murrow Award for News Excellence



WHEATSTONE is proud to be a continuing part:

- SP-5 console S/N 15688 delivered July 1983
- SP-5 console S/N 15691 delivered July 1983
- SP-E console S/N 15754 delivered September 1983
- S²-5 console S/N 15818 delivered October 1983
- S²-5 console S/N 15927 delivered October 1983
- TV-600 console S/N 22121 delivered October 1994
- TV-600 console S/N 23436 delivered October 1995

KCAL-TV-9 is owned and operated by the Walt Disney Company

 Wheatstone Corporation

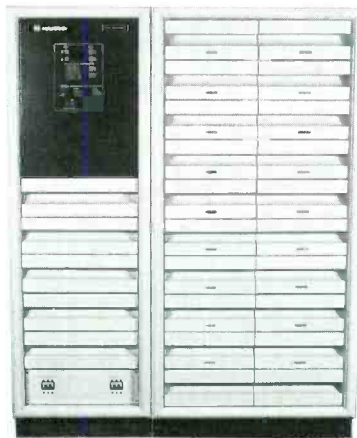
Circle (1) on Reply Card

7505 Performance Drive, Syracuse, NY 13212 USA
tel 315-452-5000 / fax 315-452-0160 / Wheatstone@ad.com

VHF TV TRANSMITTERS

Beginning August 15, 1995
Harris Platinum Series® TV Transmitters
come with the industry's only

5-YEAR WARRANTY



No other VHF TV transmitter manufacturer has the guts to offer a 5-year warranty, *because no other TV transmitter has guts like the Harris Platinum Series®.*

No wonder we're the world-standard for ultra-reliable, high-performance VHF TV transmitters from 500 W to 60 kW. The evidence from nearly 500 units on-air worldwide is in, and we are only slightly amazed to learn that the quality we designed and built into every Platinum Series transmitter is working even better than we expected. Things like our solid-state modules with 500,000 hours MTBF, and a positive pressure, integrated air system that maintains consistent cooling even if a module is removed, and blocks airborne contaminants. Add built-in transient protection and superbly regulated power supplies, plus all the benefits of our

ISO 9001 Quality System, and you can see why our whopping 5-year warranty is a great deal for you!

Contact Harris for a copy of the warranty terms, and to learn more about empowering your station with Harris Platinum and Platinum HT EL, *the only VHF TV transmitters with a 5-year warranty.*

HARRIS CORPORATION
BROADCAST DIVISION
US and Canada
TEL: +1 217 222-8200
FAX: +1 217 224-1439
Elsewhere
TEL: +1 217-222-8290
FAX: +1 217 224-2764

 **HARRIS
ALLIED**

Circle (4) on Reply Card

©1995 Harris Corp.



34

THIS MONTH...

34 QC in the Digital Environment

By David Cox and Jon Hammarstrom

In today's fast-paced world, facility automation using networked systems is a key management tool.

46 Selecting Lenses

By Evan Krachman

Choosing the right lens now can make shooting easier in the future.

58 Handling Videotape

By Tom Becker

As inexpensive as videotape might be, the material it contains could be priceless.

62 Archiving Videotape

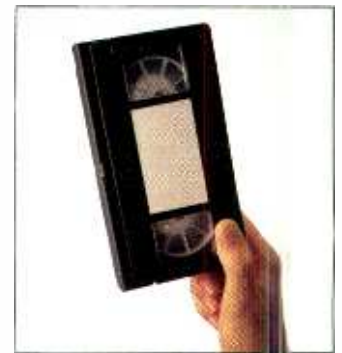
By John Matarazzo

A proper tape archive requires more than just shelf space.

66 Grounding and Shielding Practices

By Philip Giddings, P.E.

Proper grounding procedures never go out of style — but there are some new twists.



62



46



66

DEPARTMENTS:

- 8 FCC Update: *FCC schedules wireless cable auctions*
- 10 EAS Update: *A typical EAS installation in a TV facility*
- 12 Management: *Identifying leadership styles*
- 16 Transition to Digital: *Testing serial video*
- 20 Production: *Choosing an audio console*
- 22 Interactive: *Web publishing: Don't get left behind*
- 24 ATV Update: *Will the digital channel replicate my NTSC channel?*
- 28 Broadcast 2000: *Broadcast PC platform*
- 76 Transmission: *TV transmitter maintenance basics, part 2*
- 80 SBE Update: *Ennes — your key to the future*
- 82 Applied Technology: *Prime Image Time Machine*
- 84 Applied Technology: *Acrodyne Au60D 60kW UHF TV transmitter*
- 88 Applied Technology: *AAVS DSA309 digital studio analyzer*



84

COLUMNS:

- 4 News
- 6 Editorial
- 90 Industry Briefs
- 92 New Products
- 99 Classifieds
- 104 Advertisers' Index

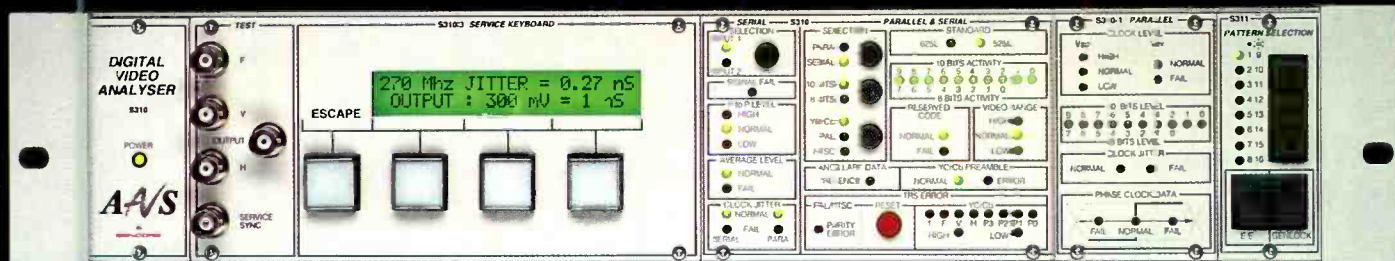


ON THE COVER: Testing digital video requires specialized equipment. Knowing what tests to perform and what equipment is needed is part of overcoming the "digital cliff." Cover design and photography courtesy of AAVS Sencore.

BROADCAST ENGINEERING (ISSN 0007-1994) is published monthly (except semi-monthly in June and November) and mailed free to qualified persons within the United States and Canada by Intertec Publishing, 9800 Metcalf, Overland Park, KS 66212-2215. Second-class postage paid at Shawnee Mission, KS, and additional mailing offices. POSTMASTER: Send address changes to *Broadcast Engineering*, P.O. Box 12902, Overland Park, KS 66282-2902. CORRESPONDENCE: Editorial and Advertising: 9800 Metcalf, Overland Park, KS 66212-2215. Phone: 913-341-1300; Edit. fax: 913-967-1905; Advert. fax: 913-967-1904. © 1995 by Intertec Publishing. All rights reserved.

Digital Video Testing Just Got Easier . . .

The S310 Digital Video Analyser is the only patented, all-in-one analyzer designed to take the frustration out of digital video testing. The S310 performs real time, on-line tests of key signal parameters for both composite and component, serial or parallel digital video, without complex and time consuming interpretation.



With The S310 Digital Video Analyser

PATENTED

With over 18 different, easy-to-use tests and measurements, the S310 provides you with critical performance data such as:

- Serial jitter
- Parallel clock jitter
- Common mode voltage
- Clock to data skew
- Correct luminance & chrominance levels
- Individual luminance & chrominance sample analysis
- Signal levels
- DC offset
- TRS analysis
- Presence of reserve codes in active video
- Analog signal output
- And many more

In addition, the S310 is equipped with:

- ◆ User-selectable alarm thresholds that provide out-of-limit parameter warnings.
- ◆ Remote control software with an RS232C/RS422 port for remote control monitoring and data logging.
- ◆ A comprehensive CCIR 601 component pattern generator with 34 test patterns, and exclusive error introduction.

Take the frustration out of your digital video testing by calling **1-800-769-AAVS** to schedule a demonstration, reserve an evaluation unit, or to order a FREE video tape.

Circle (5) on Reply Card

A-AVS By Sencore

The Name To Know In Digital Video Testing

Advanced Audio Visual Systems by Sencore
3200 Sencore Drive, Sioux Falls, SD 57197
TEL: 1-800-759-2237 FAX: (605) 335-6379

EIA victorious on UHF performance filings

At the request of the Electronics Industries Association's Consumer Electronics Group (EIA/CEG), the FCC proposes to eliminate the requirement that parties who manufacture, import or market TV receivers file reports concerning the UHF noise figure performance of new models. The FCC called this requirement obsolete and burdensome for government and industry resources.

The EIA/CEG maintains that compiling and submitting test data after the receiver has been verified and is compliant with the FCC's rules is unnecessary and inconsistent with the verification procedure for equipment authorization. Past filings of UHF performance records show a high level of compliance with the rules.

In the mid-1970s, UHF broadcasters asked the FCC to require TV manufacturers to maintain a 14dB UHF noise figure, which led to the initial UHF performance requirements. Since then, technology has improved, and it is relatively easy for TV manufacturers to maintain the 14dB level.

If the new ruling is approved, the regulatory burden on manufacturers and importers will be reduced and could decrease overall TV prices. Compliance with the 14dB requirement will be maintained through the verification process and routine follow-up testing as the manufacturer or importer believes is necessary.

Up-front spectrum auctions would endanger free TV

According to the NAB, up-front spectrum auctions of advanced TV spectrum would destroy broadcasters' ability to compete in the emerging video marketplace envisioned by the telecommunications bill. It would also deny consumers long-term access to quality, free over-the-air TV service.

In a Senate Commerce Committee hearing on spectrum auctions, NAB Television Board chairman Ralph Gabbard said that broadcasters are ready to compete in the new environment and have invested millions in new digital technology. According to Gabbard, broadcasters must have use of a temporary channel to make the transition to digital. The use of the additional channel is temporary, and broadcasters will return one channel to the government once the transition is complete.

Gabbard also told the committee that the transition to advanced television will be difficult and expensive for small-market broadcasters. An up-front auction would make that transition impossible and would

lead to less service to those communities.

Gabbard also urged the committee to reject accelerated auctions, which would disenfranchise millions of Americans who cannot afford or should not be forced by the government to buy expensive TV sets before their existing sets wear out.

A successful IBC '95

The management committee described the first annual IBC in Amsterdam as extremely satisfactory. Attendees from 98 countries totaled almost 18,500. Further proof of the success of the third IBC was confirmed by the fact that at the close of the show, 240 exhibitors had already booked 19,500 square meters of space for IBC '96.

IBC '96 is scheduled for Sept. 12-16. For more information, contact IBC at +44 171 240 3839 or by fax at +44 171 240 8830.

In other news at IBC, Stanley N. Baron, president of SMPTE, was presented with the IBC John Tucker award. The award is given in recognition of an internationally significant contribution by an individual or group from any country on any aspect of broadcast communications, including research, design, development, manufacture, operational practice or management.

Baron was recognized for his work and original contributions spanning more than 32 years in digital television, and specifically, for his leadership in establishing international digital terrestrial TV broadcasting (DTTB) standards.

NATAS awards 1994 Technical Emmys

The 1994 Technological Achievement and Scientific Development Emmy Awards were presented by the National Academy of Television Arts and Sciences (NATAS) on Oct. 12 in New York.

The following companies were awarded the coveted statue: Leitch Corporation for the development of the subcarrier and horizontal phasing monitor technology; Panasonic (Matsushita) and Sony Electronics for the pioneering development in 1/2-inch component digital videotape recording technology; DirecTV and Primestar Partners for pioneering development of direct-to-home digital satellite broadcasting; the European Broadcasting Union and the Audio Engineering Society for the standardization of serial digital audio transmission systems.

SBE elects 1995-1996 officers

The Society of Broadcast Engineers (SBE) has elected its officers and board of directors

for the next year.

Terrence M. Baun is president; Edward J. Miller is vice president; Martin Sandberg is secretary; and Troy D. Pennington is treasurer. Elected to 2-year terms on the board of directors are James T. Bernier, Marvin Born, James Butler, Richard L. Edwards, Robert Reymont, Larry J. Wilkins and filling an unexpired term is W. David Johnson. Continuing on the board of directors are Leonard Charles, Michael A. Fast, Michael G. McCarthy, John F. Schneider and Thomas P. Weber.

NAB '96 call for presentations

The 50th Broadcast Engineering Conference, the second NAB/ITS Advanced Teleproduction Conference and the fourth NAB MultiMedia World Conference are scheduled for April 14-18, in conjunction with NAB '96 in Las Vegas.

These conferences provide an opportunity to present tutorials or system and equipment descriptions on state-of-the-art broadcast and multimedia technologies. The author of an accepted presentation will receive a technical conference presenter kit that contains information on presentation preparation. A presentation will be considered for publication in the *Proceedings*. Finished manuscripts and disks are due to NAB by Jan. 19.

If you are interested, send a 1-page proposal to NAB Technical Conference Committees, NAB Science and Technology, 1771 N Street, N.W., Washington, DC 20036; fax 202-775-4981.

Include the author's name, conference of interest, address, E-mail address, phone and fax numbers. For more information, contact John Marino, director of technical conferences, NAB Department of Science and Technology at 202-429-5391 or by E-mail to jmarino@nab.org.

30th annual SMPTE advanced motion imaging conference

The 30th annual SMPTE Advanced Motion Imaging Conference is scheduled for Feb. 1-3, at the Sheraton Seattle Hotel and Towers in Seattle, WA. The conference "The Convergence Continues...Computer Technology and Television" will feature a 3-day technical program with papers on the leading-edge of motion imaging technology. For more information contact Marilyn Waldman at SMPTE at 914-761-1100.

News continued on page 81

**Mobile
production**

**“BTS cameras give us
the best pictures
under the sun...
or snow... or humidity...”**

**Gideon Uys
Operations Manager
Soljay Productions, Inc.**



“Our mobile production company covers some of the hot television sports—NFL games of the week for Fox, college football, hockey and baseball for ESPN... We're on the road 250 days a year: a new venue every few days.

“Our clients demand the best pictures whatever conditions: today, in Alabama, with 95 degree temperatures and 90 percent humidity, or tomorrow in Green Bay, in 14 degrees and snow.

“We can't have cameras that require constant tweaking. They have to function perfectly every time.

“That's why our Mother Series MU's are equipped with BTS cameras. They deliver

the finest, sharpest pictures thanks to BTS' phenomenal FT-SR CCD sensors. Our clients tell us about the unbelievably good pictures we get — more proof that we've got the right cameras. Some have bought BTS cameras for their own trucks, based on their experience with ours.

“We're so satisfied that we're on our third generation of BTS cameras. On our newest truck, 'Nother Mother, we bought both BTS LDK 10 full size cameras and 10P companion cameras.

“In mobile production, there's no time for second-best performance. That's why we're such strong supporters of BTS cameras.”

BTS

Call toll-free (800) 962-4BTS
Outside the U.S. and Canada,
call (805) 584-7436

For Immediate Information
FAXBack: 1-800-962-4BTS, opt 4
Document #1012

A PHILIPS COMPANY

Circle (11) on Reply Card

For sale to the highest bidder

In Congress's struggle to balance the budget and reduce the deficit, government agencies and federal expenditures and resources that would never before have received the slightest attention are suddenly under intense scrutiny. This includes the FCC — and the spectrum over which it governs.

At first it was easy to justify some of the revenue-generating proposals. For instance, increasing fees for federal attractions and resources. OK, so it costs \$2 more to enter a national park or the per-night camp fee is now \$10 instead of \$5. Some may justify these types of charges as appropriate "user fees." After all, these taxes only affect those who "use" the resources or services. If you don't play, you don't have to pay. (Kind of like goring the other guy's ox.)

Unfortunately, Congress seems to have its collective hand out to potentially collect (tax) perhaps billions, yes, that's billions, from broadcasters by selling TV channels. Under the guise that other industries have to pay for spectrum, why shouldn't broadcasters? The FCC has begun a dangerous lean toward supporting what will be a catastrophic tax upon TV stations.

From the beginning, broadcasters have enjoyed (and rightly so) certain flexibility in how they used their channels. In return for the spectrum, stations provide many free services to the public. Now, as the result of more than 35 years of Congress's tax and the "spend" attitude reaches the crisis point, our elected officials are looking for easy solutions, and they want to break that contract.

The most recent budget reconciliation bill would require the FCC to auction to the highest bidder *all* future spectrum assignments. If approved, this bill would undermine the contract that broadcasters have always had with the federal government. In return for the use of the spectrum, broadcasters provide local news, public affairs and other free services to the public. No one has to pay the local TV station for watching *The Simpsons*, David Letterman or Jay Leno. The local news is self-supporting and doesn't require viewers to subscribe to the service. America has free TV at its best.

Yet, under this bill, broadcasters would have to bid for their broadcast channels. This would be especially disastrous to TV stations who now must begin building their HDTV/ATV channels. Now, in return for helping lead their audiences into the digital future, TV stations would be charged for the privilege of spending billions just to do so.

The NAB has rightly brought the matter to the attention of the House/Senate reconciliation committee. However, it's important that broadcasters (and viewers) make their voices heard on this issue. From the beginning, the American public has benefitted from the free over-the-air programming provided by broadcasters. Forcing TV stations to rent or buy their RF channels would cause many to go dark, and could bring an end to free TV.

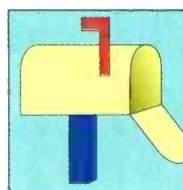
Such a quick money-grabbing scheme as taxing broadcasters for spectrum is just another example of Congress putting the blame (and looking for the solution) on the backs of the American public.

To you politicians in Washington, "Keep your hands out of my pocket and off my free TV!"



Brad Dick

Brad Dick, editor



Internet:
be@intertec.com
CompuServe:
74672.3124
FAXback:
913-967-1905

Acrodyne's New **Diacrode**[®] High Power UHF Television Transmitter Is On The Rise.



Introducing Our New Single Tube 40kW-60kW System. High Efficiency With High Reliability.

If you're considering a new 40kW to 60kW UHF television transmitter, Acrodyne has exciting news! The success of our tetrode equipped water-cooled transmitters from 10kW to 30kW output has spurred the development and introduction of a new transmitter featuring a Diacrode[®] (double-ended tetrode) capable of producing up to 60kW in common amplification using just one tube.

Our high efficiency tetrode transmitters perform superbly and are the lowest cost transmitters to operate and maintain. The tetrode is the most linear UHF amplifying device type and, combined with our high-end TR Series exciter and "super linear" solid state driver,

makes it an excellent choice today and ideal for future digital broadcasting. Water-cooled tetrodes have routinely exceeded 20,000 hours of life. The Diacrode, constructed of the same grid material and similar, yet improved cooling system, will meet and exceed these life times.

If you have concerns over the reliability of other high efficiency transmitters, or their complexity, or their cost to operate, consider the Acrodyne alternatives—Diacrode and tetrode transmitters. All

Acrodyne high power transmitters are built and fully tested at our factory in Blue Bell, Pennsylvania.



The New TH 680 Diacrode High Power Tube

ACRODYNE
More Power To You.

© 1995 Acrodyne Industries, Inc. All rights reserved.

Acrodyne Industries, Inc. 516 Township Line Road, Blue Bell, Pennsylvania 19422 • Phone: 800-523-2596 / (215) 542-7000 Fax: (215) 540-5837

Circle (12) on Reply Card



FCC schedules wireless cable auctions

On the heels of its success in raising \$7 billion from the recent auction of PCS licenses, the FCC has scheduled auctions for multichannel multipoint distribution service (MMDS) licenses, which are used in connection with "wireless cable" video services. Auctions were scheduled to commence on Nov. 13, 1995.

The MMDS auction is evidence of the growing wireless cable industry, in which operators combine MMDS channels with leased channel space from Instructional Television Fixed Service (ITFS) educational licensees to provide more than 30 channels of video. With the advent of digital facilities, observers predict that digital compression will allow wireless cable operators to provide more than 100 video channels with the possibility of data and voice transmission.

Further evidence of the growing industry is the recent transactions in which one major wireless cable operator has been purchased by Pacific Telesis for \$175 million, and another major operator received \$100 million in equity from NYNEX and Bell Atlantic. Although a substantial number of new entrants are in the multichannel video market, it's clear that wireless cable will be a player over the long term.

The auction consisted of bidding for authorizations for 493 basic trading areas (BTAs). Winning a BTA authorization gives a party the right to construct and operate facilities on all MDS channels within the BTA. This is subject to the requirement to protect existing MDS and ITFS licenses and applications from harmful interference. Winners also bargained to lease additional channel capacity on new ITFS systems within the BTA.

The MMDS auctions will have special benefits for bidders that qualify as a small business and for applicants consisting of a consortium of small businesses. For the purpose of this auction, a small business is an entity that, together with its affiliates, has average annual gross revenues of less than \$40 million for each of the previous

three calendar years. Benefits available to small businesses include reductions in the minimum upfront payment, a 15% discount on the winning bidding price and low-interest installment payments.

FCC waives settlement caps

Faced with a continuing delay in developing criteria for deciding comparative hearings, the FCC will waive two of its rules that limit terms for settlement. The waiver will lift the rules for settlement for competing applicants for new broadcast facilities and in contested renewal cases for a period of 90 days, until Dec. 14, 1995.

The waiver will allow competing applicants for new broadcast facilities, either already designated or scheduled for comparative hearings, to settle for any amount. In the case of contested renewals, settlement will be limited to out-of-pocket expenses.

DATELINE:

DEC. 1

On or before Dec. 1, 1995, TV stations in the following states must file their annual ownership reports: Alabama, Georgia, Colorado, Minnesota, Montana, North Dakota, South Dakota, Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont.

The FCC is trying to clear the backlog of cases caused by an FCC freeze on mutually exclusive proposals for broadcast facilities and comparative renewals. The freeze was prompted by a U.S. Court of Appeals decision that struck down the criteria set by the commission for deciding among competing applications. The situation was made worse by a recent Supreme Court decision calling into question policies that provide preferences for minorities. The FCC's former criteria included such a preference and the replacement criteria was also expected to contain such a preference.

The commission hopes the waiver will result in agreeable resolutions of various proceedings that are currently subject to the freeze. The agency emphasizes that the waiver is temporary, and affirms its support for the rules limiting payments in application settlements. The FCC explains "that many of the applications...were filed during a lengthy period of time when the applicants could have had no reasonable expectation of prof-

iting from their proposals."

Commissioner Andrew C. Barrett dissented with the FCC announcement, referring to the action as a "bandage approach for dispensing these mutually exclusive applications." Instead, Barrett believes that the FCC should directly address the criteria problems cited by the court's decisions. Barrett fears the waiver will serve the interests of a few individuals and not the general public.

FCC refuses to reduce EEO forfeitures

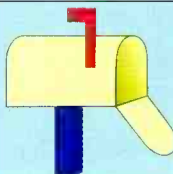
The recent rejection of two requests to reduce EEO fines shows that the commission is closely examining these requests with an eye toward rejecting them.

With every Notice of Apparent Liability, the commission must take into account a licensee's ability to pay when assessing a fine. The decision to allow the reduction, however, is made by the FCC. It requires extensive disclosures, which include statements of income from broadcast operations, expenses and payments to principals.

The FCC also rejected a Request for Rescission from a licensee for failure to disclose certain financial information. Although the licensee's statements showed a loss over several years, they also included a note from the accountant that the licensee had omitted information about cash flows and retained earnings. The licensee argued that this wasn't relevant, but the FCC found that the information could have an impact on its decision.

In another decision, the FCC found that financial disclosures, which included one station, are insufficient for a group owner. The licensee had provided properly prepared statements for the station, which showed that the station had no assets and that its liabilities exceeded its ability to pay. However, the licensee failed to include information about its other stations, particularly about the proceeds of a recent sale approved by the commission. Because this information was absent, the FCC found that the financial statements were not sufficient to show that the company was unable to afford the fine. ■

Harry C. Martin and Andrew S. Kersting are attorneys with Fletcher, Heald & Hildreth, P.L.C., Rosslyn, VA.



Internet:
be@intertec.com

CompuServe:
74672.3124

FAXback:
913-967-1905

If you made this many improvements, you'd want to broadcast it too.

Faster processing with
new Avid Media
Processor and PowerPC
601 CPU

Plays up to
1,000 spots in
a single playlist

Turbo uploading
and downloading
of spots

More efficient
one-box design with
broadcast
connection panel



CCIR
601/SMPTE 125
sampling with new
Avid Broadcast
Video Board

Increased storage
capacity for larger
spot inventories

Composite/component
analog video or serial
digital input/output

Improved reliability with
multiple redundancy strategies
including RAID-3

Today, hundreds of broadcasters worldwide are using the Avid AirPlay® system for news and commercial playback. That's an impressive following. Even more impressive is Avid's new AirPlay MP playback server, designed for better performance, faster operation and superb images. Learn more about AirPlay MP and the broadcasters who have already made the move to disk-based playback. To request a free Avid AirPlay Case Study Portfolio, call Avid today at 1-800-949-AVID (1-800-949-2843) PRESS 1.



EAS update

A Typical EAS installation in a TV facility

By Paul Montoya

Thus far in this series, we have explored the technologies behind EAS and the potential for its use. Now, it's time to put what we've discovered into practical application.

The beauty of EAS is the flexibility of the system in use at various application points. This would include decoding capabilities of the consumer end user, but we'll get into that in a future article. Cable equipment manufacturing companies are adapting new technologies to the FCC EAS standards at an incredible rate. Some of these technologies could be applied to the type of TV facilities that we will explore in this article.

Megamedia television

Let's look at a full-blown news-intensive

facility that we'll name Megamedia Television. First, we must recognize that the existing EBS system can only accomplish two tasks: sound the alarm and give brief information in an audible fashion. This alarm sounds the same for all situations, from a simple test of the system to a full-fledged hurricane. It also has no basic way of storing this information if no one is paying attention at the time the alarm is sounded.

EAS allows voice and data information to be transferred to the facility. With this data transmission capability, we now have the potential to feed video monitors and word processors for immediate editing through internal computer networks and even directly into character generators or closed-captioning equipment. The possibilities are only limited by what equipment manufacturers can imagine.

We also have the capability to send larger amounts of information by emergency management and government officials than ever before. Everything from press conference announcements to evacuation information can be sent in a detailed format by any agency of the local or state web network.

Naturally, the next question is: "Won't facilities begin to ignore these sources of information based on all the 'junk messages' that could potentially be sent from these government agencies? That's the advantage of the priority level coding built into the EAS protocol. Decoding equipment can be set up to accept and route informational data to

one area of a computer, watch information in another area and warning/emergency information into yet another area. Only emergency information could be directly routed to master control and even loaded directly into a character generator automatically. By using the power of computer networks within the Megamedia Station and the creativity of software programmers, EAS information could be routed whatever way the station personnel see fit. Think about taking emergency information only and routing it to a paging terminal capable of sending text information. Your news crews could be alerted to an emergency situation even before the assignment editor has the chance to determine who is to go where.

Local areas could even expand the EAS protocol coding within the first few lines of the datastream to further categorize the information being sent. For example, the EAS protocol has no alert level for press conferences or disaster follow-up. These codes could be agreed upon within a community, and computer software could be maintained in each facility to handle these special codes. With the multiple-source technologies built into the EAS web, continuous data could be fed through non-broadcast portions of the link without interrupting any broadcaster. This might be by means of a 450MHz link, one station's PRO channel or through the cable system — whatever works for your area.

One-man-band station

What if you own a smaller station? Maybe you only have a staff of four people, and take most of your programming directly off a satellite. You may have remote monitoring of your transmitter by a separate contractor, or even better, maybe the commission has approved unattended operation. Let's call this facility the one-man-band station.

Using the same data capabilities discussed earlier, this data could be utilized to automatically cause certain things to be put into motion. Emergencies could automatically be routed to a character generator in master control and then switched right onto the air without any human intervention and without disturbing any existing programming.

Non-emergency information could be stored in a voice-mail system that could be accessed from home periodically by the general manager to find out what the mayor might be planning. The possibilities are only limited by the creativity of the people who are involved.

It will take a fair amount of setup by broadcasters to put together effective links. It will take even more work by government agencies to put out accurate and pertinent information. But with the capabilities of EAS technology, we will no longer have an excuse for being uninformed. ■

Paul Montoya is president of Broadcast Services of Colorado, a contract engineering firm in Lakewood, CO.

GPS MASTER CLOCK/TIME CODE GENERATOR

-Worldwide Time-

Locked to the Atomic Clock in the Global Positioning Satellite System, you can have time, date and time code within nanoseconds of UTC, any where in the world!!

ES-185

\$2495.00



STANDARD FEATURES INCLUDE:

- SMPTE/EBU, ESE, IRIG-B & ASCII Time Code Outputs
- 1PPS Output • 6 Satellite Tracking • Battery Back-up
- GPS Locked Indicator • Automatic Daylight Savings Time Correction
- Time Zone Offset • Antenna • AND MORE!!

OPTIONAL FEATURES INCLUDE:

- Parallel BCD Output • 1 KPPS • 10 MHz Output • 220 VAC • 12 VDC
- Video Inserter • Video Sync-Generator

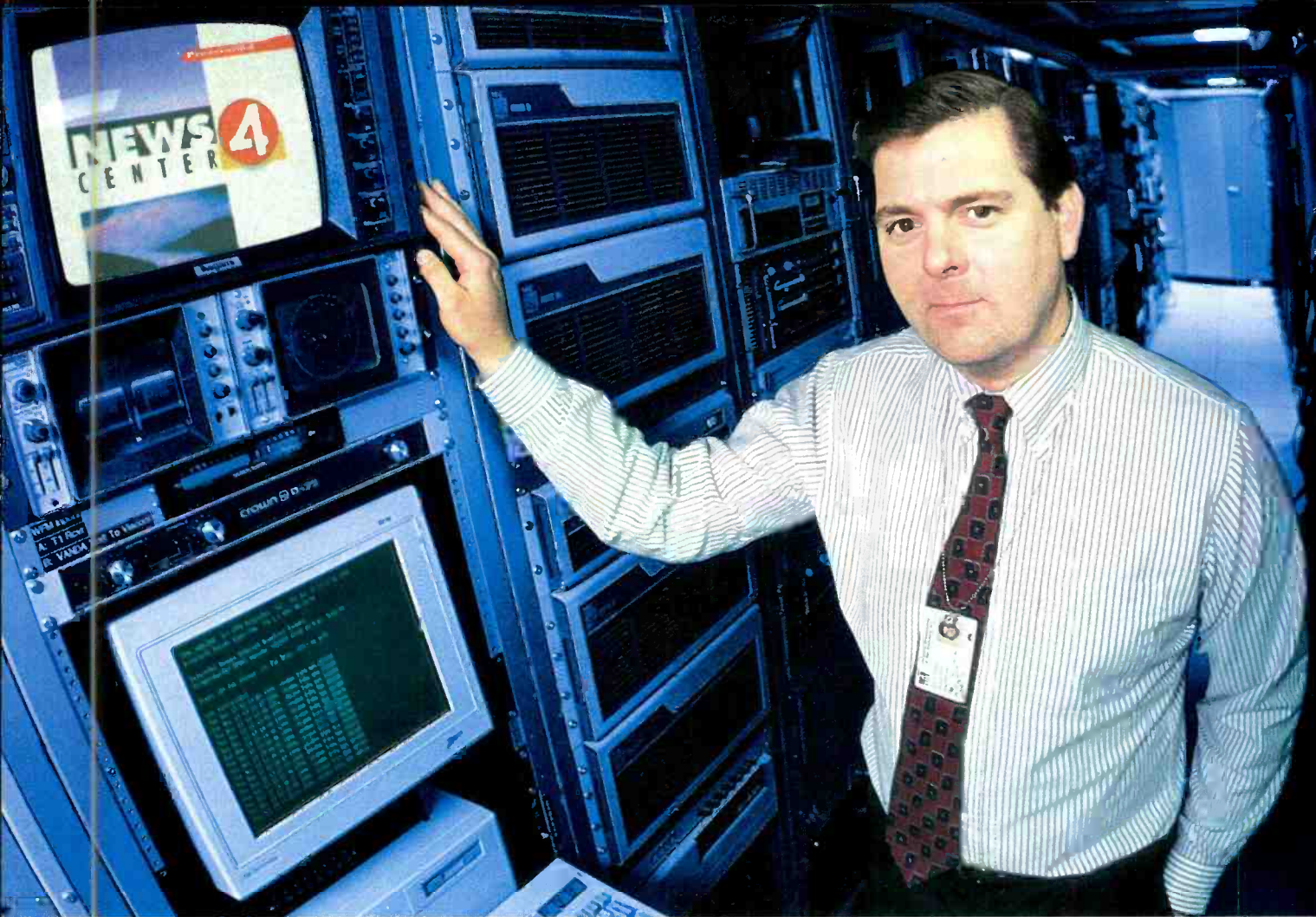
3 YEAR WARRANTY



142 SIERRA STREET, EL SEGUNDO, CA 90245

(310) 322-2136 FAX: (310) 322-8127

Circle (14) on Reply Card



"We've been delivering MPEG digital video over T1 lines 24 hours a day for 8 months."

Craig Porter, KRON TV, San Francisco

"FutureTel™ made it possible for us to quickly get the BayTV channel out to remote cable headends without investing a lot of money. It can multicast and it's fault resilient. I don't know of anyone else that can do that."

Using FutureTel's exclusive digital video distribution technology, Craig avoids the problems of transmitting video over ISDN/T1 lines. He uses our PrimeView™ encoder to digi-



tize the video which is multicast via an ethernet card to our TeleMux™ T1 cards.

Everything Craig uses to keep BayTV up and running over T1 lines is available today from FutureTel, including a Software Developer's Kit that you can use to customize your solution.

For more information on publishing and transmitting digital video, call

FutureTel at **1-800-658-5868** now. We'll put you in touch with one of our authorized resellers, who will help you put together a complete digital video solution.



FutureTel

1092 E. Arques Avenue
Sunnyvale, CA 94086



Identifying leadership styles

In your job you interact with those in authority. And chances are that you've been turned down by a supervisor at least once for something you requested. Often times, that request has been about resources. Resources in this context are any tangible or intangible assets that will support your cause, like equipment, personnel, money, supplies, perks, promise of support or just goodwill.

Whether you're an employee, owner or manager, this article will help you negotiate for resources by understanding how a company functions and by identifying leadership styles.

Leadership styles

It's important to understand the leadership styles of your company's leaders. After you identify the leadership style of the person you are dealing with, you can then decide the type of approach you need to use in the negotiation process. The seven styles of leadership are:

1. *The Prophet* is a visionary who creates the breakthrough and the energy to propel the company forward. If you work for a Prophet, don't expect him to give you specifics on a project or follow up on the details of your work. Prophets value thinking and intelligent communication on macro ideas. If you have Prophets working for you, recognize their creative abilities and reinforce and encourage those talents, heed their ideas and be patient.

2. *The Barbarian* is the leader of crisis and conquest who commands the company on the march to rapid growth. The personality of the Barbarian is depicted by a single-minded dedication to a mission or goal with a strong sense of urgency. Barbarians are decisive decision makers and turnaround artists. They are authoritarian or dictatorial and have little patience with planning and administration. If you work for one and want to make a request, get to the heart of the matter quickly, directly, concisely and honestly. The Barbarian will make the decisions and you'll carry them out. If you manage Barbarians, be sure their assignments are ones where command and single-minded action are appropriate. Let them know what

their responsibilities are and what you expect of them. Help them learn leadership skills by getting them involved with strategic issues, as well as teaching them to delegate.

3. *The Builder and Explorer* are developers of the specialized skills and structures required for growth who shift from command to collaboration. At this growth stage, leadership is shared, delegated and becomes collaborative. The Builder is a tactician who's interest is short-term — getting a product produced or service delivered. If you work for a Builder, bring solutions to the table, have clear and specific written objectives and don't expect much positive reinforcement. If Builders work for you, give them their autonomy and hold them accountable for improvements. Offer support where needed and reward them for improving a process, not for the result.

The Explorer is competitive and a convincing and enthusiastic communicator. If you work with Explorers, you'll win points by gaining new business, bringing in planned results and talking about strategic issues and how to win them. If you have Explorers working for you, recognize their achievements, help them to develop realistic expectations and make the best use of their time.

Administrators will recognize and reward you for conforming rather than creating.

4. *The Administrator* is the creator of the integrating system and architecture who shifts the focus from expansion to security. As a company matures, there is an inherent conflict between the creative impetus toward growth and the need for order. In most cases, order becomes the victor and the age of the Administrator begins. Leadership provides the vision, values and purpose that creates momentum while management channels the energy that leadership creates. In order to inspire workers and gain their loyalty, leaders appeal to intuition and emotion while administration appeals to the rational intellect. Administrators believe that order and systems will result in performance (focus on how and not what or why). Administrators will recognize and reward you for conforming rather than creating.

5. *The Bureaucrat* is the imposer of a tight grip of control, who crucifies and exiles new prophets and barbarians, assuring the loss of

creativity and expansion. As you head into the declining era of a company, the Bureaucratic age begins. In this age, the members of the company spend their declining energies on the struggle within the company. The more they focus on internal discord, the less they are capable of responding creatively to challenges. If you work for bureaucrats, remember that they need order and conformity. Also, serve as a buffer for your employees while shielding them from your bureaucratic boss, so that they will have a chance to produce creative solutions. On the other hand, if one works for you, put him in a staff position rather than a line position so he won't have a chance to stifle the Builders and Explorers. Also reward them for developing and managing efficient administrative processes.

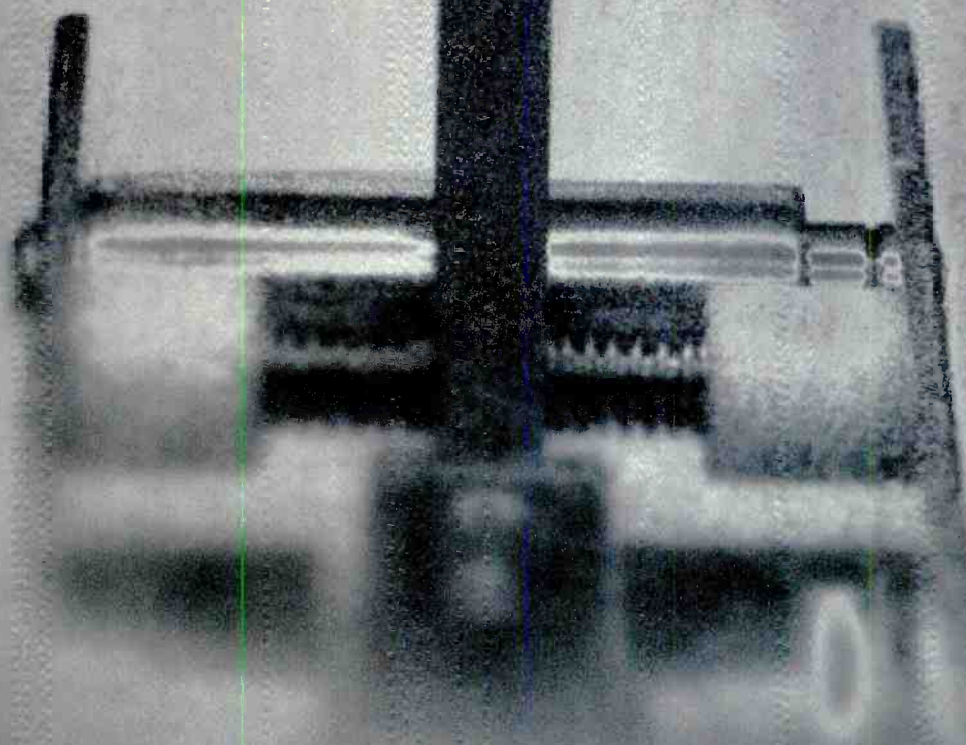
6. *The Aristocrat* is the inheritor of wealth, alienated from those who do productive work, and who, in most cases, is the primary cause of rebellion and disintegration. Managers must develop a sensitivity to the development of class distinctions and set up structures and systems to minimize those distinctions. This environment is characterized by managers having lost the desire to perform. Every relationship must have a balance of power, a mutual concern and respect. When these mechanisms break down, leadership acts on its own interests and contrary to the interests of its employees, and rebellion inevitably results. Aristocrats look for ways to manipulate the numbers, and don't concentrate on the quality of production, selling or developing new products. If you manage Aristocrats, focus on how to redirect their energies toward productivity with specific milestones.

7. *The Synergist* is the leader who maintains the balance, and continues the forward motion of a large, complex structure by unifying and appreciating the diverse contribution of all of the previous leaders and their respective characters. The final lesson in this part is that decline isn't inevitable, only probable. The best managed companies have a mix of leadership skills that allow human energy to focus on internal cooperation and external competition. Its leaders, the Synergists, are a blend of the seven leadership styles. The synergist organization achieves higher levels of integration and has a strong tendency toward development and market dominance. ■

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

Next month:
Understanding how management and communication interact in a company.

Grass Valley.



Lightworks.

800-395-9478

<http://www.tek.com>

Profile.

Profile

Just to let you know,
we're all on the same page now.

Tektronix



Once limited to the world of production video effects, component digital video is rapidly becoming the common interconnect format throughout TV facilities.

The 270MHz serial interconnect is simpler and more robust than analog circuits of the past. The circuit is still analog, carrying data as voltage changes rather than a direct voltage representation of the signal. And because it is data, the three color-component channels, associated program audio channels, and timing signals can all be multiplexed on a single coaxial cable.

The data signal in serial digital systems can be completely recovered and program information accurately reproduced if all of the voltage transitions are correctly sensed. The polarity of the data signal is not important; that a transition has occurred (or not) conveys the necessary data.

Like analog video and audio, successful interchange among various equipment is made practical by standards.

Like analog video and audio, successful interchange among various equipment is made practical by standards. SMPTE 259M and EBU Tech. 3267 define the data interface. The original analog luminance and color-difference signals are sampled at 13.5MHz and 6.75MHz respectively, and the samples are ordered in Cb,Y,Cr,Y sequence to create parallel 10-bit data words at a 27MHz rate. End-of-active video (EAV) and start-of-active video (SAV) timing sequences are added to permit word framing, plus optional audio channels and other ancillary signals, then the data is processed into a 270MB serial datastream. The serial data is then scrambled using a known

Testing serial video

algorithm, assuring an abundance of transitions for subsequent clock recovery and preventing long runs of zeros. If the data arrives at the next digital receiver in satisfactory condition, it can be deserialized and the data samples perfectly recovered.

Testing the data signal

Serial digital systems tend to work with perfect data transfer until system performance limits are exceeded — then the system crashes. As long as the serial digital system operates within limits and the data signal is accurately received, the program material may be faithfully recovered for processing and subsequent retransmission. This makes it difficult to determine digital link headroom by simply observing the resulting video. It is practical, however, to observe the in-service signal path for distortions that might cause a failure. Special test signals may be used out-of-service to stress the data receiver. Using these methods, a judgment can be made concerning how close a signal path is to failure.

In the serial digital system, there is no

separate clock for synchronization. The data receiver must extract sufficient timing information from the serial datastream to create a sampling clock at the received data rate. This is accomplished by processing the 270MHz datastream with a non-linear element, such as a squaring amplifier. This non-linear element is necessary because, due to the Non-Return-to-Zero Inverted (NRZI) coding, the datastream has no energy at 270MHz. This non-linear element converts signal energy near 135MHz to 270MHz for clock recovery.

For stress testing, there exists a special worst-case signal, with digital values of 200H (Cb and Cr) and 110H (Y), creating an occasional line of 20 bits high and 20 bits low after scrambling. This signal, transmitted intentionally by a test signal generator or accidentally in a gray graphic, will stress the receiver clock's ability to accurately lock to the signal by making available a minimum of energy at 135MHz.

Due to the frequency-dependent loss of interconnecting coaxial cable, receivers attempt to equalize the incoming data signal,

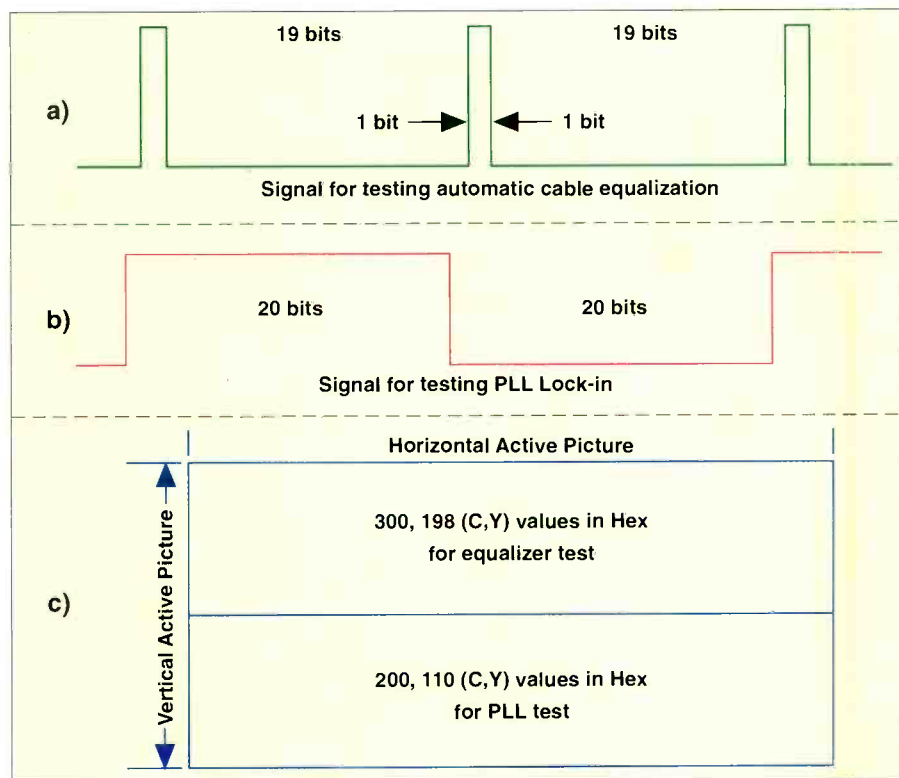
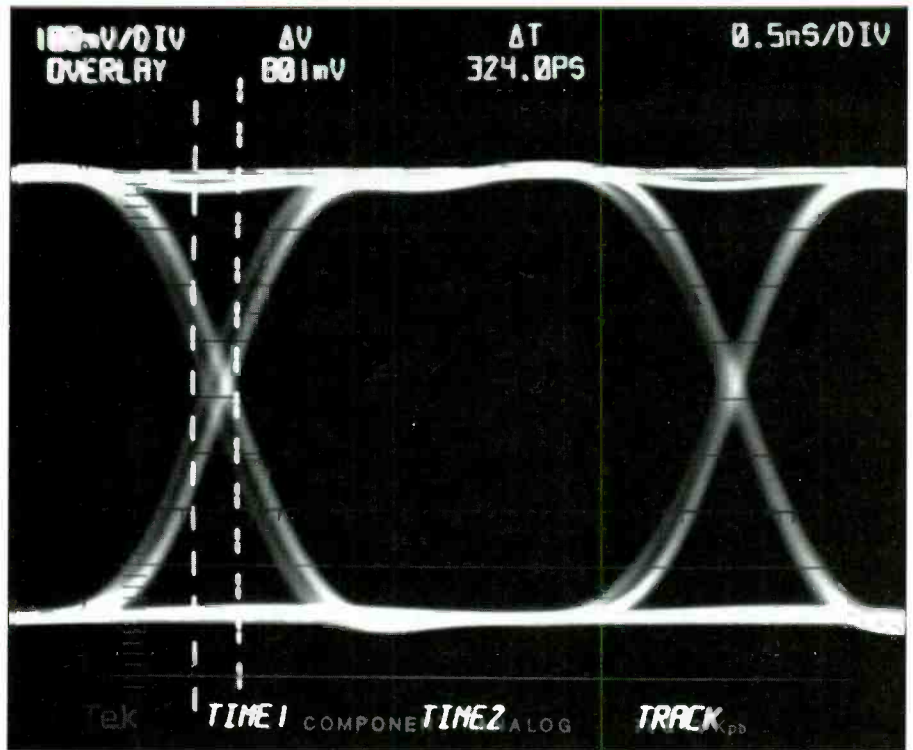


Figure 1. Pathological tests can be performed using signals that stress the system. Transitions indicate "ones" and no transition indicates a "zero." Test generators should test both polarities of a given test string. a) A string of 19 "zeros" followed by two "ones" produces a signal with large DC content; recovery of this signal stresses cable equalization circuitry; b) Signals consisting of strings of 20 "zeros" followed by a single "one" stress receiver clock recovery due to the small number of transitions; c) the SDI check field produces both of these test strings, and is used for testing digital signal paths.

restoring frequency response balance from low frequencies through approximately 270MHz. A special test signal with worst-case C_b and C_r values of 300H and Y values of 198H (purple), stresses the system by creating an occasional line with relatively large low-frequency components, possibly fooling the receiver into poor equalization.

Longer cables will cause loss of higher-frequency data information and marginal data reliability as the receiver equalizer tries to recover data transitions among the noise. This may be tested by measuring data signal power or by adding lengths of cable until the failure point is identified.

Jitter in the transmitted data signal reduces the receiver's ability to recover a properly phased sampling clock for data recovery, especially when other signal degradations are present. Instruments are available to measure alignment jitter in the arriving signal relative to a recovered clock. To measure true alignment jitter, measure the relative timing jitter between the recovered clock and the received data. By using an oscilloscope triggered with the recovered clock, alignment jitter can be evaluated by



Scope trace of an eye-pattern display with cursors and alphanumeric readout.



"YES! THE WAY AHEAD TO DIGITAL CAN BE PRETTY TRICKY" CAUTIONED SNELL.

observing the resulting eye pattern. A convenient way to determine channel amplitude and jitter characteristics of the data signal, along with the signal's video characteristics, is to use a waveform monitor with a built-in eye-pattern display.

Amplitude and alignment jitter measurements are simplified by using the waveform monitor's voltage and timing cursors. Because the recovered clock from the receiver under test is not often available, serial component waveform monitors may recover the clock with a choice of selectable bandwidths. This recovered clock then triggers an eye-pattern display, effectively high-passing the displayed jitter since the high-pass corner frequency is roughly equal to the clock recovery bandwidth. The low-bandwidth selections are provided to evaluate the total jitter via the horizontal displacement of the eye-pattern display. Higher-bandwidth choices allow the engineer to ignore low-frequency jitter that typically does not bother clock-recovery circuits.

A sampled eye-pattern display may also be used to check distortion of the data signal due to impedance irregularities or improper termination, provided the monitor is in the active data transmission path. This check confirms the physical integrity of the data

path, and may help discover improper or damaged cables, connectors or terminators. On a malfunctioning link, being able to determine if the serial signal is present or missing is an important capability.

All of this assumes that the data itself is correct. Many instruments, fixed and handheld, are available to assure compatible data, correct format, legal video and ancillary data values, and correct insertion of embedded audio signals. Also, there is operational monitoring of the video and audio used to make the data. This operational monitoring is often done with conventional analog displays.

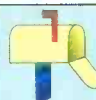
Serial component video is no more complex than analog and can be easier to understand. In today's facilities, digital video is easily implemented and its quality is easy to maintain and verify. Most of the old familiar tools are still available, and only a few new ones are needed. Cameras may still be set for the creative effects you want, and creating those effects are now technically easier. Work may be stored, recovered and sent on to the end user with confidence that it will be reproduced with the creative effects intended. ■

Guy Lewis is a product manager for Tektronix, Beaverton, OR.

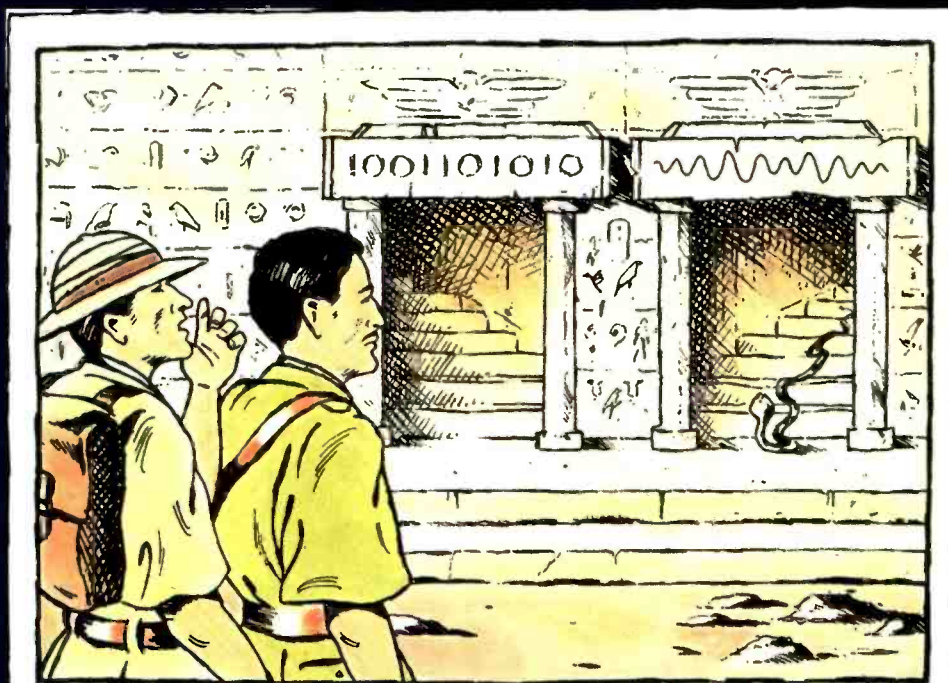
Watch for
Transition to
Digital in the
January issue. . .

Coming in January
Planning your
digital facility

BROADCAST[®]
engineering



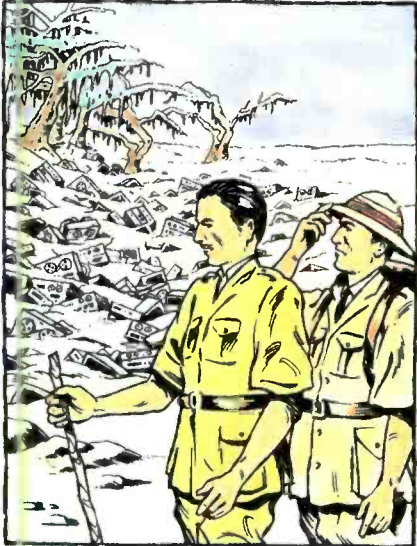
Internet: be@intertec.com
CompuServe: 74672,3124
FAXback: 913-967-1905



"AT LAST...THE DOORWAY TO DIGITAL!"
WHISPERED WILCOX.

Snell & Wilcox.

"Your essential guide to digital."



"THIS MUST BE THE LEGENDARY
ANALOG'S GRAVEYARD..."
GUESSED SNELL.

Do you really need to dump your existing equipment
to change to digital?



"THEY OBVIOUSLY WENT DIGITAL
TOO ABRUPTLY" GASPED WILCOX.

Does changing to digital have to be so daunting?



"WHEN THE WORLD WENT
DIGITAL THEY GOT LEFT
BEHIND" SNELL EXPLAINED.

Don't get left behind! Come and explore the way ahead with
Snell & Wilcox.

Buy "Your essential guide to digital" only at address below.



SNELL & WILCOX

Engineering with Vision

Circle (8) on Reply Card



Choosing an audio console

Today's TV audio consoles have become quite complex, especially compared to the ones of just a few years ago, which weren't much more than big radio consoles. TV production is caught between the conflicting requirements of shrinking manpower budgets and ever more complicated programs. It is common practice to use many more microphones and other audio sources than before. A simple "one-mic show" like *The Nightly News with Tom Brokaw* can easily occupy a 36-input console.

A careful analysis of input requirements is necessary, and this one factor will largely determine which console you buy and how much it will cost.

Input requirements

Although many consoles have input switching, it is not a good idea to put the backup lav mic from your anchor on the "B" side of an A/B input switch. Besides the fact that you cannot pre-hear the mic to verify that it's working, significant noise could accompany a hot changeover.

Some operations will want to set up one or more shows on the console and leave them in place. This may require more inputs. Others will look to automated consoles. Today's console automation requires careful investigation. Some types will store the control setting information, while others will move the controls into their stored positions. Furthermore, some will store *snap-shot* settings (or *scenes*), while others will allow fully dynamic, time-variant control of some or all settings to be stored and recalled.

Differing needs

Some programs will need the console to perform all show functions. Other large entertainment-type productions will divide the mixing requirements between separate consoles (and control rooms). Meanwhile, a complex news show (like *Nightline* or election-night coverage) might require a sub-control room to organize and mix news remotes and manage multiple mix-minus backfeeds.

Some method of grouping mixes is required, either by audio subgroups, VCA

groups or both. A need for 10 to 20 groups is not unusual.

Extensive mix-minus capabilities are used today to feed studio-talent IFBs, telephone hybrids, subcarriers for remote IFB, overhead studio floor feeds by zone, audience PA by zone, iso feeds to iso tape machines, satellite uplinks and more. It's handy to have the ability to accomplish these feeds without tying up the main buses of the console, perhaps implying an outboard mix-minus matrix or submixer. Nevertheless, all mix-minus or aux sends must still be easily monitored in the main control room via auxiliary monitor-source switching, and each mix-minus feed should be assigned to its own dedicated, full-time meter.

Two different types of input sensitivity trims are available — either stepped or continuously variable. The stepped approach offers the benefit of repeatability, but variable allows you to adjust the level while "live" without audible jumps. The best solution may be a stepped attenuator with a +/-10dB trim pot.

The inevitable issue of digital vs. analog must be faced.

Each input module should include extensive EQ, several aux sends, (pre- and post-fader and EQ), and dynamics control (compression/limiting/expansion/gating). The latter feature is a relatively recent innovation, but it is a real requirement today, and improves the level-management and overall sound of music and sports programs.

Mixing for stereo television requires some additional items. These include polarity reversal switches, pan and balance pots, left/right/stereo/mono-sum switching on each input, a monitor section that allows instant one-button comparison between mono and stereo (preferably with the mono mix coming out of a single center speaker), some type of phase-correlation meter or scope and stereo input modules with stereo faders for all line-level stereo sources. It is simply not reasonable today to use two panned mono faders to control a stereo source. The possible variances are too wide and stereo imaging is too fragile, not to mention the extra console real estate such an approach eats up.

An increasing number of shows are being mixed in surround sound and it is preferable to have a console designed for that purpose, with appropriate panning, routing, metering and monitoring facilities. Insert points are needed for external encoders and decoders.

A few other items to consider: Do you want/need patch panels on the console? What talk-back provisions do you need? Can redundant power supplies be fitted? Do the power supplies make so much noise that they must be remotely located?

Digital vs. analog

Finally, the inevitable issue of digital vs. analog must be faced. Recent advances have substantially reduced the starting prices of fully digital mixers, but the selection and cost-effectiveness of large analog consoles are still hard to match in the digital domain for many applications. Unlike storage and transmission systems, the specifications of top-notch analog consoles are not significantly improved upon by their digital equivalents.

The main advantage of a digital console lies in its configurability, particularly in its use of *assignable* controls. For example, one equalizer module can be assigned to any input and its controls set as needed, then these settings are stored and the equalizer can be assigned to another input. This is in lieu of a dedicated equalizer module on each input.

The other obvious value of a digital console is that it keeps signals in the digital domain, which becomes especially important when the majority of sources and destinations the console connects with already offer digital I/O (such as in a D-2 editing suite). Until that condition exists, however, the digital console cannot achieve its full cost-effectiveness due to the need for many high-quality A/D and D/A converters.

An interesting hybrid is also available: the digitally controlled analog console. This design stays cost-effective by keeping all signal paths analog, but allows the flexibility of digital designs with assignable modules, automation and instant reconfigurability via software. The latter is particularly useful in accommodating the fast-changing surround-sound or multichannel-output requirements of today's TV facilities.

Great variety and increasing price/performance ratios are the rule among audio consoles today. The large number of console manufacturers that have targeted the broadcast/post market assures prospective buyers of plenty to choose from to suit their varied needs. ■

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



For more information on audio consoles, circle (154) on Reply Card. See also "Audio Consoles, Mixers," p. 50-51 of the BE Buyers Guide.

There Are Two Kinds Of Engineers. Those Who Buy Utah Routing Systems. And Those Who Buy Something Else.

Introducing the UTAH-300. History Repeats Itself. Digitally.

If you're in the market for a routing switcher, you'll be happy to know Dynatech's new UTAH-300 is the ultimate achievement of four generations of router technology. In 1978, our AVS-1 proved that rugged, versatile routing switchers could also be affordable. Today the UTAH-300, with analog/digital capability, is the most sophisticated



At 128 x 128 VAA, with redundant power and control, the rugged UTAH-300 takes up only 2 1/2 RU of space.

member of a full family of mature, reliable routing products. The UTAH-300 is built for growth. It goes from 32 x 32 to 256 x 256. And beyond. It's compatible with every control system we've ever built,



so it integrates into any Utah installation. And not only does the UTAH-300 manage D1 (serial component) and D2 (serial composite) formats, it's ready for 360 Mb/sec. data rates of future ATV signals. Far more capability, yet it's priced competitively.

Experienced Support, Too.

Over time, we've also learned about what you need in the way



Universal matrix frames allow easy upgrade to digital signals.

of support. That's why we offer reliable 24-hour, 7-day Global Customer Service Support Center, training and on-site repair, and a 10-year warranty. Call your nearest Dynatech sales office for more information on the routing system everyone is smiling about.

In the USA call
1-800-246-6744 ext. 5007

Americas
Phone: 801-575-8801 Fax: 801-575-3299



Europe
Phone: 44-1635-521939 Fax: 44-1635-528387

Asia
Phone: 852-2868-1993 Fax: 852-2525-8297

© 1995 Dynatech Video Group, Inc

Circle (16) on Reply Card



Remember when the fax machine suddenly became a necessity? It is hard to pinpoint the time, but there was a year in the mid-'80s when you suddenly could not compete in the business world without one. Facsimile technology became a hot trend, and in a blink of a business eye, you became a pariah if you weren't able to fax documents to partners and customers. The same transformation is now occurring on the Internet's World Wide Web (web).

Constructing a web site today means that you're not dumb enough to get left behind.

Only a year ago, a web site meant your company was a "leading-edge" corporation astute enough to see the future of distributed communications. Constructing a web site today means that you're not dumb enough to get left behind. Like the fax's golden age 10 or so years ago, the business world is now beginning to fill with voices asking the question that today's corporation can no longer afford to ignore: "What do you mean you don't have a web site?"

Whether or not you have heard the murmuring, it is inevitable that a web site (or "home page" as they are also known) is quickly becoming de rigueur to play within the parameters of today's business world. The reasons for this new prerequisite are many: instant worldwide access to corporate data 24 hours a day, 365 days a year; dynamic control of a corporation's global image in ways previously unknown; a direct connection to your customers; and a quickly evolving multimedia forum to showcase your company's strengths. What could possibly be holding you back from starting a site of your own?

Probably a clue as how to begin. But never

Web publishing: Don't get left behind

fear — web publishing is not as daunting as it may first appear. One of the reasons the web has proliferated so quickly is that the technology requirements are minimal and the costs are reasonable considering the benefits you and your company will reap. To establish a web site, all you have to do is follow these basic steps:

- **Step 1: Register your domain name with InterNic** — This is important because your domain name is literally your web address, and you want people to find you easily just by knowing your company name. A short, logical domain builds easy name recognition and gets people to your site quickly (a boon in these days of instant gratification). InterNic is a government agency and can be reached at www.internic.net. Registration is free, but can take as long as a month to process, so plan ahead.

- **Step 2: In-house or outsource?** — Creating a web site is not hard, but expect a learning curve. How much time do you have on your hands? Like the desktop publishing revolution in the 1980s, the web has given birth to scores of specialty shops specializing in custom publishing. The costs vary by the hour and the project, and while some companies provide the full service of designing and hosting your web site, many others just do the design work and leave the technology to you.

Deciding what you need from an outsourcing company requires some research. The best place to search is at Yahoo! for "Internet presence providers." This kind of search will give you plenty of options, anywhere from big name players like Poppe Tyson (www.poppe.com/) to smaller growing shops like Silicon Reef (www.reef.com).

Doing it yourself requires even more research, but could ultimately provide you with better control of your site. First, you will need a dedicated Internet connection like an ISDN or T-1 line (call a national provider like MCI or go to the catalog of ISPs at www.netusa.net/ISP and find a provider near you), then you need a computer to which your line connects. The Net was born on Unix, but Windows or Mac will work just fine (in fact, Macs are getting a tiny corporate rebirth as web hosts). Go with whatever you feel most comfortable, but make sure that you have a fast processor and plenty of RAM to handle lots of guests visiting your site.

Once you have your server box, you then need your server software. You can get free software from CERN, where the web was born (www.w3.org/hypertext/WWW/Daemon/), or the NCSA, where Mosaic was born (www.ncsa.uiuc.edu/). But if you are

in business, you probably will want to pay for the support. If you are a Unix lover, you can get Netscape for \$1,500-\$5,000 (www.netscape.com). For the Windows user, O'Reilly & Associates WebSite has garnered great praise for its ease of use and the fact it is easily found in local bookstores for a price of \$349. For the Mac folks, the only real option is WebStar from StarNine that sells for \$599 (www.starnine.com).

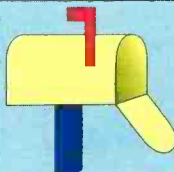
- **Step 3: Create your content** — Now that you have a web-ready box, you need to fill it with interesting material. Once again, the in-house or outsourcing question must be answered. HyperText Markup Language (HTML) is the formatting language of the web, and though it is not hard to learn, it does take time to master. Microsoft and Novell's Wordperfect division have put HTML authoring tools in their word processors, and you can buy tools like HotMetal Pro from SoftQuad to do it yourself.

Whether you do it yourself or not, the critical thing to remember about web publishing is that you are not done once you create your page. The beauty of the web is also its curse: Playing in a dynamic medium means that you must remain dynamic. Updating your web page is crucial and requires re-engineering your internal business processes to include updating and publishing material to your web page.

"What do you mean you don't have a web site?"

Just remember to be interesting. Dumping your brochure on-line won't cut it anymore. Grab your audience with relevant material that tells them why they should care to work with you. Giving things away, such as software or other informative freebies, also doesn't hurt. So join the revolution! Making this move should be easy, unless, of course, you are the type who still doesn't own a fax machine... ■

T.C. Hall is a senior account executive at Niehaus Ryan Haller, a high-technology public relations firm in South San Francisco.

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

42 GB Uncompressed.

12 MB per second
transfer rate

Protect the
projects you've
spent weeks
creating

Ideal for
Digital Video
Multimedia
3-D Rendering/
Animation



Power loss.

Disk crashes.

Operator error.

It only takes an instant to wipe out gigabytes of data.

If you're on the leading edge of multimedia, digital video, and 3D animation, you need a high performance

backup solution to match. And the CY-9000 is the *only* drive on the market capable of handling enormous files at a speed that respects what your time is worth.

Featuring a Fast/Wide SCSI interface and a 32 MB data buffer, the CY-9000 1/2" tape drive can store 42 GB *uncompressed* to a single cartridge—at a speed of 12 MB per second.

Based on field-proven helical scan technology, the CY-9000 features an MTBF of 200,000 hours and a bit error rate of less than 1 in 10^{17} bits read—the best reliability and data integrity in the industry.

Need to access stored data quickly? Unix systems can take advantage of our Accelerated File Access option which

allows you to locate a single file on a 42 GB tape in an average of 90 seconds.

Whether you choose a single drive or our tape library, we're compatible with virtually every computer system, and we'll back you up with a one year warranty that includes technical support from our in-house engineering groups.

Considering the investment you've made in hardware and software, it makes sense to protect the work you create with the most powerful backup solution available.

Call today for more information.

(804) 833-9000

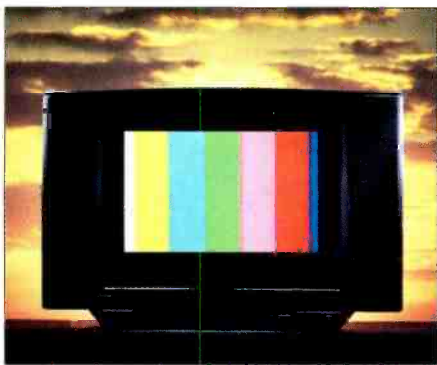
CYBERNETICS

Tera One • Yorktown, VA 23693 • Fax (804) 833-9300

Circle (17) on Reply Card



The CY-9135
tape library
features one drive,
35 tapes,
and provides
automated access
to 1.47 terabytes.



Will the digital channel replicate my NTSC channel?

A station example

Let's look at an example. (See Table 1.) Assume an existing NTSC VHF station is assigned a mid-UHF Channel 47 for ATV. Also, assume that the ATV power has been set so that the area of the noise-limited reception contour for ATV reception is equal to the area of the station's current Grade B contour. The maximum radial to the Grade B contour is 100.6km. With these givens, evaluate the assignment to verify that the new ATV coverage will indeed cover the station's existing market.

Assuming ATV channel assignments for all stations in the area, the new ATV interference into reception of the NTSC signal can be estimated. Note that the NTSC VHF station already has some loss of Grade B area due to existing interference from other NTSC stations. For this example, the additional loss is 4.3% of the service area, but only 0.8% of the population served.

The service area of the new ATV channel can now be estimated. There may be some loss due to interference from the other new ATV stations and there is also some loss due

to interference from the existing NTSC stations.

The loss of ATV service in the Grade B contour for this example is mostly due to interference from NTSC stations — 0.9% of area and 0.1% of the population. For the NTSC audience, 99.9% will be able to receive the ATV signal. The market impact of introducing ATV in terms of covered population is a near term loss of 0.8% of the NTSC market and a gain of 1.7% over NTSC for the ATV market. In terms of service areas, the NTSC service area is reduced by 4.3%, but the ATV service area is increased by 15%.

You should begin learning how your ATV signal will propagate across your current NTSC coverage area. Armed with the proposed ATV assignment table, engineers can start the evaluation process of ATV vs. NTSC coverage patterns. A little planning now will help you move quickly when the channel assignments are finalized.

We'll examine the 8-VSB modulation system in next month's column. ■

Louis Libin is director of technology for NBC, New York

It is now only a matter of months before the FCC will set a standard for a new Advanced Television Broadcast Service (ATV). The commission will also assign each of the approximately 1,700 TV stations a new channel for ATV pairing the new channel with the current NTSC channel. Most of the new ATV assignments will be in the UHF band and each NTSC station will be assigned a new ATV channel with a specific numeric value. In past columns, I have explained the basis for the assignments because this is something you and your station manager should understand. What if your station, now on a low VHF channel, is assigned UHF Channel 68? Will your viewers tune up to Channel 68? Here is how you can begin to answer questions.

Digital television will be different!

An NTSC picture deteriorates gradually with a decreasing signal-to-noise ratio as distance from the transmitter increases. This is a characteristic of NTSC television as an analog system. This will not be the case with a digital TV system; the digital system is designed with built-in headroom that takes natural interference into account. As a result, there is no gradual degradation, the ATV signal is perfect or it can't be received.

Also, because NTSC television is an AM system, the video is subject to multipath "ghosts" and to natural and man-made electrical noise that show up as annoying sparkles and lines in the picture. The quality of the received signal also varies widely from location to location and over time.

The different grades of NTSC reception are statistically derived on the basis of time and location variability. Field tests have demonstrated a high degree of UHF multipath variability. Even a fraction of a foot difference in receive antenna location can result in a significant signal change. This variability can not be attributed to terrain blocking the path; it can be caused only by multipath interference. The proposed digital system is designed to account for such conditions.

EXISTING NTSC VHF CHANNEL

	AREA			POPULATION		
	Area (sq-km)	Losses	%	Population	Losses	%
NTSC VHF CHANNEL						
NTSC Grade B contour	31,816		100.0%	8,583,805		100.0%
Existing NTSC interference		4,394	13.8%		153,805	1.8%
NTSC base line service area	27,422		86.2%	8,430,000		98.2%
NTSC base line service area						
NTSC base line service area	27,422		100.0%	8,430,000		100.0%
New ATV interference		1,179	4.3%		67,440	0.8%
Service area with ATV	26,243		95.7%	8,363,000		99.2%
ATV CHANNEL 47						
ATV noise-limited contour	31,816		100.0%	8,583,805		100.0%
Interference from NTSC stations		300	0.9%		6,546	0.1%
Interference from ATV stations		2	0.0%		1,375	0.0%
Combined interference		301	0.9%		7,921	0.1%
ATV service area	31,515		99.1%	8,575,884		99.9%
ATV service area						
NTSC base line service area	27,422		100.0%	8,430,000		100.0%
ATV service area	31,515		114.9%	8,575,884		101.7%
NTSC area match	27,395		99.9%			
NTSC not matched		27	0.1%	est.	8,430	0.1%
ATV service gain beyond NTSC	4,120		15.0%	N/A		
Net ATV service gain	4,093		14.9%	145,884		1.7%

Table 1. Using Channel 47 as an assumption, the above table illustrates how to calculate the differences between a station's current NTSC coverage area and the proposed ATV coverage area. The calculations are based on a maximum radial of 100.9km, HAAT 402.3m and an ATV ERP of 852.3kW. In this example, the ATV coverage is 14.9% larger and encompasses 1.7% more population than does the NTSC VHF signal.



Space age CCD-cameras don't fit on iron age pedestals

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 jerkfree column movement thanks to the patented Sachtler pneumatic system. Test for yourself the optimum camera support for all compact Studio/OB cameras, now!

55 North Main Street
Freeport, N.Y. 11520
Phone (516) 867-4900
Telex 140 107 sac trpt
Fax (516) 623-6844

California office:
3316 West Victory Blvd.
Burbank, CA 91505
Phone (818) 845-4446



sachtler
corporation of america

Preview

Coming in December . . .

New recording technology

Take a look forward at how video is recorded today and what new technology lies ahead. Areas that will be covered include disk caching, optical storage, the video CD, digital videocassette, digital VHS, Sony/Philips consumer video CDs.

Disk-based servers for production and broadcast

Servers are now available that can provide multiple streams of real-time video with full CCIR-601 quality. Find out about the technology behind tapeless storage.

Routing video

Getting the signal from here to there used to be straightforward. Now, you must decide analog or digital, component or composite. Once these factors are selected, a whole new realm of transport protocols are available to interconnect the many video devices. Sometimes, it is no longer a case of selecting the router size, but of a virtual routing system where the traditional crosspoint no longer exists. Then you must add the issues of ATM vs. SDI and SDDI topology. Find out whether you will need to route video or whether the routing will be on data.

Preparing for disaster: Lights out

Being able to maintain broadcast operation when the power fails is an expensive, but important operational requirement. By their very nature, natural disasters are unplanned. To avoid being embarrassed and shortchanged, you must plan in advance for such eventualities. Review the latest types of generators, their maintenance and how to properly size and purchase one. ■

BE THE ENVY OF YOUR FELLOW ENGINEERS

Get A Portable Hamlet Waveform/Vectorscope For As Low As \$ 1,695



For More Information,
Call 800-331-2019

WAVEFORM, VECTOR, DUAL/MONO
STEREO SIGNAL MEASUREMENT

POWERED BY RECHARGEABLE
NICAD BATTERIES or AC ADAPTER

FOR DISPLAY ON FIELD MONITORS,
LCDs or CAMERA VIEW FINDERS

EXTERNAL REFERENCE

OPTIONAL OVER-THE-SHOULDER
CARRY CASE and 6" LCD (SHOWN)

Circle (19) on Reply Card

Manufactured in the U.S.A. by:

JAMES GRUNDER & ASSOC., INC. • 9204 Bond St. • Overland Park, KS 66214 • (913) 492-4666 • Fax (913) 492-5556

Now Supports
ISDN Station
Communications!



From the top, a 12-key LCD display station, a 9-key LED display station, a 20-key LED expansion panel, and a 5-key LED display station

Matrix Plus™ II

The best in television intercom systems...

just
got
better!

Matrix Plus II
with its new
bright LED
display stations



New LED Display IFB Assignment Panel

and new software features broadens your ability to communicate under a wider range of situations. It is a truly integrated, **100 x 100 digitally-controlled** intercom with stations for every application, a comprehensive modular interface system, and simplified PC pull-down menu programming. Exclusive features include **"simplified IFB assignment panel"**, call-signalling, touch-tone dialing, paging, ISO, **station access from remote telephone**, variable input levels and many other sophisticated features. There's also **versatile station communications** including long line remote capability and fully-digitized **single pair wiring**. Plus much more, including the highest level of service and support in the industry. Want all the details? Call us at 510-527-6666.



The Matrix Plus II connects to a variety of intercom stations.

Circle (20) on Reply Card

Matrix Plus™ II

FROM CLEAR-COM INTERCOM SYSTEMS

Broadcast PC platform

Major players tap into the TV bandwidth for new networks to deliver more data to home PCs.

By Marjorie Costello

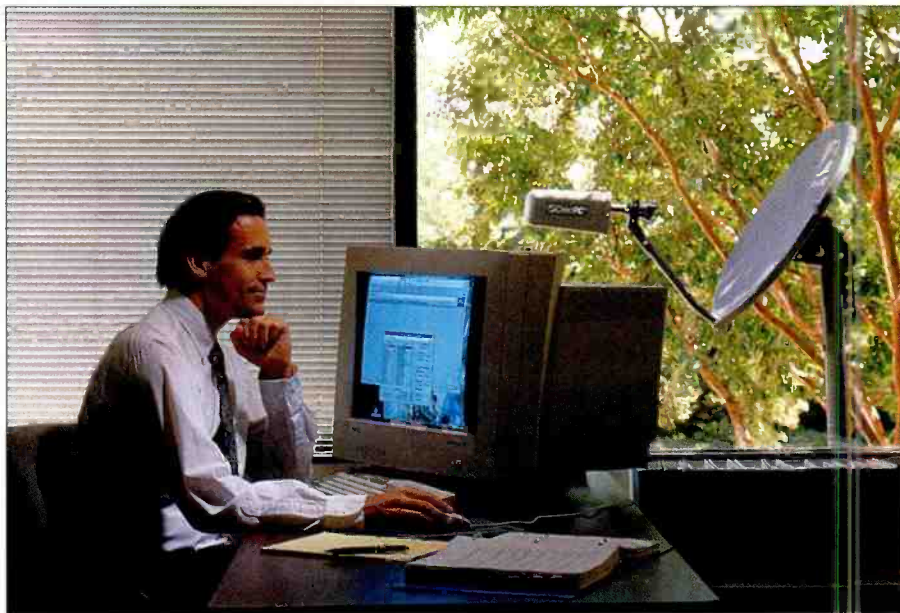
Sending data over the broadcast TV signal offers potential for linking the television and the computer. In addition, other TV-related pathways are under development, including cable television and satellites. The driving force is the quest for more bandwidth dictated by the limitations of the plain old telephone service (POTS). With millions of new consumers downloading large multimedia files from on-line services and cruising the Internet, the conventional narrowband phone line is just not sufficient.

A host of companies — including major players in computers, cable, satellite, broadcasting, on-line services and consumer electronics — are developing ways to send more data faster. Using the terrestrial broadcast signal — including the VBI — is just one pathway most players are pursuing.

Broadcast network perspective

NBC, the network currently most actively involved in developing datacasting, is not just looking at the VBI. According to Ken Bronfin, general manager, NBC data network, when he considers the various delivery pathways, he is talking in terms of applications that can work on any of those platforms. Bronfin, who also is vice president, NBC cable and business development, explains that his data operation is not necessar-

Top photo: HNS currently operates a digital communications satellite service, DirecPC. The service is being marketed primarily to commercial customers, as well as high-end consumer Internet users.



ily developing something just for VBI, but also for cross-delivery platform use.

Although planning to tap all data delivery networks and speaking with all the players, NBC has a special interest in the VBI. NBC owns and operates a TV network, seven TV stations and two cable networks (CNBC and America's Talking). NBC also is linked by its network to affiliates in markets across the country. As a result, the company controls a significant amount of the VBI.

According to Bronfin, the VBI's appeal in data delivery is that it is ubiquitous. "The technology is well-known, well-tested and the costs have been brought down to chips at a dollar," says Bronfin. And, although the VBI can't deliver video and barely provides audio, Bronfin believes that it can do just about anything else.

One data delivery application that NBC has a strong interest in developing involves interactive advertising. For instance, in an interactive ad for a car, an application can be sent out with a picture that will allow the viewer to change the car's color and spin it around from different angles. The application can be downloaded prior to a 30-second commercial making it available to the viewer the second the commercial comes up. Bronfin says, "You have a 24-hour, continuous datastream [to the home] as long as the TV is on and the PC is on collecting the data." Although the VBI is not superfast, Bronfin says, "You can send a megabyte file and create some nice functionality."

Regarding the use of the Digital Satellite

System (DSS), Bronfin mentions, "We have NBC stations on DSS and CNBC and America's Talking. So I am inclined to provide [data] services over DSS for NBC."

Bronfin believes that data delivery has to be implemented by the network and local stations. He says that at RTNDA/SMPTE, all the affiliates were interested in participating in terms of bringing their local advertisers and local news content.

And Bronfin's group is not the only new media unit at the network leveraging what even broadcasters are now calling *content*. Other NBC multimedia operations include NBC Desktop Video, which provides live video news to business customers; NBC Digital Publishing, which develops CD-ROMs and other digital products; and NBC Online ventures, which launched NBC SuperNet, the TV network's new on-line service on the Microsoft Network.

As broadcasters seek new ways to use — or re-purpose — news, sports and entertainment content and distribute it on as many new networks as possible, they are meeting up with other industries. The computer industry — including hardware and software firms — is one of the major players at the convergence, seeking ways to expand the bandwidth for communication with the home PC.

The computer industry networks

In the computer industry, the word *network* as it relates to sending data to a mass audience of home PC owners goes beyond tap-

NO OTHER CAMERAS DARE ENTER ITS DOMAIN.

Introducing the ultra-sensitive JVC KY-27C.


JVC[®]
PROFESSIONAL

Only one low-light camera was bred with the features to conquer the most intimidating shooting environments — and with virtually no vertical smear. The JVC KY-27C 2/3" 3-CCD camera.

The KY-27C inherited the technology of the KY-27B — the industry's #1 camera. But, with its key features sharply improved, this new camera can fearlessly roam the darkness like no other. A new generation of high-performance CCD's provides 1 lux low-light capability with 100 percent video level output, 800 lines of horizontal resolution, and a 63-dB signal-to-noise ratio.

Vertical smear and annoying rings and flare are practically eliminated, because the KY-27C's new CCD's utilize an IT chip constructed with a revolutionary Tungsten material for its pixel mask. This IT chip is clearly far better than any ever produced, and as a result, you are assured of the highest resolution, maximum sensitivity and outstanding image quality.

From the brightest lights to the darkest jungles, the KY-27C's automatic level control and full-time auto white provide continuous shooting. Plus, a Triaxial System permits operation up to 5,000 feet, empowering it with incredible field worthiness.

The only thing tame about our new KY-27C low-light camera is its price. For more information, please call 1-800-JVC-5825 and mention Product Code 183 



ping NBC, CBS, ABC, CNN or ESPN. Network translates into any pathway — wired or over-the-air, terrestrial or satellite, telco or broadcast — for delivering data to home PCs.

This past summer, software giant Microsoft enunciated its strategy for the broadcast PC platform. In a speech aimed at content providers and developers for the new Microsoft Network (MSN) on-line service, Microsoft senior vice president Craig Mundie noted, "The Microsoft Network and other on-line services have been born in the environment of narrowband communication [POTS]. What we see as an opportunity...is essentially the ability to use the existing broadcast infrastructures — which exist in many forms, such as satellite and cable modems."

Microsoft, based in Redmond, WA, is also exploring use of the VBI to send data and has as its goal the creation of a system that is network neutral. Mundie maintains that the form of data transmission is ultimately up to the people that are going to work with Microsoft to provide these networks and use the company's software.

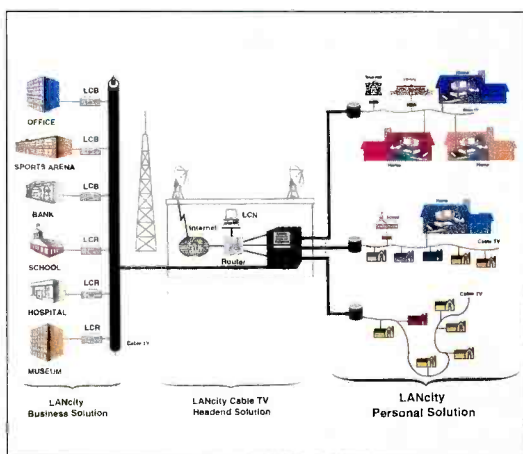
Mundie, who heads Microsoft's consumer systems division, explains that the data could be simulcast, complementing a TV sporting event with statistics or featuring an enhanced version of an on-line service related to a TV program. Another possibility Mundie mentions is using a satellite or terrestrial broadcast system as a bulk data download engine to send video clips to PCs in the middle of the night.

At Microsoft, the goal is not simply to transmit more content-rich multimedia versions of MSN; the company also wants to provide operating system and applications software that will transform the home computer into what Mundie calls "the broadcast-enabled PC."

The importance to the computer industry of exploiting new delivery networks is summarized by an executive at the major microprocessor maker Intel. Avram Miller, vice president of corporate business development, has been leading his company's efforts in this area. According to Miller, in the next 10 years, computers will increase their capabilities by 100 times and there is a need to increase the communications capabilities proportionately.

At major PC direct marketer Gateway 2000, increasing the speed of data to the computer has become a major issue. Tom Grueskin, senior project manager, observes, "Whether it is the network people, the computer companies or the end user, everybody is very focused on that because [the speed problem on-line] is a huge customer satisfaction issue. Nobody likes to wait for anything."

Grueskin also predicts that when the content and services are offered, people will be all



Deployment diagram for the LANcity cable modem.

over it. Grueskin says, "When Microsoft or other companies offer some kind of content that gets our customers excited, we will design a network card and throw it in the system as an upgrade for a couple of hundred bucks."

Data from the birds

Microsoft and others have made no secret of their interest in using satellites to reach home PCs. Of particular interest is the Digital Satellite System (DSS) because, as its name indicates, this broadband TV programming service is all digital.

Shortly after Mundie delivered his speech in July, stories began appearing in the press that Microsoft was finalizing a deal to deliver a multimedia version of MSN on DirecTV. DirecTV is the major programming distribution service and key backer of the direct-broadcast, all-digital TV service referred to as DSS. To date, more than one million DSS 18-inch dishes and IRD set-top boxes (integrated receivers/descramblers) have been installed. This past summer, Sony joined Thomson in marketing home DSS consumer equipment.

Delivering data to home PCs via DSS is one of the major goals for 1996 at DirecTV. "DirecTV will become one service to provide information and entertainment to the entire household, whether that platform is in the den as your PC or in your family room as your TV set," predicts DirecTV's Ed Huguez, vice president, new media and interactive programming. As of early fall, the El Segundo, CA-based company had not made any announcements regarding Microsoft or any other potential data service providers.

At DirecTV, adding data or multimedia services is an extension of its core business. Huguez says, "The assets we have in the sky and in Castle Rock [broadcast center] are already all-digital." He also points out, "It is easy for us to add extra platforms for delivery of data services. [This is] unlike cable and telcos who have to make some significant changes to their systems to deliver digital

services."

DirecTV plans to start offering data services by next summer. The company will follow two approaches, each geared toward different ends of the audience spectrum. For the passive couch potato, DirecTV intends to send data to the DSS set-top box. The information, which could accompany a sports event with relatively simple text and graphics, would be displayed on the TV screen at the press of a button on the DSS remote. And for customers who are interested in more interactivity and are often heavy on-line users, DirecTV will deliver multimedia material that subscribers can download, store and manipulate on a PC.

To receive the enhanced data service, a PC card containing the IRD components will be installed inside the home PC by the PC owner. The consumer would connect the PC to a DSS dish and could also receive the 175 channels of TV fare through a DSS set-top IRD box, provided the dish model featured dual outputs.

Huguez explains that in order to launch the new data service, DirecTV is talking to everyone who is a key player in the computer industry. In order to introduce a product that is PC-centric, the cooperation and the willingness of all the major players is needed.

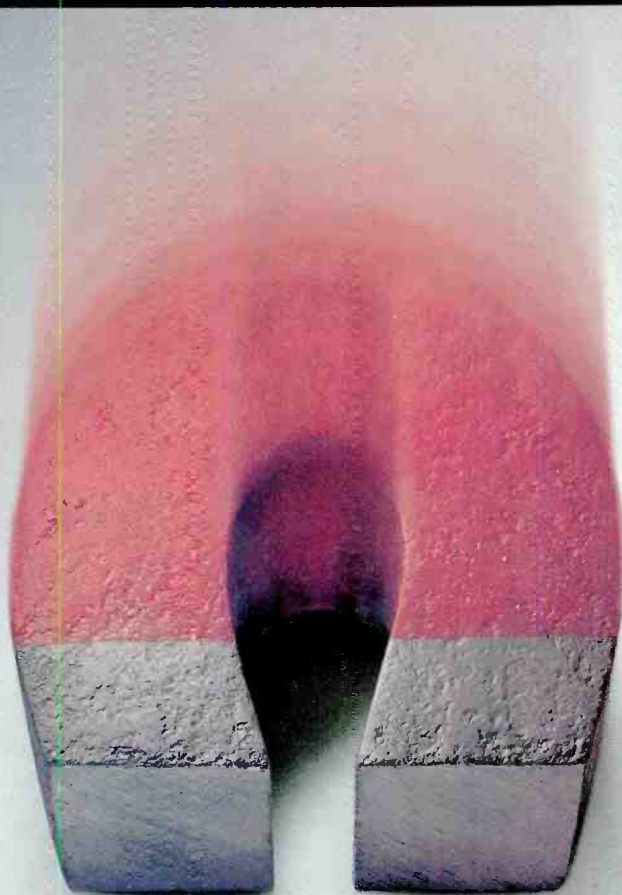
While each DirecTV channel offers the potential of delivering up to 30Mb/s, it's unlikely that any service would be allocated the maximum capacity. The official range cited by DirecTV is zero to 30Mb/s.

For companies that start adding data on the VBI, Huguez explains that DirecTV (which doesn't need or include a VBI on its digital transmissions) could capture the VBI from incoming analog signals, such as ESPN. Then, the data could be digitized and re-inserted, sending it along at the appropriate time with the channel's DirecTV video service.

DirecTV's PC customers who want to access more media-rich versions of on-line services would use the phone line as the return path. Huguez says that on-line services recognize that through the broadband that DirecTV has, they can complement their service. The services can download more robust video and text to the PC that would work in conjunction with that phone-delivered service.

Next year, Thomson and Sony will be joined by Toshiba, Uniden and DirecTV's sister company, Hughes Network Systems (HNS) in offering home DSS equipment. HNS, based in Germantown, MD, currently operates a digital communications satellite service, DirecPC. The service is being marketed primarily to commercial customers, as well as high-end consumer Internet users. In addition to transmitting business-related services to desktop PCs at speeds up to 12Mb/s, DirecPC also offers a Turbo Internet application.

DirecPC transmits on a transponder on the medium-powered Hughes Galaxy satellite,



Solid. Metal.

The 3M™ BC-Metal Betacam SP™ Videocassette.
A positive force that delivers nothing short of a

picture-perfect image. A solid performer. One try
and you'll see the attraction. Call 1-800-752-0732.

in contrast to DirecTV's use of high-powered DBS birds. With DirecPC's 24-inch antenna and ISA PC adapter card selling for \$1,295 (plus a monthly service fee of \$15.95 and user fees), customers can retrieve information from the Internet at speeds up to 400kb/s. The phone line carries user requests back to the Internet, networked by Hughes.

The cable modem connection

The cable industry is also profiting from the pressure to push PC-bound data. The cable modem, as evidenced by the attention it has received at recent cable shows and in field trials around the country, has become one of the promising new revenue generators at cable systems.

With cable penetration at nearly 65% and operators offering 50 and more TV channels, delivering data through a cable modem is becoming another viable network to reach the home PC. In homes wired for 2-way communications, consumers can receive information without tying up their phone line and they can also request data through the cable.

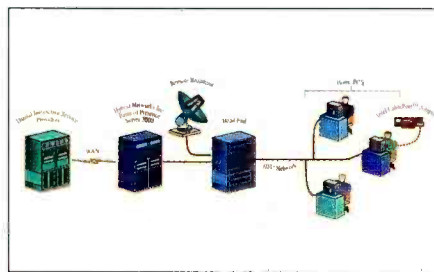
Cable's viability for delivering data is reflected in the major companies that have either announced or are reportedly developing cable modems for consumer use. They include Zenith, LANcity, Hewlett Packard, Intel, General Instrument, Motorola, DEC and Scientific Atlanta. While many cable modems are in trials or in development, only Zenith and LANcity are currently selling a product to cable systems.

However, persuading the cable industry to take data and cable modems seriously took some convincing. According to Intel's Avram Miller, the initial challenge was to make them aware of the personal computer. The cable companies defined themselves as being in the TV business and Miller says it was a "paradigm" change to make them understand that the growing home PC penetration represented a major economic opportunity for the cable industry. Intel's CablePort modem is currently in field trials with Comcast and Viacom, with Intel expecting the unit to reach the market in 1996.

Although the cable industry may recognize the money it can make deploying cable modems, most systems are not equipped to handle 2-way cable communications. Even optimistic estimates place cable system support of 2-way service at only 25%.

However, many cable companies are in the process of rebuilding their facilities to include hybrid coax/fiber systems. When they make that upgrade, they are also adding the capability to offer 2-way communications. Miller figures that systems are upgrading at a rate of about 20% a year.

Zenith, a company active in cable set-top box and TV set sales, has distributed its cable modem to most of the major MSOs. According to Tim Frahm, Zenith's product manager,



The Intel CablePort modem is a component of the Asymmetric Broadcast Communications (ABC) system for interactive PC communications.

data products, "The products we are providing today are being bought because [cable operators] can economically get a good pay-back on their investment and provide data services that no one else can at those speeds."

The company's flagship HomeWorks Universal runs at 500kb/s or 4Mb/s in both directions: downstream to the home and upstream back to the cable head-end. LANcity, in Andover, MA, began shipping its LCP, 10Mb/s cable modem this past August.

Intel's approach was to design its CablePort modem so it could support using the phone line as the return, or upstream, path back to the cable head-end. Explains Miller, "As an interim step, it's possible for the cable operator to offer high-speed data communications at speeds of up to 30Mb/s and use the telephone system as a return path until they upgrade."

Unlike telephony modems, cable modems — at least for the next few years — are sold to cable systems and leased to consumers, as with set-top cable boxes. Cable modems that are now on the market sell in the \$400 to \$600 range. As for service charges, in a market test conducted by Time Warner in Elmira, NY, consumers are charged \$14.95 monthly for a package that includes the modem and access to local services. For an additional \$9.95 per month, consumers can receive access to the Internet.

Cable modems today are external devices that connect to the PC through a standard Ethernet card. One of the reasons the cable modem is not inside the PC, explains Lorraine Bartlett, product manager, HP cable modem,

is that cable operators don't want to open up the PC when a customer wants a cable modem. The operation expects to begin shipping its cable modem by mid-1996 offering 30Mb/s downstream/15Mb/s upstream. In addition, the company is developing a server complex for cable systems to run their data network.

Another factor that would make consumers reluctant to buy or install a cable modem in their PC is the absence of standards. If a consumer installed a cable modem and then moved, the modem may not be compatible with the next system's data service.

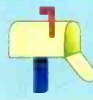
The future: a moving target

Ultimately, as television (including broadcast and cable) moves into the era of advanced all-digital transmissions and the phone companies finally deploy their own 2-way broadband networks, the differences between data and traditional programming will blur. At the eventual convergence, it's likely that the public will see little difference between traditional television and the newer data channels.

Microsoft's Mundie shared several observations that could have also been made by a broadcast or cable network executive involved in new media. Mundie maintains that people in the non-computer environment enjoy real-time voice communication by phone, and entertainment is largely a video or moving-pictures-based medium. Mundie believes that as consumers get involved in a broader array of non-text-oriented on-line services, the tendency will be for them to demand more media-capable delivery vehicles that are faster and can eventually deliver moving pictures.

As Mundie sees it, "People have been socialized by TV and they expect high-quality moving pictures. You can bet the consumer won't be satisfied until that is what they get — whether they think of TVs or PCs." ■

Marjorie Costello is a broadcast and video industry consultant and *Broadcast Engineering* contributing editor based in New York.



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

Stop the presses: InterCast group launches

Just at press time, several companies announced their participation in a plan to integrate the broadcasting of data along with video programming. The technology, called *InterCast*, will link the Internet and video on a PC.

The formation of the InterCast Industry Group was announced by media companies NBC, Turner Broadcasting's CNN Interactive, Viacom and WGBH Educational Foundation, programmer QVC, cable operator Comcast; software developers America OnLine, Asymetrix, En Technology and Netscape Communications; PC manufacturers Gateway 2000, Packard Bell and semiconductor manufacturer Intel.

With InterCast, users will be able to receive broadcast Web pages and other data combined with cable and broadcast programming. InterCast content will be created with HTML (WWW language) and include hyperlinks to related information on the Internet. Via modem, users will be able to move transparently between web pages sent over broadcast signals to related Internet sites. See the December issue of *BE* for more details. ■

Be Quiet!



The original Shure FP32 set the standard in field production for portable stereo mixers. Now, with the new FP32A, you can count on getting even less. Noise, that is...30dB less! In fact, the FP32A is so quiet and improved that it's perfect for use with DAT and other digital recording media.

Professional Mixing You Can Take Anywhere.

The Shure FP32A is a 3-input, 2-output portable mixer specifically designed for:

- remote audio recording
- electronic field production
- electronic news gathering
- location film production

The FP32A weighs just 3.5 lbs and is only 2-1/4" H x 6-3/8" D x 7-1/4" W in size.

FP32A

PORTABLE
STEREO
MIXER

With 8 hours use from two 9V alkaline batteries — or powered by any 12 to 30 VDC source — the FP32A goes wherever you do. And since it's from Shure, you can count on its durability and ruggedness.

So Many Features In So Little Space.

You get all the features of the original FP32 plus:

- 48V phantom power
- pop-up pan pots
- input level LED indicators
- mix bus jack and cable
- headphone mode switch
- mixer/monitor switch
- adjustable peak output LEDs
- stereo link for inputs 2 and 3
- more than 30 other new features and improvements

So go to your nearest dealer and pick up an FP32A. Once you use it, you'll see why we're making so much noise about something so quiet.

For the Shure FP dealer nearest you, call 1-800-25-SHURE.

SHURE®

The Sound of The Professionals...Worldwide.

Circle (21) on Reply Card

QC in the digital environment



The Bottom Line:

As facilities transition from automated digital islands to fully networked digital systems, one of the key benefits is the consistent "lock" obtained from a well-thought-out system. Building a system to manage technical resources, including equipment and personnel, is a complex task. Ensuring that such a system can also take your facility into the future is even more difficult.

In today's fast-paced world, facility automation using networked systems is a key management tool.



Station automation systems have evolved from limited control of a few devices to fully automated multichannel systems. The advent of video file servers for use in station and network environments sets us on course for significant developments in this area. Before an automation system is implemented, however, many quality control issues need to be addressed. The purpose of this article is to help understand today's and tomorrow's requirements.

Some of the first questions that arise when assessing automation include the following: What really is automation? How well will it perform labor-intensive tasks? Can it reduce operating costs? Which devices can I expect to automate today and in the future?

Typically, when broadcast facility automation is discussed, what is meant is the automation of the master control area, including the on-air systems. Master control automation can improve the consistency of the on-air look and feel. This can mean anything from simple solutions to complex multichannel configurations.

The important issue is that the proposed automation system be flexible enough to allow the users to implement a basic single-channel solution with an upgrade path to a multichannel environment. This must be possible without requiring significant retraining or recapitalization. One way this is accomplished is by choosing an industry-standard expandable platform. Proprietary or closed network solutions should be avoided because they may be difficult or impossible to expand.

For those wondering where to start or how much automation is enough, the place to look is the bottom line. Anything that adversely affects the bottom line is a potential candidate for automation, especially if it involves tasks that are repeated on a regular basis. Tasks that consistently require some form of make-good, such as missed spots or satellite recordings are primary candidates for some form of automation.

Automation applications

An entry-level automation system might consist of a small routing switcher, a compact master control panel and automation software running on a PC. Control instructions are sent from the PC to the router and master control switchers. Machine control may be accomplished using either the master control switcher or the computer. A robotic cassette library could easily be added to this system. The machine's playlist could simply be triggered by a GPI closure from the master control switcher.

Automating a typical single-channel environment could include such equipment as the master control switcher, a character generator, a still-store and videotape machines, which may or may not include a cassette library. This is usually dictated by whether single or multisegment commercial tapes are used. Automated devices would be connected on an automation local area network (LAN) via an automation device interface (ADI). Each ADI listens to the activity on the LAN and acts on appropriate instructions for the device it is controlling.

Multichannel operation can be achieved by adding more devices to the existing LAN. The event list could be generated either by a workstation residing on the automation system's LAN or it could

Photo: At the Kentucky Educational Television master control area, computer-based automation systems are used extensively for resource management. (Photo courtesy of Bill Straus Photography, Inc.)

be imported from an existing traffic system. The event lists may contain complete information for the on-air schedule. It could also be expanded to include any satellite recordings necessary for future playback needs.

Master control panels and signal formats

One of the most important issues when implementing automation is the ability to manually override the automation computer. It's beneficial to the operator if there is a dedicated manual override button. This button should instantly disable the automation system, allowing manual intervention.

Automation applications vary considerably, especially in terms of the number of signals switched to air. In some cases, multiple channels may be controlled from a single control panel. Some manufacturers provide various master control panel options, tailoring the control panel to best suit a facility's individual needs.

Another important issue is the signal to be switched. Many analog sources remain in on-air systems that are moving toward digital. Any analog system implemented today should be flexible enough to be upgraded to digital in the future without requiring major costs or renovation.

Manufacturers that offer solutions to accommodate analog, analog and digital, and all-digital signals (embedded and separate) have an added benefit from a resource management standpoint. Furthermore, if the same type of master control panel can support all formats, then operator retraining can be kept to a minimum. Because most master control switchers also feed a bypass switcher, it might also be advantageous if the bypass switcher control panel could be mounted into the master control panel and support the above-mentioned formats.

Video servers and automation

Many broadcast facilities maintain a large commercial tape library. The most frequently used commercials are housed in the library system's bins. Commercials are usually played out compiled (the entire commercial break is played out from a single tape) or played out from single-segment tapes (a single tape for a single commercial). Program and



Typically, production control rooms are not included as part of an automation system, however, portions can easily be automated if desired. (Photo courtesy of Bill Straus Photography, Inc.)

promotional material may also reside in the cassette machine's bins. The unit's outputs are normally fed to the master control switcher and taken to air by automation. These machines and tape transports are susceptible to mechanical wear in these applications and subsequent maintenance costs can be fairly substantial.

Recent innovations in computer technology have led to video file servers for automation applications. Typically, these video servers have a storage capacity of several hours and can be used as video cache memory when combined with cassette machines and automation. Controlled by the automation computer, the video server plays out the appropriate commercial when it receives the appropriate command.

To minimize the wear on videotape and cassette machines, the most frequently used clips are dubbed into the video server. Once in the video server, the clips can be played directly to air under automation control via the master control switcher. Assuming the

desired clips reside in the server, last-minute changes are easily accomplished, because the server can access clips randomly.

However, before video servers can be effectively implemented into automated environments, the appropriate application software needs to be installed. Applications may include:

- **Database manager:** A database manager is an application that documents all data associated with each video/audio clip, i.e., compression rate, clip ID, clip titles, group names, clip duration, record date, record time, expiration date and last aired date. When any clips are recorded to the server, these parameters could

be documented. Once a clip is no longer required within the server, it will require archiving. If the database knows the archiving format and associated data, it can provide additional benefits for the archiving function or for data searches. These may include database searches for appropriate clips. Searches could be for a specific clip based on a name or date or setup to find a group of clips.

- **Playlist manager:** The video server could be automated in two ways. First, the video server would contain its own playlist. The playlist could be created either within the video server application or imported from a business traffic system. The video server would be sent the appropriate GPI triggers to initiate or to terminate the playlist by the automation system. Second, the video server's automation device interface (ADI) would initiate individual clips from the video server's database on a clip-by-clip basis as dictated by the automation system.

- **Automated clip manager:** With the appropriate software, clips can be automatically recorded or deleted. Attention to detail is vital. If the automation system requests a clip from the video server, it should reside within the server. If it doesn't, the automation computer should prompt the operator and the clip could be quickly dubbed to the video server. To avoid this extremely undesirable situation, however, the automation computer should check ahead of time to ensure that all the required clips reside in the video server. Doing this ahead of time allows any missing clips to be recorded into the server so that they are available when needed.



System automation provides the tools to manage and maintain quality control levels throughout a facility.

Continued on page 40

CANON'S DIGI-SUPER70 LENS LETS YOU SHOOT A GOAL-LINE STAND...



DIGI SUPER70

FROM THE OPPOSITE END-ZONE.

Canon's new 70X zoom lens, Digi-Super 70 (PJ70:9.5BIE), provides the longest telephoto and widest angle combination of any lens, an advantage that opens up a wide range of shooting options.

Engineered to incorporate Canon's unique internal focusing and IFplus technologies for long-range telephoto applications, Canon's Digi-Super 70 is the first digital lens now in use.

The Digi-Super 70 provides extremely high performance without regard to object distance, as opposed to other lenses on the market, which are generally optimized for certain distances. No matter what the object distance is, users receive the full benefits of reduced chromatic aberrations. And IF plus technologies reduce those aberrations even beyond conventional IF lenses.

In addition to its optical advantages, with IFplus, the heaviest group of elements remains stationary in the focusing section of the lens, so that the camera's center of gravity never changes.

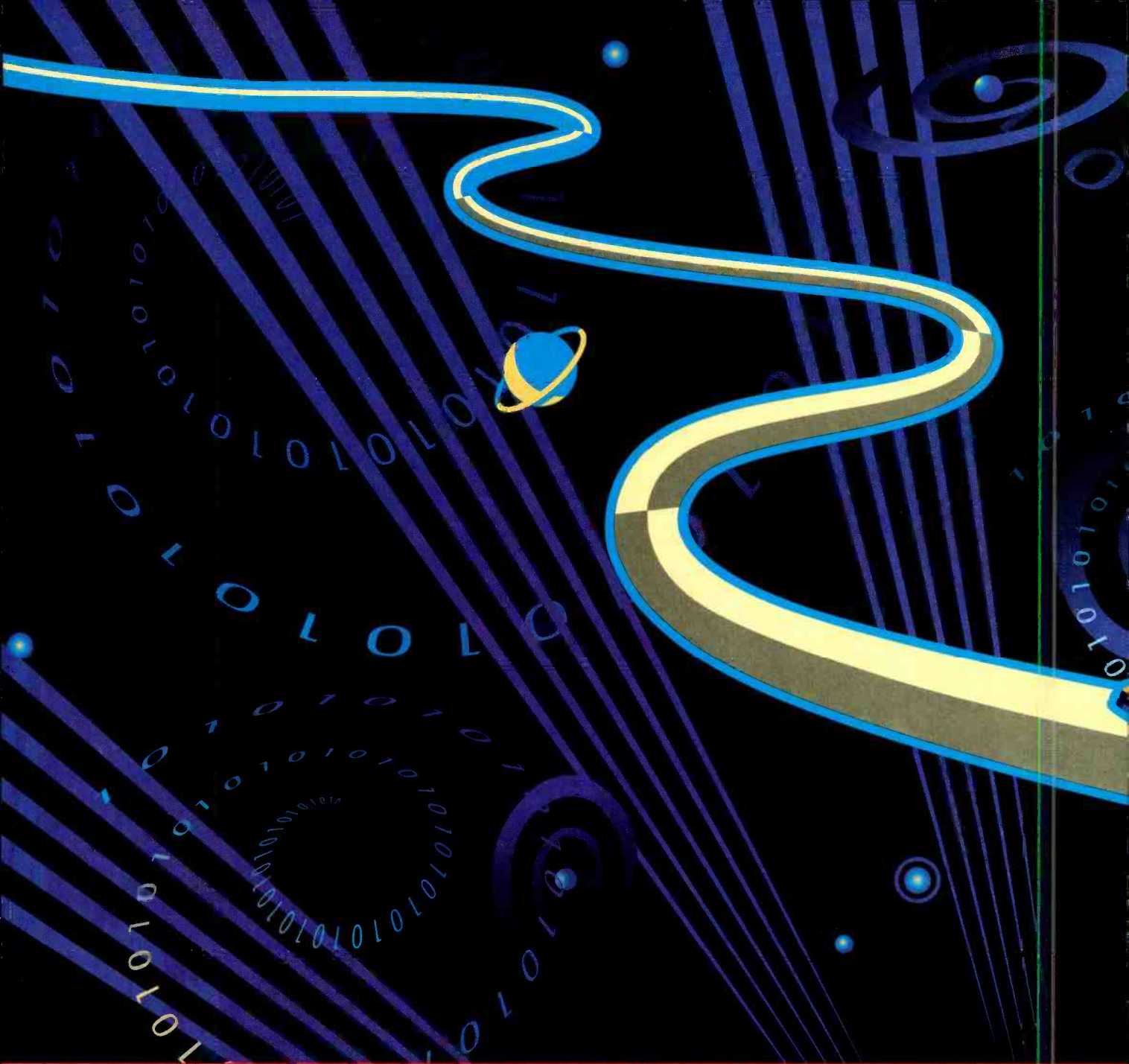
In addition to its new digital electronics, other enhancements to the Digi-Super 70 include: a new servo system with a wider range of focusing speeds; 10-bit iris technology for a precise level of repeatability; LED tally lamps; and a sleek, new, ergonomic design that features improved RF noise shielding and easier access to the lens' electronics.

For more information on the incredible Digi-Super 70, please call **1-800-321-4388**. (In Canada call 905-795-2012).

Canon

The Number One Lens

Circle (29) on Reply Card



Here's How Cable Operators

Hang Ten Mbps. There's a tidal wave breaking in cyberspace. An ever increasing swell of millions of net surfers worldwide. This global community of surfers will look to ride on the cutting edge. To push the envelope and surf to the farthest frontiers of the internet in the blink of an eye. Now is the time for cable operators to channel the power of this on-line surge before it crests.

Introducing CyberSURFR™, a product of Motorola's CableComm™ technology. It's a high-speed modem that connects IBM-compatible or Macintosh computers to a hybrid fiber/coax transmission system for lightning fast multimedia communications. Data zips downstream through CyberSURFR at a rate of 10 Mbps. Which is more than a thousand times faster than your average modem today.

CyberSURFR is not just about speed. There's superior bandwidth management, and it successfully overcomes upstream noise inherent in HFC systems, as well as providing tight privacy and security. Its capabilities lower the deployment and operating costs when deploying high speed data services. Any way you look at it CyberSURFR



Can Catch The Next Wave.

is an excellent way for operators to generate new revenues.

However the most important element of this and all Motorola products is the commitment to technological leadership and quality. From radios to pagers to cellular phones to broadband modems, Motorola creates the best available products for operators and their subscribers.

Just like an ocean-going surfer the key to a successful ride in cyberspace is timing. Now is the time for cable operators to make their move. Call Motorola today and find out more about CyberSURFR. But don't wait long or you may wipeout and end up as driftwood on the Infobahn beach. Catch the next wave with Motorola's CyberSURFR and harness the infinite possibilities of the internet for you and your subscribers.



MOTOROLA

Multimedia Group

Motorola Multimedia Group • 1475 W. Shure Drive, Arlington Heights, IL 60004 • 1-800-2WAY-HFC • 708-632-3409

Circle (30) on Reply Card

Automatic archiving of clips could also be accomplished to avoid occupying unnecessary disk space.

• *Delayed play-out manager:* Another application where video servers offer a clear advantage is in delayed play-out. For example, if an affiliate station has to air the network feed at 10:00 a.m., but a locally produced program is over-running by 15 seconds (news flash) and the station chooses to stay with the local program for the extra 15 seconds, then the affiliate station has two options: It can either switch to the network 15 seconds late or delay the network feed by 15 seconds until the time can be made up. A 2-channel video server with delay play-out software can do this easily. At 10:00 am, the server's record channel would be initiated; 15 seconds later, the network feed would begin playing out. This prevents the viewers from missing the first 15 seconds of the network material. Systems are coming to market with time expansion and contraction capabilities. These units would be able to shrink the 15-second buffer of network material over time, thus allowing the network feed to be taken directly.



So much of today's equipment is microprocessor-based that connecting systems on a LAN is simply an extension of older serial and parallel remote controls.

Additional considerations

These quality-control applications would reside on Pentium personal computers running Windows NT, and should be device and compression independent. Currently, no application provides a single control point, however, they are under development and may be available next year. By installing a network of computers, station resources can be easily tracked and allocated. With the appropriate driver software, much of today's

dedicated hardware can be tied into the network. For engineers, moving facilities to a networked environment can be challenging and rewarding. Computer expertise either in-house or through integrators is critical.

Computer networks, if designed properly, can provide their own redundancy. Careful planning and integration will allow technical resources to be managed effectively in the future. Automation should produce a higher quality look and better station presentation. With the advent of video file servers, running the appropriate application software should provide broadcasters with more cost-effective solu-

tions while providing the advantages of disk-based video technology. ■

David Cox is a senior product specialist with Dynatech Video Group, Newbury, Berkshire, England. Jon Hammarsrom is VP, control products and Adware with Dynatech Video Group, Salt Lake City, UT.



Internet: be@intertec.com
CompuServe: 74672.3124
FAXback: 913-967-1905

See page 44 for "Battery FAQs"

In a nutshell, here's all you need to know about Video Signal Measuring...



A cost effective solution for your video testing requirements.

- Switchable NTSC and PAL formats (B, D, G, H, I, M, N)
- Fully programmable for automated testing
- More than 90 individual measurements within 49 powerful tests
- Hand-held and menu driven
- Intuitive user interface for broadcast and CATV applications



COMSONICS, INC.
An Employer Owned Corporation

We set the standards.

1350 Port Republic Road, P.O. Box 1106 • Harrisonburg, VA 22801 USA • (540) 434-5965, In USA: (800) 336-9681 Fax: (540) 434-9847



Call
ComSonic
Customer
Service
Department for
your nearest local
representative.

Circle (31) on Reply Card

Brontostore. The Still Store with the Real Time Attitude.



Imagine real time access of stills, video, and audio clips. The ability to record, edit, and recall them in an instant. All from a single system.

Think what that will do for managing station graphics, trailers, bumpers, and promos – not to mention last minute news and sports reports!

Think Big. Start Small.

Brontostore's basic configuration includes an intuitive On-Air Control Panel and digital storage for 1,000 still frames at a price you can afford.

From there, the sky's the limit. You can network up to 32 Brontostore nodes throughout your entire facility, add an Extended Control Panel with image browse and library management, and increase storage to dozens of hours of uncompressed 60i video on-line – or hundreds of hours when utilizing Brontostore's compression!

The Total Digital Solution

Brontostore fits right into your current environment. You can get video/audio inputs/outputs for all standard formats. Brontostore easily interfaces with paint and graphics programs via Ethernet. There's even a Virtual Control Panel for Silicon Graphics platforms.

Cue up Brontostore!

For more information or a demonstration, contact your Accom representative today.



Accom

Earn money in your spare time!



THERE ARE HUNDREDS OF
WAYS TO MAXIMIZE
YOUR SYSTEM'S
REVENUES WITH THE SONY
VIDEOSTORE FILE SERVER.

THE **VideoStore** SYSTEM IS:

EXPANDABLE

Each media unit has a storage capacity of 4.5 hours. The VideoStore system can be easily and economically expanded to up to 31.5 hours of storage. That's almost 3,800 :30's.

FLEXIBLE

Because it's digital, the VideoStore system gives you non-linear random access to your entire library. Spots can be added, canceled or moved with an average access time of .2 seconds from command to play.

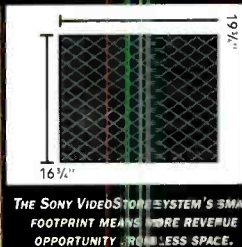
RELIABLE

Sony's RAID 3 Predictive Maintenance™ technology provides: advance notice of a failing component; interruption-free playback in the event of most any component failure; and hot swappable components. Plus, in the event of hard drive failure, all lost data is rebuilt automatically, as a background task when the hard drive is replaced.

CONFIGURABLE

Up to 12 simultaneous, independent video/audio output channels per server. That could mean hundreds of channels.

SONY



The new Sony VideoStore™ Multichannel Video File Server lets you bring the advantages of digital storage to your commercial playback needs. With the VideoStore system, you can access a huge library of material – instantly and in any order. Last minute changes are simple. Picture quality is improved. The system is designed to be more accurate and reliable than your current analog system – you can have absolute verification every time a spot airs. And there's no more time wasted assembling hundreds of spots onto a cassette – you simply enter the playlist into the VideoStore system. No more resource conflicts. Changes are just a matter of adjusting the playlist. Since the VideoStore system is digital, you save money on labor, maintenance, equipment; you make money from last minute opportunities. You basically make out financially, both coming and going. For further information call 1-800-635-SONY, ext. EARN.

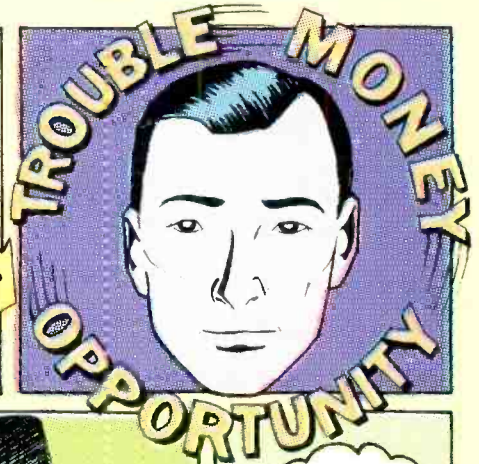
IT WAS JUST ANOTHER PEACEFUL DAY IN THE LIFE OF BERT CANAVAN, SALES MANAGER. THEN, THE PHONE RANG...

HELLO, MR. WEINER. YOU NEED YOUR SPOT ON AIR? ASAP?! COST IS NO OBJECT? ER, YES SIR!

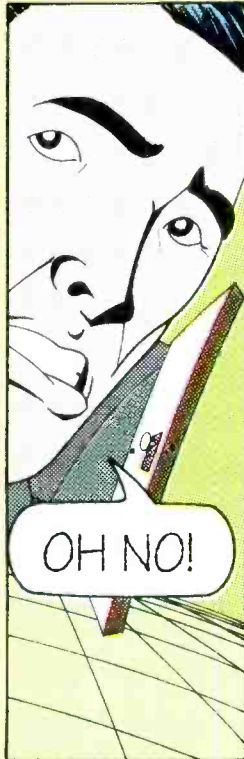
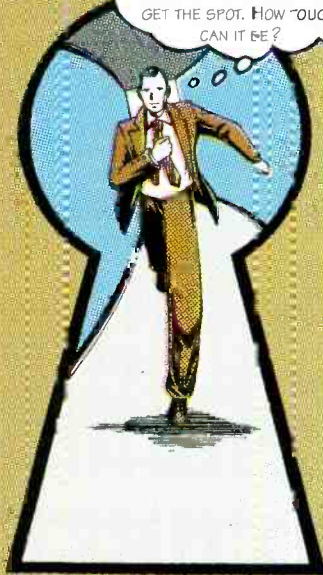


Wow. WEINER INDUSTRIES IS OUR BIGGEST ADVERTISER. STILL, THERE ISN'T MUCH TIME.

THIS MEANS



O.K. FIRST 'LL RUN DOWN TO THE LIBRARY AND GET THE SPOT. HOW 'DOUGH CAN IT BE?

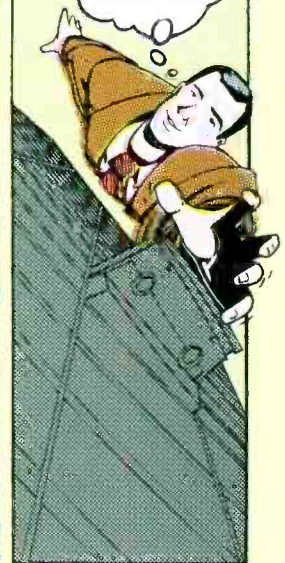


OH NO!

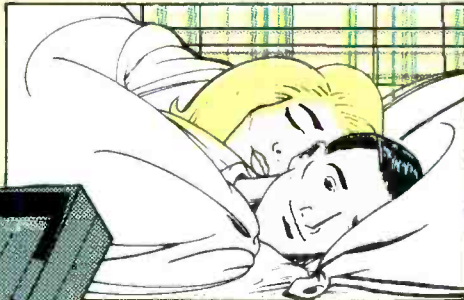
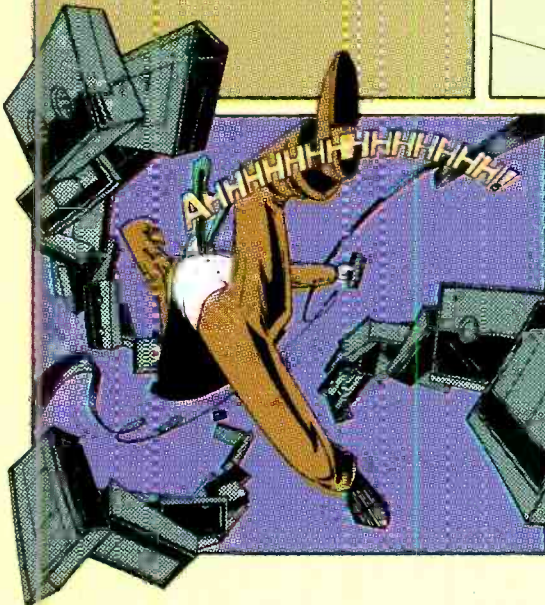
THERE'S GOT TO BE A BETTER WAY TO MANGE SPOTS. THIS IS INSANE.



HERE IT IS. AND THERE'S STILL A MINUTE TO GO.



FINALLY CANAVAN LOCATES THE CASSETTE.



UGH, WHAT AN AWFUL DREAM. THANK GOODNESS MY OPERATION HAS THE SONY VIDEOSTORE SYSTEM. I GUESS I HAVE TO LAY OFF THE ANCHOVY PIZZA BEFORE BED.

YOU TOO CAN END YOUR COMMERCIAL INSERTION NIGHTMARES. THE EXPANDABLE FLEXIBLE RELIABLE SONY VIDEOSTORE SYSTEM ALWAYS DELIVERS A HAPPY ENDING.

the end

Battery FAQs

By Alan Lavender

Another important technical resource that requires careful management is battery power. Here are some answers to the most frequently asked questions (FAQs) about nickel-cadmium (NiCad) batteries — the rechargeable battery type that's most commonly used by broadcasters today.

1. What are some common causes of battery failure?

The most common cause of battery failure is *cell imbalance*, which occurs when the individual cells in a multicell battery pack exhibit significantly different capacities (see No. 2 below). Another common cause of failure is *overdischarge* (see No. 4 below).

2. What is meant by the term "capacity" when applied to a NiCad battery and how does it change over a battery's life?

While the voltage of a cell is determined by its chemistry, the cell capacity is infinitely variable. Cell capacity is usually directly related to cell volume (i.e., the bigger the cells, the higher the capacity). Certain cell sizes have become established as industry standards, which means they conform to accepted dimensions of diameter and height. A battery's capacity is its ability to supply power, which is directly related to its amp-hour (Ah) rating. For example, you would expect a 5Ah battery to supply five amps for one hour (or one amp for five hours), which is its nominal capacity.

3. Should we expect a battery of a stated capacity to run all types of equipment for the same amount of time?

No. A battery's capacity in amps over time is directly related to the current drawn from it by the device it's powering. The device's power consumption (which may vary over time during its use) dictates the running time available from the battery.

4. Is it a good practice to discharge a battery to 0V before recharging?

There is no useful advantage in discharging a battery to 0V before recharging. A battery should never be taken below 1V/cell because there is a risk of reversing the polarity of the lowest-capacity cell in the pack and damaging it permanently.

5. Is battery "memory" a real effect, and if so, what is it and how can it be prevented?

Before you apply a cure, you must be sure that you are treating the right complaint. The *memory effect* is a convenient tag to hang on a number of faults that display the symptoms of "memory."

A multicell pack that has gone out of balance will seem to exhibit a memory effect on a discharge graph. As the lowest cell in the pack becomes exhausted, there will be a voltage drop, followed by sustained output at a lower level, while the out-of-balance cell is driven into reverse and destroyed. Overcharging also makes the discharge curve look like it's exhibiting a memory effect, with a pronounced knee in the output voltage beyond a given discharge point.

The "real" memory effect in NiCad batteries is brought about by continuous shallow discharging and recharging by the same amount. The areas of cell that are continually unused will self-discharge, and this leads to the formation of lead sulfate crystals, which create a barrier to the active materials. The resulting discharge curve again suffers a voltage depression knee equivalent to the activated percentage of the cell. If the entire capacity of the cell is regularly activated, this effect will not appear.

6. What is meant by the terms "self discharge" and "equalization"?

It is a fact that NiCad batteries self-discharge, and the rate at which this happens is dependent upon temperature. Because the process is the result of electrochemical reactions, most manufacturers quote a discharge rate of 1% per day at normal room temperature. This implies that a battery will go from full charge to flat in three to six months.

As the individual cells in the pack reach their state of discharge, the chemical process within the cell slows down, thereby *equalizing* the condition of one cell in relation to another. The nitrate ions are reduced to ammonia at the cadmium electrode. They subsequently diffuse to the positive nickel hydroxide electrode where they are oxidized back to nitrate ions in what is known as the *chemical shuttle* process. This process continues until one or both electrodes are fully discharged. With the passage of time, some of the ammonia is oxidized to nitrogen and a cell's discharge rate is reduced. This oxidation is reversible, but may require special conditioning prior to use, such as slow charging. Fast charging immediately after storage is undesirable

because it will overheat the battery during the electrochemical restoration period.

7. What is the difference between "slow-," "quick-," and "fast-charging," and when should each be used?

• **Slow charge:** The charge current is generally supplied at one-tenth the output capacity of the battery, referred to as C/10. This is an overnight (10- to 14-hour) charge, and it is recommended for batteries that have been in storage for long periods of time or those that have been specifically designed by the manufacturer for use at these charge rates.

Charging at a slower rate enables the recombination of gases without the space provision required for fast charging, which means the cell can be more densely packed. Such higher power-density cells are often used in the communication industries, where size is (and charging time often is not) an important consideration. In an overcharging situation, such lower charge rates are also considered non-damaging to the cell's plate structure and chemistry, so this kind of charge is often used to address cell-imbalance problems.

• **Quick charge:** This charge was originally devised for an older generation of cells (generally in the 4Ah to 7Ah range) that are no longer manufactured. These were normally overnight-charged, but had the capability to be pushed a bit harder without suffering any detrimental effects to safety and cycle life. With some of these earlier cells, however, fast charging would not allow full capacity to be loaded before negative delta voltage and a rapid increase in cell temperature occurred.

• **Fast charge:** Improvements in NiCad technology are mainly resulting from high-volume consumer applications. These improvements have included higher capacity and faster charge-acceptance.

Safety is the most important consideration. The faster the rate of charge, the more accurate the charger system has to be in determining not only the charge termination point but also the fitness of the cell to receive the charge. For the first time, conventional charging technology had been superseded by cell technology. This has led to most of the recent confusion about charging.

8. It is generally recognized that internal overheating during charging is the greatest killer of batteries. Why is this, and how do modern chargers avoid the problem?

Any charging system that causes internal heating of the battery (which typically occurs at the end of the charging cycle) is damaging the cells. The NiCad charging process is an *endothermic* reaction — the internal chemical process absorbs a small amount of heat energy during charging. Conversely, during discharge or overcharge, the reaction is *exothermic* — the battery produces heat. A sufficient amount of this heating can cause cell damage, which is how any charger that continues to apply current after full charge is reached destroys a battery.

To avoid this, today's better chargers use a method more sophisticated than simple temperature-rise or negative delta voltage-sensing to determine the end-of-charge point, thereby removing charge current before any cell overheating occurs.

9. Can a battery be safely charged irrespective of its temperature?

No. NiCad batteries should only be charged at room temperature. Charging extremely cold or hot batteries should be avoided.

10. Is there an optimum temperature at which charged batteries should be stored?

The recommended storage temperature is 0°C to +30°C but cells can tolerate temperatures of -40°C to +100°C for short periods.

Batteries that have been stored correctly for 20 years have been shown to have no detrimental effects on their working life. ■

Alan Lavender is chief executive of PAG Ltd., London, England.



For more information on NiCad battery systems, circle (152) on Reply Card. Also, see "Batteries, Chargers, Analyzers, Reconditioners," p. 93 of the BE Buyers Guide.

BEST PERFORMANCE IN A SUPPORTING ROLE.

Vinten's New Osprey Elite Pedestal and Vector 70 Pan/Tilt Head.

The Osprey Elite Pedestal supports Studio, OB and Portable Cameras with a maximum payload of 165 lbs.

The two stage "on shot" column design ranges from a low of 26" to a maximum height of 56".

The Osprey Elite easily dismantles to maximize portability in and out of the studio, and the column attaches to any existing Osprey skid.

The Vector 70 Pan/Tilt head supports fully equipped CCD Studio, OB and Portable Cameras up to 154 lbs.

Vinten's Lubricated Friction (LF) Drag System provides smooth and continuously adjustable drag over an extremely wide range.

The revolutionary design allows for quick counterbalance adjustments without time consuming cam changes.

Other features include $\pm 60^\circ$ range of tilt, illuminated leveling bubble, locking wedge adapter and pan/tilt brakes and controls.

For additional information, contact Vinten TSM today.



Classic

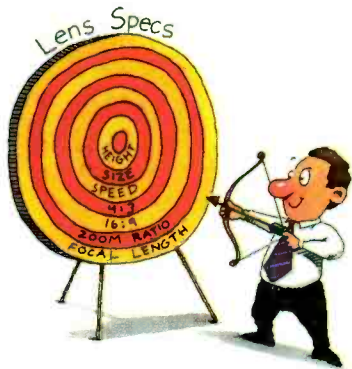
Vinten TSM Inc.
709 Executive Blvd.
Valley Cottage, NY 10989
Phone: 914-268-0100 Fax: 914-268-0113

Sales offices in UK, USA, Japan, France, Germany, & Singapore plus worldwide distribution

Vinten TSM™

Circle (22) on Reply Card

Selecting lenses



Choosing the right lens now can make shooting easier in the future.

To cinematographers and those in the film industry, lens selection is a critical part of the production process. Videographers, on the other hand, typically view the lens as a permanent fixture on the front of their camera; changing lenses is seldom considered. This article focuses on the specifications and features to consider when choosing a lens. (For additional background information, see "Choosing a Lens," p. 60, *BE* October 1993 and "Camera Lenses," p. 48, *BE* October 1994.) Lenses are critical to camera performance. A poor lens can prevent a great camera from getting even good pictures.

The Bottom Line: —

Lenses are one of the most important camera accessories. The wrong lens can make it impossible to get the shot you need. The right lens, combined with the right accessories, allows the shooter to exercise the creativity needed to turn a good shot into a great shot. §

Lens basics

Before delving into features, some basics must be covered. One of the most basic lens specifications is focal length. What you need is based on the type of shooting you do. If you are shooting news, you could use a normal focal length lens with 15x zoom ratio. If you are shooting sports, a long telephoto of 20x or higher is normally recommended. If you mainly do interviews or shoot indoors in tight situations, a wide-angle zoom lens might be best. Wide-angle zooms are becoming more popular because they enable shooting close to the lens with an excellent depth of field. Today's magazine shows love that "in your face" look while maintaining a balanced composition.

With that in mind, typical lens classifications are as follows:

- *Normal focal length lens*, 15x zoom ratio and a focal length of 8-8.5mm at the wide angle, ranging to a telephoto focal length of 120-127.5mm;
- *Wide angle focal length lens*, 9x zoom ratio and focal lengths from 5.2-5.5mm at the wide angle to a telephoto of 49mm and higher;
- *Telephoto focal length lens*, 20x zoom ratio with a wide-angle focal length of 8mm and a telephoto length of 160mm.

Most ENG lenses include a built-in extender. The extender inserts a magnifier lens and usu-

ally increases the focal length by 2x. For example, a lens with a focal length of 100mm would be extended to 200mm when the extender is engaged. This feature is helpful and can sometimes allow you to get the shot you need. The only drawback is the loss of at least one full f-stop when using the extender. Today's lens extenders are extremely sharp and do not degrade lens performance.

Another lens specification to look at is *maximum relative aperture*. Most ENG lenses have similar aperture ratings at the wide angle. It is important to also look at what happens to the f-stop as you move through the zoom range. For example, a lens with an f-1.7 rating at the wide angle of 8.5mm will change to about f-2.2 when it reaches the end of the focal length at 127.5mm. All manufacturers publish the maximum relative aperture with the extender engaged, which should also be considered.

Common features

One of the most frequently forgotten specifications is the size and weight of a lens. As cameras have gotten smaller and more compact, lens manufacturers have also reduced the size and weight of their lenses. If you compare many of the older short focal length lenses, they weigh more than the newer models with longer focal lengths. Size and weight are important because they will affect camera balance and handling. If a lens is too heavy or too long (physical length), it will make the camera front-heavy. A short or extremely lightweight lens can force the cameraperson to constantly pull the camera down because it is back-heavy. The "feel" of the camera/lens pair is important. Lens and camera manufacturers work together to keep the relative weights and sizes within a comfort zone. Always try out the camera/lens combination with the unit fully rigged with lights, microphones, matte boxes and batteries to be sure of its balance and handling.

Internal focus is the most common feature found on all broadcast-quality ENG lenses. Just a few years ago, only wide-angle lenses had internal focus. Today, all three manufacturers provide



“Online and offline? Nonlinear and linear? All in one system? It’s about time.”



You’ll grow old trying to find another video editing system that can do what FAST’s Video/Studio Quad™

can do. Yes, it is both a full nonlinear system and a full linear system in one. And yes again, it’s designed for simultaneous editing from hard disk and tape. It’s a complete Betacam/MII quality online and offline system. And it’s only from FAST Electronic.™

Unlike our friend up there, this system has no wrinkles. Our 3:1 nonlinear compression ratio is the best in the

industry. With more than 300 real-time effects, no rendering required and eight active channels of digital audio, you’ll never miss a beat.

The Video/Studio Quad starts at \$24,995. But, because it’s a modular system, you can also get into it for only \$4,000 for Video Machine,™ the heart of our Quad Systems. It’s the perfect bridge from our present multi-format world to the future’s fully digital domain. For more information, call 1-800-249-FAST, today.

The wait is over.

FAST
The Art of Digital Video.

© 1995 FAST Electronic U.S. Inc. Video/Studio Quad, FAST Electronic, Video Machine and FAST Electronic U.S. Inc. are trademarks of FAST Electronic U.S. Inc. FAST Electronic U.S. Inc., 393 Vintage Park Drive, Foster City, CA 94404 Fax: 415 345-3447

Circle (23) on Reply Card



Canon's DIGI-SUPER 70, the first 70x lens made its debut on Monday Night Football.

internal focus lenses in the normal, wide and telephoto configurations. Nikon invented internal focus lenses in the mid-1970s for 35mm lenses, but it was Canon who first popularized this feature for video lenses with the J14ax8.5 lens.

An internal focus lens enables shooters to place a special-effects filter at the front of the lens and then set it and forget it. The name "internal focus" comes from the fact that the front element of the lens moves internally. On non-internal focus lenses, the front element rotates when the focal

length is changed. Although it may add to some effects, the rotation of the front element generally causes problems when combined with special-effects filters. For example, gradient filters can be used to trick the lenses into thinking the exposure of a bright sky is the same as the subject in the foreground, having one rotate when the focus is adjusted would cause problems. The advent of internal focus lenses has allowed shooters to be more creative and to use filters more often than before.

Internal focus lenses can also take advantage of matte boxes that clip to the front of the lens.

Now shooters can have two stages of filtering without having to use the cumbersome rods always associated with matte boxes. Internal focus lenses allow video cameras to be equipped more like a traditional film camera. Many matte box users also equip their systems with a follow focus knob. This knob, which attaches to the lens

where the focus module attaches on the lens, provides easier lens focus adjustment. For film use, the camera assistant usually uses the follow focus to adjust focus as the subject changes position in the frame.

Another new feature to the ENG lens market has been the adaptation of aspheric elements. Aspheric elements have been around for some time, and ENG lens manufacturers have just started to incorporate these elements into zoom lenses. Fujinon and Nikon have used aspherics to take advantage of their benefits, which include the ability to reduce the size and weight of their lenses.

Aspheric lenses focus the light more accurately through the lens, thus reducing chro-

A high-quality matte box is a creative accessory available for professional and industrial zoom lenses. Shown is the Petroff MB7



4x4 matte box in special direct mount for internal focus lenses. (Photo courtesy of Miller Fluid Heads, USA, Inc.)

The GALLERY

A Versatile VTR Control System...

Control Solutions
from DNF Industries
Your Source For High Quality, Low Cost Control Solutions

1X8 RS422 Switcher
Gang Roll 8 VTRs at the press of a button
Select 1 of 8 VTRs for individual control

Slow Motion Controller
100 Cue Point Memory
Cue points are retained when controller is off
Vary from -100% to +200% of play speed

Call now for a free catalogue
213-650-5256 ♦ 213-650-6639 Fax

VTR Control Solutions
from \$250.00



Circle (60) on Reply Card

ADVERTISE IN THE GALLERY

- 32,000 TV-only circulation
- Free reader service number
- Frequency discounts
- Agency discounts

Take Control
with Programmable Event
Controllers from LEIGHTRONIX!

- AUTOMATED BROADCAST
- UNATTENDED RECORDING
- TIMED EVENT VIDEO & AUDIO SWITCHING
- REMOTE VCR & SWITCHER CONTROL



LEIGHTRONIX, INC.
2330 Jarco Drive Holt, MI 48842
(517) 694-8000 Fax (517) 694-1600

Circle (61) on Reply Card

LIKE FORT KNOX, WITH AN ATM

Imagine a towering stack of cartridges, open reels and DAT tapes—a vast wealth of audio cuts—representing hours of costly, painstaking production. Now imagine that treasury of sounds (like commercials, IDs, SFX, and stingers) securely stored, intelligently organized and instantaneously accessible. All within the confines of one very impressive



DigiCart/II's internal hard drive can't be beat for speed and convenience. Now with up to 32 hours of 20kHz stereo storage.

machine—the digital audio hard disk recorder, DigiCart/II.

Smart operating controls and easy-to-read displays makes scanning through DigiCart/II's massive vault of storage a snap. With a simple spin of a knob or keystroke on a remote control, you can call up any single cut, or even an entire playlist—instantly, effortlessly.

While DigiCart/II plays a pre-selected cut, its production-oriented software allows you to program the next series of cuts at the same time. All performed with reassuring reliability.

No dead air, no missed cues, no scrambling around.

Our remote controls enhance DigiCart/II with programmable Hot-Keys. Just find functions, and more.



DigiCart/II holds 10,000 cuts, records in linear or with Dolby AC-2 data compression, allows precise edits, and features removable media for archiving, backups and transfers.



Move digital audio between 360 Systems products at eight times normal speed

It's easy to see why DigiCart/II is fast becoming the industry standard for hard disk recording. If you're searching for the best place

to bank your audio valuables, take a look—and listen—to DigiCart/II.

To see, hear and feel the true value of a DigiCart/II for yourself, contact us at 360 Systems and we'll arrange for a hands-on demonstration in your studio or production facility. Call (818) 991-0360.

DigiCart/II features both professional digital conversion formats.



360 Systems[®]

PROFESSIONAL DIGITAL AUDIO

5321 Sterling Center Drive · Westlake Village, CA 91361 USA · Phone (818) 991-0360 Fax (818) 991-1360

DIGICART IS A REGISTERED TRADEMARK OF 360 SYSTEMS. DOLBY IS A TRADEMARK OF DOLBY LABORATORIES, INC. © 1995 360 SYSTEMS

Circle (24) on Reply Card

matic aberrations. In addition, aspherics also reduce the minimum object distance (MOD) of the lens. The MOD is a measurement of how close to the front of the lens an object can be located without using the macro feature. Check and compare the MOD on the lenses you're considering. Generally, the shorter the MOD the better. The standard was 0.85m, now in a normal lens (15x) it ranges from 0.75m to 0.55m.

All three manufacturers provide zoom speed adjustments on the lens. This enables the shooter to repeat the same zoom speed over and over again without having to press the zoom rocker exactly right. In the past, zoom speed adjustments could be changed by a screw pot on the front of the lens or through the pistol grip accessory. One manufacturer has also expanded on this idea by providing a zoom torque control on the lens. This feature comes in handy when you need a superslow zoom and need to do it by hand. The torque switch increases the drag on the zoom 20% by employing a lower gear ratio.

Protein paint is being used on many ENG broadcast lenses. This paint coats the outside of the lens with a non-slip finish, reducing the likelihood of having



Nikon's S15x8.5B1-III, a normal focal length lens that features internal focus, a 2.2x extender and zoom speed adjustment.

the lens slip from your hands. It does not, however, give the lens any natural nutrients to make it look better.

For comfort, all manufacturers offer a hand strap that can be adjusted to fit your hand. Some manufacturers have angled the servo zoom housing to provide additional comfort. One company has expanded on this feature to provide an adjustable servo housing that can be moved through several different positions.

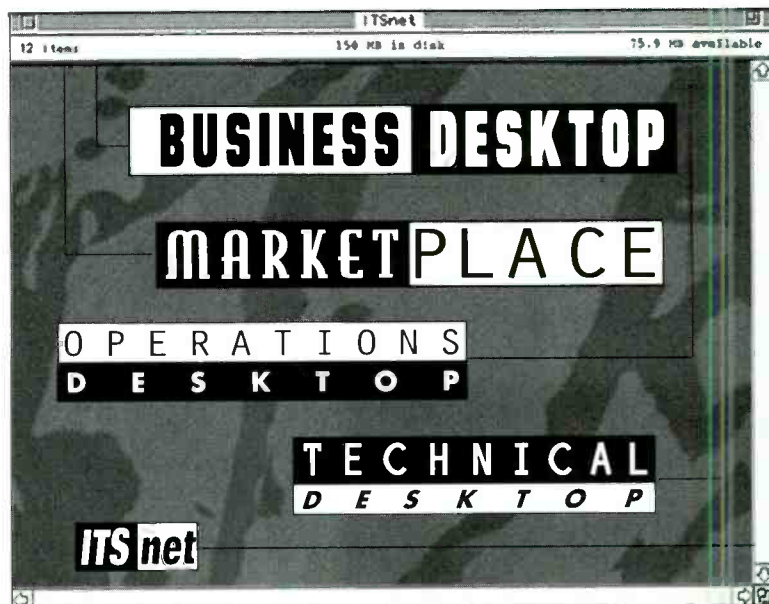
New features

Studio lenses have always been available with full servo options. Most manufacturers now offer this feature for ENG lenses as well. This provides electronic focus control. Most ENG lenses used in a studio configuration use the mechanical module that screws to the lens via a flexible cable. The mechanical method is less costly, but focusing can usually be done faster using the motorized version. The servo focus motor is built into the lens hand grip.

Although few cameras are sold with 16:9 aspect ratio CCDs and prism blocks, all three lens manufacturers state in their literature that the lenses on the market today are compatible with 16:9 cameras. In addition, some manufacturers have shown prototype ENG lenses with built-in 16:9 aspect ratio converters. This converter is built into the lens at the rear, opposite of where a conventional extender is located.

Many of the camera manufacturers provide electronic feedback information from the lens to the camera viewfinder. Now you can see where you are on the f-stop if the extender is engaged and what the focal length is at. The focal length information

**Looking
for that
window of
opportunity in
Teleproduction?
Get the ITSnet
advantage!**



Call ITS at 212-629-3266 today to see how the ITSnet can increase your marketability, help you make the right financial decisions, keep you abreast of the changing technologies and more.

International Teleproduction Society • 350 Fifth Avenue • Suite 2400 • New York, NY 10118



Circle (62) on Reply Card



Hard Disk. Easy Choice.

Who Says You Can't Buy Experience?



A disk system is just another piece of computer hardware—until you add the decades of broadcast experience that only Odetics offers. Broadcast expertise makes the SpotBank™ from Odetics your most flexible, cost-effective, and dead-on reliable choice in on-air disk systems.

Actually a complete family of format-independent disk automation systems, SpotBank integrates network sources, programs and spots as well as tags and other still images for single and multi-channel applications. It has all the features you need:

- Control of up to 24 devices—digital disks, VTRs, and a variety of switchers

- RAID3 disk controller provides redundancy to protect against data loss
- MicroSpot™ option for easy news replay
- Interfaces for all popular traffic systems
- MediaPrep™ software automates dubbing new spots to disk
- Four playlists on one screen allows single operator control
- *Smart* management of disk storage prevents fragmentation

So don't compromise on your bottom line. Odetics knows disk technology as well as we know broadcast. That equals an easy choice for you.

Call today to (800) 243-2001.

Director of Sales
Bill Keegan
(714) 774-2200

Northeast
George Anderson
(609) 953-9101

Southeast
Emerson Ray
(813) 960-0853



West
Chuck Martin
(702) 256-7001

South Central
David Scally
(404) 917-9506

Canada
Applied Electronics
(905) 625-4321

provided in Sony's broadcast cameras is represented by a bar graph at the bottom of the viewfinder. In the future, this could be replaced with an actual number corresponding to the lens focal length position and could be handy in helping judge focus distance from the subject.

Final considerations

The best way to choose a lens is to try it out. It's best to use it on your camera or the camera you plan to purchase. Most dealers can set up a demonstration and let you take the lens and camera for a few days. This way, you can put the combination through its paces, trying it out in real-world situations.

Lens care is important. A well-cared-for lens can last a lifetime. However, it is recommended that problems be checked quickly. All of the manufacturers provide service and there are a few good places throughout the country to get your lens repaired. It is important to see if you can get a loaner lens while your lens is in the shop. One manufacturer offers a loaner lens within 48 hours of your call, for the life of your lens.



The Fujinon A15x8DEVM internal focus lens features aspheric lenses and is 4:3/16:9 switcheable.

Choosing the right lens is as important as choosing the right camera. Before purchasing a lens, be sure to do the following:

- Compare the specifications and try the lens out on the camera.
- Keep an open mind before choosing --- you may find a feature in another brand that works better for your type of shooting.
- If you decide to change brands, check to

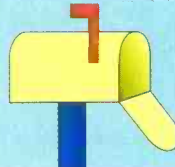
see if any of your accessories are compatible with other manufacturers' cameras.

- Keep your lens clean and always use a protective filter to protect the front element of the lens.
- If you notice any problems, call your manufacturer or local repair facility and send the lens in for repair. Check on the possibility of a loaner lens.

A quality lens can last a lifetime with proper care. Through careful selection, your camera/lens combination can provide you with years of quality images. It can also provide the shooter with the tools necessary to accomplish the job in an

efficient, creative manner. ■

Evan Krachman is a sales specialist for Nikon Electronic Imaging, Melville, NY.



Internet:
be@intertec.com

CompuServe:
74672,3124

FAXback:
913-967-1925

SYNC AUDIO FOR \$799?!



Pristine Digital Quality From the AVA 22 Audio/Video Alignment Delay.

The AVA 22 does only one thing: digital audio delay in one-field increments. It does it very well. And very inexpensively.

By clever application of the Dolby™ Time Link 1-bit delta-sigma circuitry, Rane brings uncompromising digital performance with a new degree of cost-effectiveness to the process of audio-to-video synchronization. Two separate channels each provide up to 9.5 NTSC frames or 8.0 PAL/SECAM frames of audio delay. That's it.

Okay, we did add a few nice features, like two memory locations per channel, remote memory recall capability, front panel lockout, fail-safe bypass and battery-free EEPROM operation. But we didn't get carried away.

The AVA 22. Pristine. Clever. Reliable. Inexpensive.
The Rane solution for audio sync.

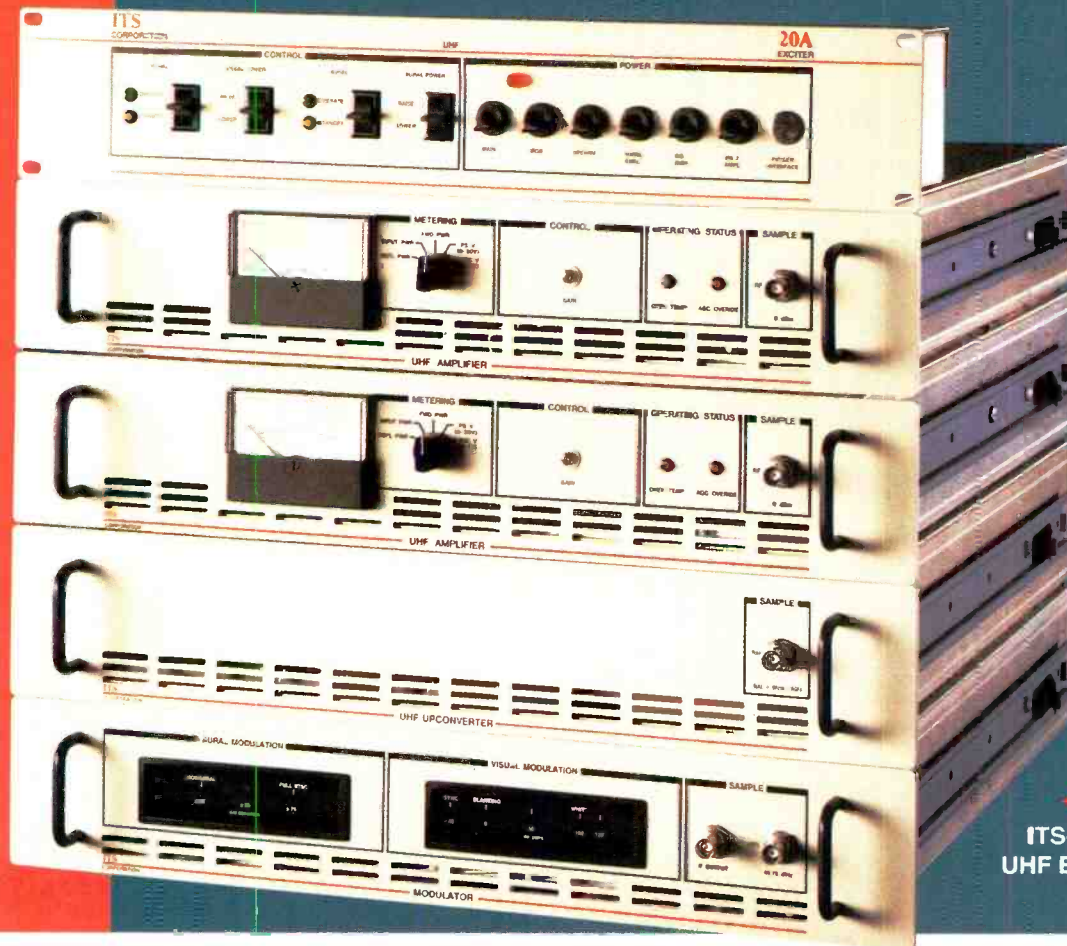


AVA 22

A / V A L I G N M E N T D E L A Y

NOW
SHIPPING

RANE CORPORATION 10802-47th Ave. W., Mukilteo, WA 98275 (206) 355-6000
Circle (26) on Reply Card



ITS-20A
UHF Exciter

THE UHF EXCITER PLUS™ SYSTEM FROM ITS...

The
Industry
Standard
For
Quality &
Reliability

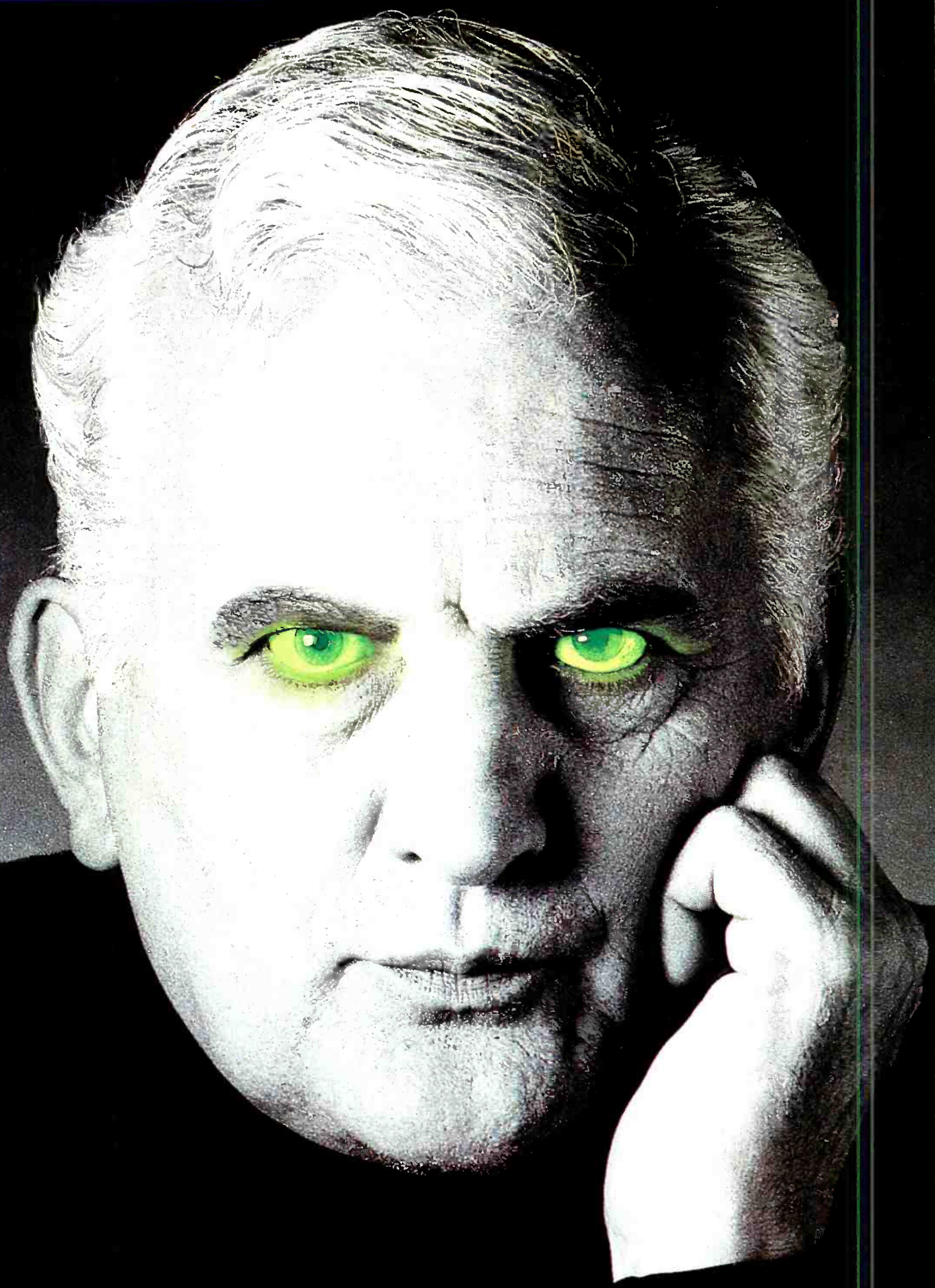


With over 200 satisfied customers in all major markets and networks, the UHF Exciter Plus™ System from ITS is today's benchmark for solid performance and reliability. Featuring the ITS-20A UHF Exciter, custom-designed packages are available for standard klystron, MSDC and IOT transmitters. Exciter Plus™ Systems offer solid-state amplifiers, pulsing systems, extensive signal correction and many other features to bring new levels of performance and efficiency to your transmitter. With more than 12 years of experience in exciter retrofits and a deep commitment to technical excellence and customer service, ITS is the best source for upgrading your existing transmitter. Call for details on a package to meet your specific needs.

"Visibly Better Technology"

ITS information
transmission
systems
CORPORATION

Broadcast Systems Division
Freedom Drive
P.O. Box 460
Lawrence, PA 15055-0460 USA
(412) 873-1500 FAX (412) 873-1264



'I can
give you
amazing
powers.'



How can he do it for the price?

Circle (35) on Reply Card

ち

SNELL & WILCOX



I can
give you
powers you
thought were
out of your
reach.



How can he do it for the price?

Handling videotape

As inexpensive as videotape might be, the material it contains could be priceless.

As tape libraries grow larger, there is increased interest in videotape care. With the potential for 500 channels to the home, production and broadcast libraries are being viewed as profit centers. Old 2-inch tapes are being dusted off and transferred to new formats for additional programming to fill expanded multichannel broadcast days. Unfortunately, some of this older programming will be lost because of improper storage. Facilities that decided tapes did not warrant proper storage conditions may now be faced with the loss of significant revenue because of lost program material contained on those tapes.

Whenever and wherever programming is created, planning should include proper care of the finished videotapes. After all, the material on the tapes is the result of creativity. Cutting corners when protecting "intellectual property" is not wise. With proper planning, playback of videotapes can be assured throughout their lifetimes.

Today, there are many tape types, from oxide to metal particulate and metal evaporate. Data storage devices may make use of tapes containing cobalt chrome or barium ferrite. Regardless of the tape type, research suggests that all magnetic media, properly stored, can easily last 10 to 20 years. It is not uncommon to find broadcasters transferring 2-inch tapes recorded in the late '50s and early '60s to today's digital formats.

Storage basics

Proper magnetic media storage involves several factors. Considerations include:

- Air flow within the area should be clean and the room(s) should be at a "positive pressure" relative to the surrounding area. This means that there is a micropore filtering system in place with forced air such that when a door into the area is opened, air rushes out. Filters are important because they minimize airborne debris, which can cause immediate performance degradations, including high dropout or error levels. Additionally, foreign material can infiltrate machines and

media and cause long-term maintenance and retrieval problems.

- The temperature should be set at 68°F (20°C) and maintained within +/-4°F (2°C) at all times. Tape is sensitive to changes in temperature and will expand and contract. Stable temperatures are important to minimize physical distortions in the tape pack, which can cause tracking and tension problems later.

- Relative humidity should be maintained at about 45%, +/-5%. Tape will acclimate to the room's humidity, and if it is too high or too low, it can cause problems ranging from excessive head wear to head clogging.

With proper planning, playback of videotapes can be assured throughout their lifetimes.

- Smoking, eating and drinking in tape rooms and libraries should be prohibited. The airborne contaminants create dropout problems in the tape room. In addition, the particles can be wound into the tape pack, creating microscopic distortions and dropout problems when the tape is played back in the future.

- Keep the area clean. Use a sealed tile flooring and dust- or debris-free ceiling tiles. Carpet holds dust and vacuum cleaners stir the dust up and redeposit it on the tapes. Cardboard boxes should be opened elsewhere to keep the cardboard debris out of the area. Dust the equipment and the area often to remove any accumulations of dust and debris.

- In high traffic areas, consider installing adhesive mats that remove dust and dirt from workers' shoes. It is surprising how much can be tracked

The Bottom Line: —

Many times, the value of a videotape is far greater than the cost of the tape itself because of the information it contains. Unlike computer files that can be copied without degradation, the quality of analog videotapes is reduced with each generation. Typically, there is only one master tape of any given production. If the master is lost or damaged, replacement costs can be extremely high. _____ \$

FUJINON'S GOT THE ANGLE ON COMFORT.



Only Fujinon's *V-Grip* series gives you a Variable Grip that adjusts from 3° to 17°.

Fujinon's V-Grip Series is simply the most comfortable, versatile grip for professional hand-held lenses. And it's a standard feature on Fujinon's superb 8.5X, 15X, and 20X hand-held TV zoom lenses.

You can adjust the ergonomically designed V-Grip in five positions to balance any load in seconds, from lightweight camera/lens combinations to camcorders. You can even adjust the zoom rate between 1 and 7 seconds wide-to-tele, directly from the grip.

AT, Inner Focus...and rugged, too.

Each model in the V-Grip Series has AT, Inner Focus, and is exceptionally lightweight and incredibly durable, too.

No one's got a better handle on comfort and performance than Fujinon's fantastic V-Grip Series. For more information, contact Fujinon at 1-800-553-6611.



A15X 8BEVM

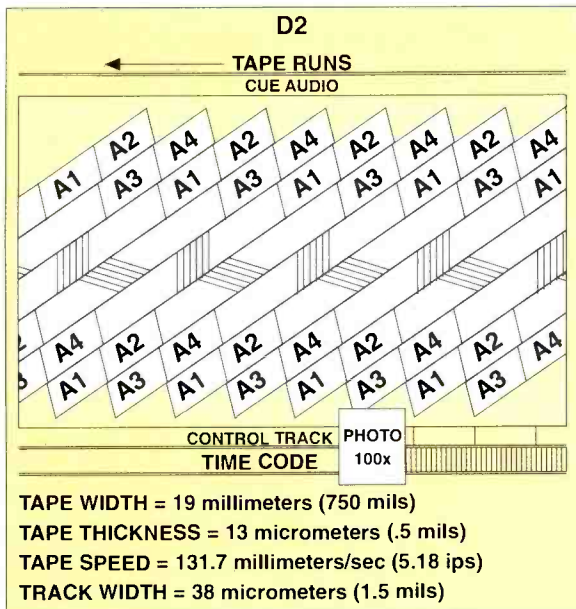


Broadcast & Communications Products Division

FUJINON INC. 10 High Point Dr., Wayne NJ 07470-7434 (201) 633-5600
FUJI PHOTO OPTICAL CO., LTD. 1-324 Uetake, Omiya City, Saitama 330 Japan.
Phone: 048-668-2152, FAX: 048-651-8517, TELEX: J22885

FOCUSED ON THE FUTURE

Circle (37) on Reply Card



The diagram shows the layout of tracks used for the D-2 format. The small square indicates the area of tape shown in the photograph. The original photograph was taken using 100x magnification, and is reproduced slightly smaller. The upper area is the control track that is only 0.5mm. Lower area shows a portion of the time code track that is also 0.5mm.



into an area on workers' shoes.

- Fasten open-reel tape ends securely and use high-quality adhesive tape that does not leave any residue when removed.
- Store tapes correctly. Tape should be stored in dust-free boxes. The boxes should support the reels by the hub, not by the flanges. Supporting reels by the flanges can cause edge damage. Tape boxes and cassettes should be stored on edge, never flat. Questions should be directed to the manufacturer

er concerning how to best store tapes. Inspect storage containers for dust and debris prior to removing them or placing them in storage. Wipe them clean if necessary.


- Rewind the tapes. Never store cassettes that have not been rewound to the beginning of the tape. Storing an improperly rewound tape can create severe hub clip impressions that can affect the first several minutes of tape. A good wind is important also if a tape has been shuttled many times

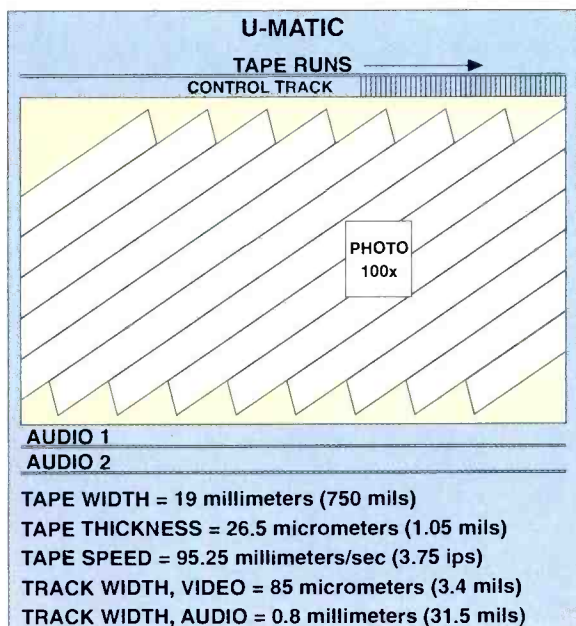
during an edit session, popped into and out of machines and handled many times. Look closely at the tape pack before storage. If the pack is uneven, with many strands close to the flange, take the extra time to rewind the tape to get a better tape pack. Try rewinding at slower speeds, it usually helps produce a better tension profile and a cleaner wind, thereby possibly reducing future problems.

- Keep tapes several feet away from stray magnetic fields. Large transformers, electric motors, permanent magnets (e.g., speakers) and the like can weaken the recorded signals, adding noise to the recordings. Although today's tapes are higher coercivity, which means they are less susceptible to low-level magnetic fields, it is still a good idea to store tapes away from any magnetic source.

Remember, the program material contained on videotapes is a valuable asset. The proper storage of that asset is essential and may be critical to your business future. If your facility does not meet the guidelines previously outlined, take steps to improve it today. Every step taken is a step in the right direction. A plan for the future is important, and proper videotape use and storage areas are key. ■

Tom Becker is in the technical services department of 3M's Audio and Video Products Division, St. Paul, MN.

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

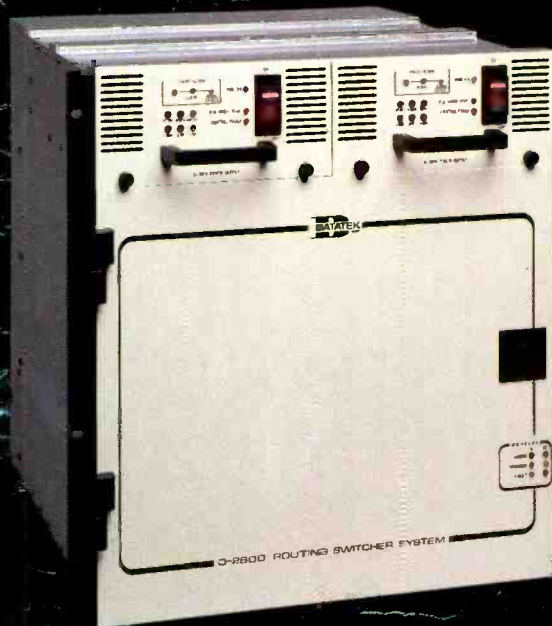


Tracks used for the U-matic format are shown in the diagram. Photo shows the video tracks magnified 100x. The dark area is the recorded information, with the lighter areas used as guard bands. Guard bands are approximately .05mm, the diameter of a human hair.



SAVE TIME

For fast, accurate service, please remove the Peel-Off Label (which is used to address your magazine) and affix it to the Reader Service Card, the Address Change Card or to any correspondence you send us regarding your subscription.



D-2800 Series, systems 32x32 to 1024x1024



D-2600 Series, systems 16x8 to 32x32



No system too small... No system too large.

Datatek's Routing Switchers.

Meeting the needs of every broadcaster...and every budget.

At Datatek, we've been supplying leading-edge routing switchers for large and small broadcast systems for over 25 years. That tradition continues with our newest additions, the D-2800 and D-2600 series. These new switchers support all signal formats: serial digital video, AES/EBU digital audio, data, analog video, analog audio, and time code. The D-2800 and D-2600 also deliver a number of other advantages:

- Total Upgradability—Each switcher uses a common control system, so the smaller D-2600 can be integrated into the larger D-2800 system...when you're ready
- You can mix formats and levels...in the same rack frame
- An advanced virtual tally system
- Serial digital video to 400 Mb/s with auto equalizing and reclocking
- Tie-line control management, your gateway to mixed digital/analog facilities
- Central control panel management with no system interruption
- No external common control system is required
- A full line of control panels is also available with your choice of 4 to 8 character alphanumeric displays

Datatek. The routing switcher company that's been ahead of the pack for 25 years.

For more information, please call or Fax:
Datatek Corporation
1121 Bristol Road, Mountainside, NJ 07092
Tel: 908-654-8100 • 1-800-882-9100 • Fax: 908-232-6381



Archiving videotape

A proper tape archive requires more than just shelf space.



The Bottom Line: —
Without the proper storage conditions and care, your tape library can become an expensive dustbin. Although many of the tapes that go into your archive will never be needed again, any one of them could become a valuable asset in the years to come — but only if it's still in good condition. Observing some simple rules of storage will maximize the longevity of your archives. ————— \$

Whether it's an entire award-winning newscast or a short but well-shot clip of special interest to your viewers, the last thing you as a broadcaster want is to have any harm come to your videotape archives. Thanks to advancements in technology, videotape today can withstand a significant amount of normal wear and tear, but optimal long-term storage requires some extra effort.

Protecting your videotape archive is simply a matter of following a few basic guidelines. If you pay close attention to these suggestions, your prized videotapes should be in excellent shape whenever the time comes to air them.

Ambient conditions

Magnetic tape may expand or contract with changes in temperature and humidity, so sudden climatic fluctuations should be avoided. In general, videotape should be archived in the same conditions that people find comfortable. Temperatures between 15°C to 25°C (59°F to 77°F) and relative humidity between 40% and 60% are recommended.

Among the problems that can arise if tape is stored at excessively high temperatures are tape expansion, increased print-through and increased dropouts and noise. Temperatures below the recommended range can cause tape to loosen in the cassette shell, and potentially harmful condensation could be created when the tape is moved to a warmer location. High levels of humidity can speed up the deterioration of the chemical components that make up the magnetic layer. On the other hand, a storage area that is too dry can lead to static electricity in the tape.

When climatic conditions differ greatly between where a tape has been stored and where it will be used, give the tape time to acclimate to the new conditions. Special care should be taken when tapes are used in high temperature and/or humidity. Condensation could form on the tape, cassette or metal reel section, and this

could harm the tape. Condensation can be avoided by allowing the tapes adequate adjustment time to make the transition. Leave tapes inside their cases as long as possible during this transition time.

Winding and storage

Videotape should be correctly rewound before it is stored. Prior to storing, check to see that there is no unevenness (also called *stepping*) in the tape. If stepping appears, the remedy is to carefully rewind the cassette on a VCR or tape player. If possible, rewind at slower speeds for best results. Similarly, avoid storing tapes that have been stopped and ejected mid-tape. Tapes that are stored for long periods of time with uneven winding or stepping can stretch or warp, and the results will be playback with distorted pictures or varying sound levels.

Videotape should be correctly rewound before it is stored.

A note of caution: no programming should be recorded on the first or last 30 seconds of a videotape. These sections can be susceptible to dropouts caused by dust, contamination and the tape's terminal stop.

Always store tapes in their cases in an upright position. Storing tapes stacked on top of one another could result in tape-pack shift. Cassettes may stand either on their sides or their front/back ends. When transporting tapes, arrange them in a snug, upright position so that they will not shift position during transit.

The loose ends of open-reel tapes should be held firmly in place either with high-quality adhesive tape or with special end-stoppers that do not

D-5. When quality is your absolute first priority.

But don't take our word for it.

Ask the editors at Grace & Wild why they choose D-5 as "the best possible recording medium" for their clients...



"As the largest post house in the region, we feel a responsibility to offer the best possible recording medium to our clients. We think D-5 is the optimal method for archiving and recording high-quality images. When our clients ask us to use the best video tape recorder available to keep their digital video looking its absolute best...for example, in graphics, film transfers, or high end post production...we recommend they use our new

Panasonic D-5 recorders," says Grace & Wild president Steve Wild.

Compared to D-1 8-bit, D-5 uncompressed 10-bit records four times more information per pixel. With 8-bit video, dithering or rounding is added to mask artifacts which reveal themselves as contouring and pooling. D-5's 10-bit video and lack of compression yields the best possible lossless storage of video available today. For high-end

post production, advanced graphics, film transfer, colorist work or any other critical video application, D-5 is ready to give you a real competitive edge.

Panasonic
Broadcast & Television Systems Company

deposit any glue onto the videotape surface itself. If the ends are not firmly affixed, wound tape may loosen and cause deterioration in the tape's configuration. Before storing open-reel tapes, remove any twisted or wrinkled end sections.

Labeling

Cassette labels should only be placed on the areas designed for them. When relabeling an already-labeled tape, remove the old label before applying the new one.

Labels placed incorrectly or placed over existing labels can result in improper po-

sitioning of the cassette in the VCR or tape player. This can lead to tape-running problems during playback. Such labels

Tapes need to be played periodically to stay in top shape.

can peel off and cause the cassette to jam in the machine. Improperly placed labels can also impede the motion of moving

parts on the cassette, causing serious operational problems.

Tapes need exercise, too

Tapes actually benefit from use; they are physically and chemically designed for playback and recording in VCRs, tape players and camcorders. They need to be played periodically to stay in top shape.

Leaving tapes wound and unplayed for a long time makes them particularly susceptible to expansion or contraction from temperature and humidity. To avoid these problems, simply fast-forward and rewind the tape from end to end at least once every three years. To be safer, this process can be performed once each year. If you plan to record over a tape that has been stored for an extended period, perform this same operation on it first for best results.

Combating dust

The floor surface of an archival area is often overlooked, a serious mistake since dust is one of the main enemies of tape. Concrete floors should be treated with a sealant to prevent erosion, and tiled floors should not be waxed because wax attracts dust. Carpeting should be regularly monitored for loose fibers and for static electricity build-up.

The archival rooms should also be equipped with air filters to promote a dust-free environment. Maintaining a positive pressure environment in storage rooms can also help to reduce airborne dust levels.

Archival rooms should also be equipped with air filters to promote a dust-free environment.

Your archive facility may be called upon to store tape that originated outside production areas, and these tapes may be dusty. Tapes that may have become contaminated in such circumstances should not be archived. The dust on such tapes can include hard mineral particles like silica or aluminum that can cause dropouts or can even damage tape surfaces and video heads. If you suspect that a tape may have such dust or dirt on it, transfer the recorded material to a clean tape and archive the clean copy.

Avoiding damage

It should come as no surprise that strong magnetic fields can have an adverse effect



...from the ground up

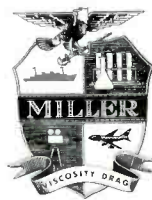
Whether your expertise is Broadcast ENG, EFP or Corporate production, Miller's extensive range of 36 custom Camera Support Systems are designed to meet the specific needs of the most demanding camera operators.

Using the latest camera support technology - *multi-step leakproof*



fluid drag control, fully variable counterbalance systems, torque-limited leg clamps - and materials such as *robust die-cast bodies, carbon fibre and hard-anodised alloy*, Miller Camera Support Systems

deliver the ultimate in quality and choice for all your support needs.



Miller - Designed for the world's most challenging conditions

Miller Fluid Heads (USA) Inc. Tel: (201) 857 8300, Fax: (201) 857 8188
Miller Fluid Heads (Australia) Tel: +61 2 439 6377, Fax: +61 2 438 2819

Circle (44) on Reply Card

on archived tape. As a precaution, it makes sense to keep certain items out of your archival room, such as speakers, electrical motors, video monitors, toys or anything else with a strong magnetic field. Magnets can weaken a tape's recorded signal or increase tape noise. Oxide or metal tapes are safe in magnetic fields of less than 4000A/m.

In case of fire in a tape archive, vapor or gaseous-based fire extinguishers are recommended. The powder-based or liquid extinguishers can damage both the performance and the durability of magnetic tape.

It's easy to forget about archived tapes until it's too late to solve their problems.

Tape damage can also occur during playback. For instance, wrinkles or scratches may appear on tapes if they are played on a poorly adjusted tape-path mechanism. Maintaining the quality and durability of tapes is not just a matter of proper tape storage — VCRs and tape players must be in good working order to help ensure that the tapes themselves will last.

Large-format cassettes

The size and mass of the tape packs inside larger videocassettes (such as D-1 and D-2 formats) can cause damage to the shell if the cassettes are subjected to physical trauma or rough handling. For this reason, these larger cassettes should be treated with special care, and carefully checked upon receipt after transit.

Before attempting playback, a thorough inspection of these cassettes might reveal any damage. Look for the following items:

- Broken shell pieces inside the cassette;
- Cracks in the cassette shell;
- Smooth operation of the cassette door;
- Proper operation of the hub-locking mechanism. This can be checked by opening the cassette door and ensuring that both reels are spinning freely, then closing the door and verifying that both hubs are locked;
- Visible tape damage. The cassette door can nick the tape, but still open and close in apparently normal fashion. Such nicking of the tape can result in its complete breakage when the full stresses of loading playback are applied.

If any of these inspections reveals a problem, make a copy of the tape immediately and discard the damaged original.

Out-of-sight, out-of-mind

It's easy to forget about archived tapes until it's too late to solve their problems; don't let this happen to you. Following the simple processes outlined in this article can prevent such a catastrophe from befalling your operation.

The hardest part of instituting these practices is sticking with them for the long haul. This is not a "quick-fix" issue, however, and it's well worth the effort. Taking proper care of videotapes will return the investment over the years with problem-free playback of your valuable archival material.

John Matarazzo is technical services manager for Sony Recording Media & Energy Products Group, Montvale, NJ.



For more information on videotape, circle (153) on Reply Card. See also "Recording Tape," p. 71 of the BE Buyers Guide.



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

DRAG, DROP, THROW, YANK, PUSH, KICK...

...you name it, we can take it.

This can be a pretty tough business. Setting up, tearing down and hauling your equipment can really take a toll. One way to protect your fragile gear and keep it in top shape is to have the right transit case at hand. Since 1952, Anvil has set the performance standard in custom-designed reusable transit cases. And it's no accident the name Anvil has become synonymous with durability and reliability, a couple of qualities that carry a lot of weight in this business today. So if you're looking for a top-notch, thick-skinned performer that can take its lumps—choose Anvil Cases.



Individually Designed with Protection in Mind™



Anvil Cases
A ZERO Corporation Company

15650 Salt Lake Avenue
City of Industry, CA 91745-1114

Phone: 818-968-4100
Fax: 818-968-1703

24BE

1-800-FLY-ANVIL (359-2684)

Circle (38) on Reply Card

Grounding and shielding practices

Proper grounding procedures never go out of style — but there are some new twists.

The Bottom Line: _____

In a world of sophisticated audio and video devices that make any form of signal manipulation possible, serious artifacts still turn up because of real-world effects on installed systems. In most cases, these problems can be solved in a cost-effective manner, but the solutions are not always self-evident. Recent research has brought engineers some helpful new information and techniques toward this end. _____ §

To the uninitiated, the attraction of audio and video system design is the thrill and excitement of carefully selecting the audio and video components, determining the correct interconnection of the equipment to provide the system's functionality, installing this equipment into its new home, and testing and commissioning to bring the equipment on-line. It is not long, however, before our new audio-video and systems designer is disillusioned by the effects of the real world on any new system. These effects include noise, hum, buzz, snow on video pictures, shadowing and a variety of other forms of distortion to what was hoped would be a clean signal.

The complexity of the problem of noise in audio and video systems requires an organized, methodical approach to control or minimize its effects. This is important because grounding and shielding systems alone will not provide guaranteed freedom from noise problems. Moreover, the design of the grounding and shielding system is dependent upon other factors in the system. Achieving the right level of hardware installation to optimize system performance and minimize cost of installation must be done with a clear head and a knowledge of the issues that affect the noise in the facility's audio and video signals. It is easy to overdesign and spend excessive time on installation procedures that have little impact upon the system's freedom from noise.

EMI overview

The problem of noise in electronic signaling is universal, and it affects the computer, aerospace and manufacturing fields as much as it does the audio and video industries. The problems that all these operations face with regard to noise in signal systems is referred to as *electromagnetic interference* (EMI). EMI is a well-studied and highly documented science, and solutions to these types of system inade-

quacies are well-developed. (See the references at the end of this article on p. 74.)

It is possible to break down the problem of EMI into a number of individual components that can be studied and dealt with one at a time at the concept, development, design, installation and testing phases of any audio or video system. This systems approach to dealing with EMI is an effective and efficient means of attacking these problems.

Electrical noise has four means of transmission: common-impedance (or "hard-wired") coupling, electric-field coupling, magnetic-field coupling and electromagnetic radiation. When attempting to solve EMI problems, it is of foremost importance to know how the noise is being coupled.

Five well-established techniques are used to control EMI. These include shielding, balancing and twisting, physical separation and routing, isolation and grounding. It is difficult to predict the cost/benefit trade-offs among these techniques in a given installation. In many cases, broadcast system designers may only have substantial control over the areas of signal wiring and equipment selection and in some elements of ground-system design. Nevertheless, these are areas where proper application of good engineering principles can result in measurable, cost-effective benefits, and where some new information has recently come to light. Therefore, the remainder of this article will concentrate on signal wiring and grounding. It assumes that a proper AC grounding system already exists in the facility.

Shields in signal cables

The last few years have brought a number of interesting developments to the area of cables and cable shields. One of the most interesting findings is found in a recent paper by Neil Muncy of Markham, Ontario. It reports that the current flowing in the shield of a cable is not particularly influential to the induction of noise into signal

Performance **PLUS**

REAL SAVINGS

OVER \$7M SAVED IN ENERGY COSTS

OVER 2M IOT OPERATING HOURS

EEV IOT



EEV has always accepted the Broadcast Industry's continuing challenges to lower energy consumption resulting in technologies such as high efficiency external cavity klystrons, BCD pulsing, higher efficiency wideband klystrons and high power compact IOTs. The results are now in. Since their introduction:

Over 2 million IOT Operating Hours achieved! Over \$7 million* saved in Energy Costs!

EEV's IOTs are continuing to set completely new standards in design, efficiency, and lower energy consumption. And, of course, all EEV's IOTs are digital ATV/HDTV ready.

Start saving today.

Call us to find out how you can start enjoying your share of these energy savings.

EEV Power Tubes

USA: EEV Inc, 4 Westchester Plaza, Elmsford NY 10523
Tel: (914) 592 6050 or Toll Free 1-800-DIAL-EEV Fax: (914) 682 8022
CANADA: EEV Canada Ltd., Tel: (305) 678 9811 Fax: (905) 678 7726
UK: EEV Ltd., Tel: (01245) 493493 Fax: (01245) 492492

*Based on 7.5c/kWhr

Subsidiary of the General Electric Company plc of England **SBC**

Circle (53) on Reply Card

THINK Belden THINK HERMAN ELECTRONICS

Stocking one of the largest
**AUDIO & VIDEO
BROADCAST CABLE
INVENTORIES**

in the country at prices that
can't be beat! Such as:

8281-1000 / All ColorsOnly \$329.00
8451-U1000Only \$77.00

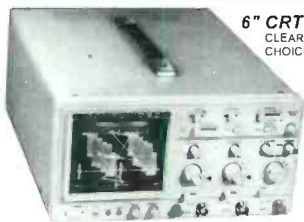
Also stocking everything in
**BROADCAST
ELECTRONICS SUPPLIES**
including: Neutrik, Shure, Brady, Kings,
Leader, Panduit, and much more!

**CALL FOR
FREE HERMAN
CATALOG!**

Call Joe Steinberg, Broadcast Specialist
800-938-4376 • Ext. 335

Circle (39) on Reply Card

COMPUVIDEO TEST INSTRUMENTS



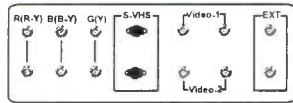
6" CRT
CLEAR
CHOICE

COMBINATION NTSC or PAL
• WAVEFORM MONITOR
• VECTORSCOPE
• DUAL TRACE OSCILLOSCOPE

MULTI INPUTS
• COMPOSITE, S-VHS/Hi-8 COMPONENT
• EXT REFERENCE
BASIC FEATURES
• FLAT IRE CHROMA 1H, 2H
1mS/DIV, 2V, 2V MAG
• CIRCLE VECTOR
• OVERLAYS DC REST
• H-PHASE SUB-PHASE
ADVANCED FEATURES

• LINE SELECT
• DG, DP
• X-Y DISPLAY (STEREO/AUDIO)
• VIDEO/AUDIO HEADS CHECK

POWER (AC/DC/BATTERIES)
DESK TOP OR RACK MOUNT
Priced from \$1421

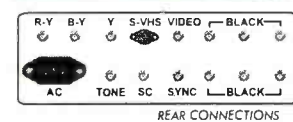


REAR CONNECTIONS
IN STOCK NOW



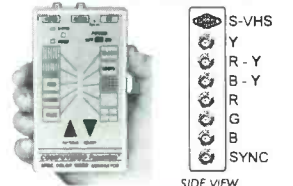
**NTSC or PAL
VIDEO SYNC & TEST GENERATORS**
MULTI OUTPUTS / MULTI PATTERNS

• ALL SIMULTANEOUS OUTPUTS
• COMPOSITE • S-VHS
• COMPONENT • RGB
• 12 PATTERNS incl SMPTE & BLACK
• 6 BLACK BURST OUTPUTS (GENLOCK)
• SYNC & SUBCARRIER OUTPUTS
• AUDIO TONE
• 2-CH XLR AUDIO BALANCED OUTPUTS
POWER (AC/DC/BATTERIES)
DESK TOP OR RACK MOUNT
Priced from \$299



REAR CONNECTIONS

JUST ASK FOR "POCKETGEN"



SIDE VIEW

**NTSC or PAL
HANDHELD
VIDEO/AUDIO GENERATOR**

• 10 PATTERNS INCLUDING
SMPTE BARS and BLACK BURST
• ALL SIMULTANEOUS OUTPUTS
• COMPOSITE • S-VHS
• COMPONENT • RGB
• AUDIO TONE
• 2-CH XLR AUDIO BALANCED OUTPUTS
POWER (AC/DC/BATTERIES)
Priced from \$357

VIZ TECHNOLOGIES

TEL: (718) 714-9873
FAX: (718) 714-0242

Circle (40) on Reply Card

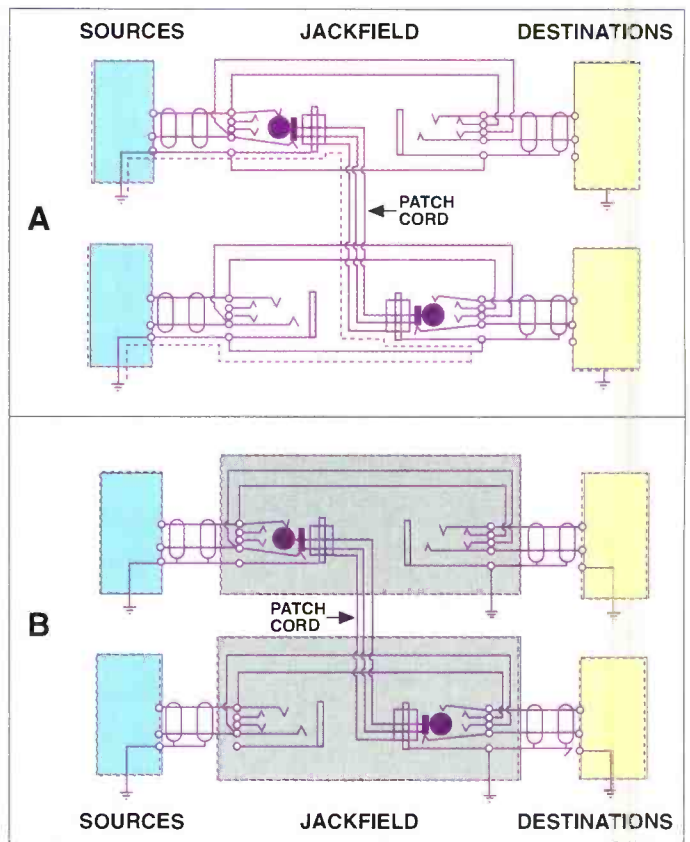


Figure 1. The use of patchbays greatly complicates the shield-grounding scheme because it allows ground loops to be easily created. In the half-normalled jackfield shown in (A), the dotted line follows a ground loop caused by patching. The same jackfield in (B) uses a different grounding scheme that avoids the creation of this loop.

wiring and circuit inputs. (See Reference No. 2 at end of article.)

To understand this, first consider that most ground loops are formed by a cable with its shield terminated at both ends. Under such conditions, the current in the loop flows through the cable's shield and the ground conductors that form part of the technical ground system. In the past, it has generally been thought that the current in the cable's shield induces electromagnetic interference in the signal conductors contained within the cable, and that the current in the ground conductors also created noise because it was modulating the ground reference of the equipment. But new tests indicate that, for most modern cables, the noise induced into a cable's signal conductors of shield currents is insignificant — at least for systems with less than 90dB of dynamic range. This means that ground loops created by shields do most of their damage because of the current they create in the other technical ground conductors that form part of the loop, not the cable shields.

This is an important point, particularly in light of the fact that the shield of a cable is relatively less important with regard to EMI than, say, the twisting of the conductors within. (Note that the telephone company operates with unshielded, twisted-pair cables with great effectiveness, and the use of unshielded cable has other advocates.) Given this new understanding, it becomes extremely important that shield-grounding schemes do not introduce ground loops. Because the shield grounding seems to be of limited importance, the last thing you want to do is create additional problems by implementing it. Therefore, a primary criterion in developing shield-grounding techniques and termination methods is that they do not create ground loops.

In the case of coaxial cable, the shield serves several purposes. It provides a transmission line with constant and specific characteristic impedance — usually 75Ω. It also shields the signal conductor within

WOULDN'T IT BE GREAT IF TASCAM MADE A PORTABLE DAT RECORDER WITH THE SAME DURABILITY AND SOUND QUALITY AS THEIR STUDIO DECKS?

It's here. The TASCAM DA-P1. The ideal portable DAT for field recording in broadcast applications.

You need a durable and high-quality DAT recorder for your team to take into the field. You'll get higher quality digital audio, plus be able to dump it to a digital audio workstation for quick and easy editing. That's why TASCAM makes the DA-P1. It has the features demanded by broadcast professionals. Things like XLR-type MIC/LINE inputs with phantom power so you can use a wide range of microphones and input devices. A 20dB pad, and a versatile, easy-to-read display. But field reporters and production personnel will love the DA-P1's extended life 2-hour battery that recharges in just 1 1/2 hours.



If you can get the DA-P1 back from your field personnel, you'll find it performs outstanding in the studio, too.



With a built-in S/PDIF direct digital I/O, it integrates with DAWs, and other digital gear. Also, it supports multiple sample rates (48, 44.1 and 32 kHz) and utilizes next-generation A/D and D/A converters delivering studio-DAT quality sound.

Standard accessories include a shoulder belt, AC adapter and battery — carrying case optional.

So if you're torn between a new recorder for the field, or a DAT for the "B" suite, think no more. Pick up a DA-P1. You get the best of both worlds. In fact, once you get your hands on a DA-P1, you may want to buy two. So get to your dealer today and order your new portable DAT from TASCAM.

TASCAM®

Take advantage of our experience.

Circle (42) on Reply Card

MSRP \$1,899. For complete specs and information via TASCAM FaxBack, call 800-827-2268 document #2150.

© 1995 TEAC America, Inc. 7733 Telegraph Road, Montebello, CA 90640 (213) 726-0303. TEAC CANADA LTD., 340 Brunel Road, Mississauga, Ontario L4Z 2C2 Canada (905) 890-8008

SURPRISE!

and provides the return current path for this signal cable. This system creates ground loops at every turn because a shield is normally terminated (to ground) at both ends, in order to provide a constant characteristic impedance and a signal return path. Video systems today are fairly resistant to low-frequency hum often associated with these types of ground loops, and a number of techniques are used to overcome problems associated with these ground loops when they do occur. This, however, does nothing for the associated audio equipment that might be operating near the video equipment and affected by the ground loops created. A technique for dealing with this problem (segregating equipment) will be discussed later.

When analyzing the problems of shield-grounding schemes, also remember that the connections for the shield in a twisted-pair cable are wholly distinct from the connections for the signal conductors. Depending on the format of the audio interconnect (balanced or unbalanced, transformer or

electronic), there are different ways to terminate the signal wires. These have nothing to do with the method used for terminating the shield. These are two distinct problems that can be analyzed and resolved separately.

With the notion that ground loops are problematic because of the current that they create in *ground* conductors, and given that ground conductors will be shared by certain pieces of equipment in an equipment cluster, a ground loop created by one piece of equipment may have an impact on the noise of

another piece of equipment. Because of this, it is often difficult to track down noise problems associated with ground loops. For this reason, it is paramount that every precaution be taken at the wiring stage to eliminate the possibility of any shield becoming grounded anywhere other than where you want it to be grounded (more on this later), either to a connector shell, the conduit system or the technical ground system. For this reason, neat and professional wiring practices are critical to the success of an audio instal-

Types of systems

lation. It can take several years of full-time wiring practice for an installer to develop the skills and understanding required for reliable and fail-safe wiring.

The ground-shielding scheme you use will be determined by the type of system you are working with: fixed or flexible layout systems.

Fixed layout systems are permanently wired and have no built-in ability to be

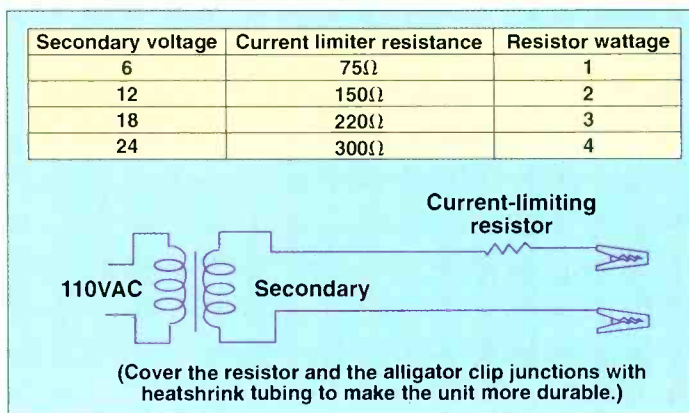


Figure 2. The hummer test determines whether an audio device is sensitive to "the pin-1 problem." (After Windt.)

TELEMETRICS MAKES CAMERA CONTROL COMPLETE.

Telemetry gives you the complete picture in camera control systems. With powerful camera control software that fully integrates Telemetry's comprehensive line of camera robotic systems equipment. It's the camera robotics system that puts you in complete control.

Achieve the ultimate in camera control with Telemetry's Control Panel Software (TM-CPS). It combines real-time program and preview video displays, still image presets, camera set-up controls and video switching capabilities — all on one screen. And provides you with the highest levels of performance, versatility and cost-efficiency.

TM-CPS also provides seamless integration with Telemetry's extensive line of camera robotics components. Including the company's industry renowned pan/tilt mechanisms for studio and traffic/weather-cam applications. With features like internal serial receiver/

repatched or reconfigured. In these systems, shield connection issues are fairly straightforward: Ground the cable shield at *one end only*. (This is often called the OEO rule.) Whether to ground at the input or the output has been the subject of much discussion. I recommend grounding at the output ("source" end of the cable) as a general rule. This is because outputs are never looped together, and thus, you avoid the possibility of creating ground loops in this fashion. On the other hand, inputs are often driven in parallel, particularly in voltage-source ("bridging") systems, and numerous exceptions to the OEO rule would be required if grounding were done at the "destination" end of the cable.

In the case of unbalanced signal paths, such as single-ended (consumer) audio connections or video coax cables, the shield also forms the return conductor for the single signal conductor. In this case, the shield cannot be lifted, and a ground loop is unavoidably formed.

Flexible layout systems use jackfields or other patching means to allow reconfiguration of the system. In practice, the use of patching greatly complicates the shield-grounding scheme, as Figure 1A illustrates. No ground loop exists in the normalized

path from source to destination through the jackfield, but when a patchcord is inserted, a ground loop is formed because of how shield-grounding was handled at the jacks. (There are many ways of implementing grounding schemes through patchfields that will cause ground loops, and this is only one of them. Any proposed shield-grounding

Ground the cable shield at one end only — this is often called the OEO rule.

schemes involving patching should therefore be drawn out and analyzed.)

Note that if the jacks are treated as a piece of equipment, however, in which the shields are either grounded or lifted, the loop is avoided (as shown in Figure 1B).

Other considerations

Because unbalanced, coaxial video connections inevitably create ground loops, it is often appropriate to segregate the equip-

ment into separate racks and to provide individual, isolated ground conductors to these racks from the main AC distribution panel. As a result, the ground loops created by the video system are isolated as much as possible from the more-sensitive audio system. This idea can be taken one step further by segregating less-sensitive systems, such as intercoms and tally, and locating this equipment in other racks as well.

Each of these three rack systems (video, audio and intercom/control) can be free-standing on its own isolating base and fed from power with dedicated technical ground conductors from the local power-distribution point.

As systems become increasingly digital, the differences among all of these types of signals diminish because they all become bitstreams. Nevertheless, the sensitivity of digital signals to ground-loop problems is at least as critical, if not more so, than with analog systems.

Another helpful technique is grouping the grounds. The *loop area* of a ground loop will determine the extent of the current that may be induced into it by nearby magnetic fields. If the ground wires associated with equipment in a rack are grouped together and run parallel, then the loop area will be

decoders for programming preset motion control functions. And precision Swiss motors for smooth and quiet operation.

To keep your cameras moving, TM-CPS also controls Telemetrics' exclusive linear motion trolley system. Along with a full line of joystick controllers, power supplies, lens interfaces, programmable motion controllers/receivers and video switchers. In addition, there's Telemetrics' innovative line of triax and coax multiplex systems. It's everything you need for fully integrated camera robotic system operation.

You can get it all from Telemetrics. The company that makes camera control complete. For more information, call 201.848.9818. Or fax 201.848.9819.



Telemetrics Inc.

6 Leighton Place, Mahwah, NJ 07430 USA

Circle (54) on Reply Card

minimized. These ground wires could even be twisted together, thereby dropping the loop area of this portion of the circuit to zero.

In the case of extremely long runs, or for cables running through locations with extremely high EMI fields (such as transmitter sites), it may be preferable not to terminate the cable shields to the electronic equipment at all, but instead to terminate them at an interim terminal block with its own dedicated ground conductor back to the local ground bus. (This avoids the possibility of the pin-1 problem discussed later.)

Shield termination

The following rules and comments may be helpful with regard to the use of cable shields:

- Terminate the grounded end of a shielded cable with an insulating sleeve (preferably shrink-tubing) over the jacket termination and another, smaller-diameter piece of tubing ("spaghetti" or shrink-tubing) over the drain wire. This prevents the possibility of the shield becoming inadvertently shorted to another circuit, shield or ground.
- When terminating shielded cables, always keep the unshielded ("stripped and spread") end portion as short as possible. The unshielded portion should normally be less than an inch (25mm) long.
- Never terminate the shield of a balanced audio line at both ends.

- As noted previously, for long cables — more than 1,000 feet (305m) — or in extremely high EMI areas, it may be desirable to break the shield and ground it as two separate pieces. Alternatively, it is possible to use a capacitor-to-ground at one end, while the other end is grounded normally with a direct connection to ground. This provides high-frequency grounding without introducing a DC ground loop. In areas of extreme EMI, this technique may be helpful even on shorter cables.

- Always avoid or minimize unnecessary breaks or connectors in shielded cables, such as at junction boxes, and always maintain shield continuity and isolation from ground through all boxes or multipin connectors unless the system-design documentation shows otherwise.

- Use shielded cables that have a continuous conductive path around their circumference. This is not the case in some cheaper cables in which a spiral wraps around the cable and lays Mylar insulation against aluminum foil. A fold in the foil is generally needed to ensure conduction at the overlap. Also, the drain wire should lie against the foil side of the shield, making good electrical contact. The number of wraps of this shield around the center conductors should also be investigated. Cables vary significantly in this regard. The more overwrap, the better

the expected shielding is.

- Multiconnector, shielded, twisted-pair cable should have an insulated shield and separate drain wire for each twisted pair of wires.

- Shielded cable may also be used to contain EMI signals. For example, in the case of relay switching or digital control, the shield will help contain the signals and prevent crosstalk into other analog cables.

- Be aware that when a cable specification states that there is 100% shielding, this is an indication of the physical coverage of the shield, not a measure of the effectiveness of the shield. A shield with 98% coverage has openings in 2% of its surface area (typical of braided shields, while foil shields are 100% covered).

The pin-1 problem

The *pin-1 problem* (as identified in Reference No. 2) refers to a means of EMI pickup in audio equipment related to connections to pin 1, the ground pin, of an XLR-type connector. This is also the pin used for cable shield connections. In general, the pin-1 problem refers to the connection of shields to audio equipment and how the connector's pin 1 is internally grounded. In the case of 1/4-inch or other tip-ring-sleeve (TRS) jacks, this would correspond to the sleeve connection.

The longest lasting
battery* for the home...



*Comparison of leading non-rechargeable battery brands.

The pin-1 problem manifests itself as noise that is induced into the internal circuitry of an audio or video device, which then appears in that device's output. In brief, the problem occurs when the internal circuit grounds are shared with the input and output connector shield grounds. When this occurs, common impedance coupling causes the electrical noise picked up in the cable shields to be transferred to the electronic circuits. A conceptual model for this considers the shield grounds as sewer pipes, while the circuit grounds are freshwater pipes. Keeping these two apart has advantages.

Complicating the pin-1 problem is the fact that a piece of equipment might measure flawlessly on the test bench, but when installed, could become quite noisy. Once all of the shields are connected to the many inputs and outputs of a switcher, for example, the pin-1 problem may manifest itself. Therefore, the noise specifications of most audio devices are rendered meaningless. The pin-1 problem is common in much of today's audio equipment, in everything from large mixing consoles to small processing devices. It is preventable by good electronic design, but users often unknowingly install devices that exhibit the problem, and it remains prevalent. This is a major source of EMI in many audio systems.

One way to minimize the pin-1 problem is

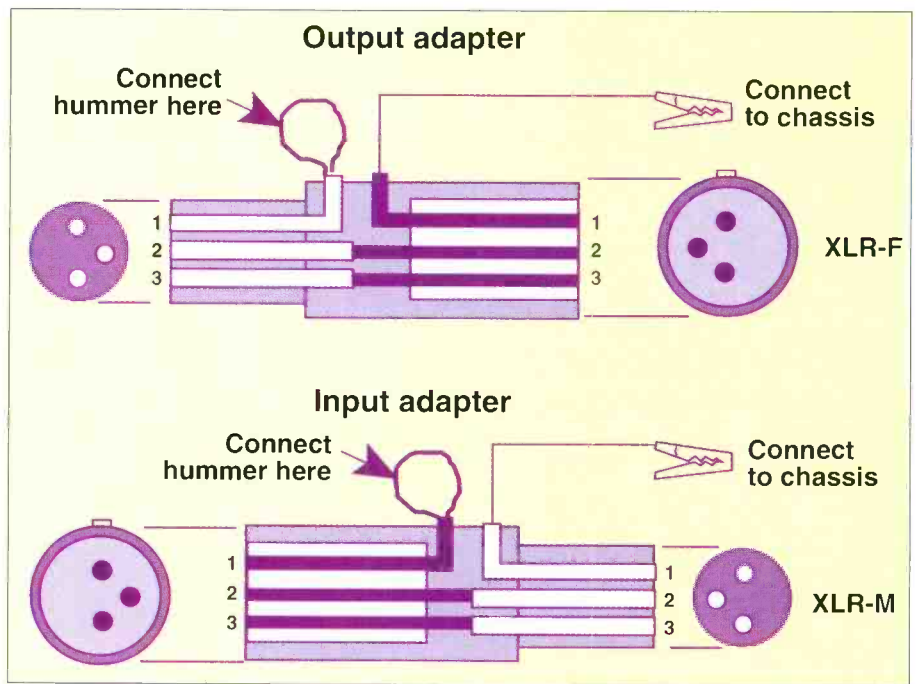


Figure 3. These adapters can make the use of the hummer simple and effective. (After Windt.)

not to connect any of the cable shields to pin 1 at the audio equipment, but rather to ground the shields to some intermediary terminal strip near the audio equipment. This approach applies to twisted shield pair

cable and requires a fully engineered approach to the design and documentation. If comprehensively addressed, a solution to this problem can result in the largest overall improvement to a facility's system noise.

...is also the longest lasting battery on the job.



That's because PROCELL® PROFESSIONAL™ batteries are DURACELL® batteries — the longest lasting alkaline batteries available. PROCELL is Duracell's line of alkaline and specialty batteries made for professionals. They deliver DURACELL dependability, DURACELL value and DURACELL performance.

PROCELL's superior performance is the result of a new Duracell alkaline battery design with features so unique they're patented.

See for yourself that PROCELL is the longest lasting battery you can buy. For more information or a distributor referral, call 1-800-4PROCELL Ext. 21.

When it matters the most.

DURACELL®
PROCELL® PROFESSIONAL™ BATTERIES

Circle (55) on Reply Card



D100 NTSC DECODER



**A HIGH END DECODER
WITHOUT THE HIGH END
PRICE TAG**

\$4950⁰⁰

- 5 MHz bandwidth
- 36 db subcarrier rejection
- 8 bit digital, adaptive comb filter
- NTSC and YC inputs
- RGBS, Y/R-Y/B-Y, YC outputs
- Pinnable sync on RGB outputs
- Digital control with recall
- Programmable filter weighting
- Optional remote control panel

broadcast video systems ltd.

40 West Wilmot St., Richmond Hill, Ontario L4B 1H8
Telephone: (905) 764-1584 Fax: (905) 764-7438

Circle (57) on Reply Card

NEW! It's MATCHBOX II!



**The industry's best
"balancing box" is now even better!**

All four outputs adjustable
HI-GAIN mode for digital editors
Pro-grade gold-plated RCA jacks
More dynamic range

A better product...for the same price!
Over 15,000 Matchboxes are in use worldwide



HENRY ENGINEERING

503 Key Vista Drive
Sierra Madre, CA 91024 USA
TEL (818) 355-3656
FAX (818) 355-0077

FAX-on-Demand Doc #120 (818) 355-4210

Circle (58) on Reply Card

The hummer

There now is a way to test for the pin-1 problem: the *hummer test* as devised by John Windt of Culver City, CA. (See Reference No. 3 at end of article.) The test determines whether a piece of audio equipment is sensitive to noise being injected on the pin 1 or shield termination points of the audio inputs and outputs. To perform the test, a 60Hz signal is injected into the ground system of a device at two points, using various combinations of input pin-1s, output pin-1s and chassis connections. While this is being done, the output of the equipment is monitored with suitable test equipment. Any change in the noise level in the device's output will be unambiguously due to the noise being injected.

On large multi-I/O devices (such as mixers and routers), a large number of potential paths should be tested. For example, test pin 1 of an input and pin 1 of each of the outputs on a console, then try pin 1 of each input and the chassis of the console, followed by pin 1 of an input and pin 1 of the other inputs to the console, and finally, pin 1 of an output and pin 1 of the other outputs of a console. Depending on how the grounding has been implemented in the console, these will have varying effects on the overall output noise of the console.

Monitoring the output noise is a critical element of this test. The simplest form of test equipment would be a voltmeter or a good loudspeaker monitor system with high gain, allowing you to hear the noise floor of the equipment.

Figure 2 shows the circuit diagram for the hummer. It consists of a 110VAC to 6/12/18 or 24VAC transformer and a current-limiting resistor. The output of the transformer is terminated in alligator clips, which allows it to be terminated as required. The adapters shown in Figure 3 can make using the hummer simple and effective.

One possible solution for a device that has the pin-1 problem is to not connect anything to pin 1 and to ground the incoming shields separately via a terminal block to some other technical ground point in the system, such as the ground block in the rack. Of course, in the case of microphones, phantom power returns on pin 1. Trying this indirect grounding approach in such cases can cause microphone oscillation.

The pin-1 problem and the different internal wiring schemes of various devices can explain why some equipment performs well in some projects and not in others, and why solutions that seemed to solve noise problems in one application don't help in others.

Although it would be nice when designing a system to focus just on the choice and installation of new audio and video equipment, proper grounding and shielding must also be considered. Without it, any other systems in the facility will not perform as well as they could. Careful attention to the design of the grounding and shielding system allows you to get optimum performance under real-world conditions without incurring unreasonable installation costs.

Philip Girdings is principal of Engineering Harmonics, Toronto, Ontario, Canada.

References:

- 1) P. Giddings, "Audio Systems Design and Installation," Howard W. Sams, 1990.
- 2) N.A. Muncy, "Noise Susceptibility in Analog and Digital Signal Processing Systems," J. Audio Eng. Soc., June 1995.
- 3) J. Windt, "An Easily Implemented Procedure for Identifying Potential Electromagnetic Compatibility Problems in New Equipment and Existing Systems — The Hummer Test," J. Audio Eng. Soc., June 1995.
- 4) A.H. Burdick, "A Clean Audio Installation Guide," Benchmark Media Systems, 1986.
- 5) C. Davis and D. Davis, "Grounding and Shielding Workshop," Tech Topics, Vol. 12, No. 10, Syn-Aud-Con, 1985.
- 6) "IEEE Guide for the Installation of Electrical Equipment to Minimize Electrical Noise Inputs to Controllers from External Sources," IEEE Standard 518-1982, IEEE, 1982.



Internet: be@intertec.com

CompuServe: 74672.3124

FAXback: 913-967-1905

The Board of Directors says, "We need to get earnings up. Cut the advertising."

Short-sightedness is everywhere. Often because management doesn't stick around long enough to feel the later bite of its short-term cost-cutting strategy.

The fact is, in the long run, advertising creates higher profits. A recent study by the Advertising Research Foundation and the American Business Press proves it. After 16 months of advertising,

one product advertised at low levels saw a 54% increase in profits. And when advertised at high levels, profits soared by 295%.

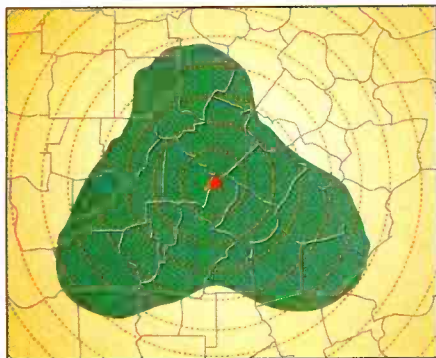
Moreover, the equity of a brand built and sustained by advertising can add tremendously to a company's capital value.

Cut the advertising and you just may cut off your brand's potential. Your company's potential.

Don't be forced into the trap of a short-term solution. For more information on how advertising affects brand image, write the American Association of Advertising Agencies, Dept. Z, 666 Third Ave., New York, NY 10017-4056.

AAA/ABP/ANA

American Association of Advertising Agencies
American Business Press
Association of National Advertisers



TV transmitter maintenance basics, part 2

Last month, we looked at a basic TV transmitter maintenance schedule and the work to be performed regularly. This month, we will look at the needed tools and test equipment and focus on some similarities and differences between the predominant types of transmitters, with an eye toward future upgrades.

Basic toolkits

The list of fundamental tools and test equipment needed for effective transmitter maintenance is relatively short. Even the smallest stations with the tightest budgets can assemble a decent toolbox to meet virtually every primary maintenance need. For day-to-day work, the main items are going to be cleaning supplies. Invest in a good shop vacuum along with the small brush attachments and crevice tools for it. A great additional item is a small, portable vacuum with a hose and attachments. The smaller unit is handy for getting deep inside a high-voltage cabinet or driver tray. Keep a good selection of clean rags and a few rolls of paper towels on hand along with basic household cleaning solutions and sprays.

For most maintenance tasks, you will need a set of basic hand tools. Every toolbox should contain a selection of screwdrivers, nutdrivers, box and open-end wrenches, socket set, Allen wrenches, adjustable wrenches, pliers and so on in metric and standard fractional sizes. For working on high-power tube assemblies, a set of ball-end Allen wrenches is frequently needed. Tube manufacturers often provide extra-long drivers and wrenches for reaching into the tight places around some tuning cavities. Purchasing an extra set of these wrenches can make tube changes much quicker. You may also want a set of brass, bronze or stainless tools for working around energized focus magnets.

Fundamental test equipment

Every TV transmitter site should have on hand, at minimum, a demodulator, aural modulation monitor, high-quality picture monitor,

waveform monitor, vectorscope, oscilloscope, frequency counter and multimeter. The demodulator should be highly linear, offer a quadrature signal output for ICPM and sub-carrier measurements, stereo audio outputs, a choice of filters, traps and attenuators and a zero carrier "chopper" pulse for system reference. The modulation monitor should offer a total modulation meter as well as L+R and L-R meters, peak indicators and an IF output. The demodulator and modulation monitor should be calibrated annually, preferably by the manufacturers, to an NIST traceable standard.

Proper video quality control is dependent on a quality waveform monitor, vectorscope and picture monitor. These instruments also need to be highly linear so as not to introduce false indications into measurements. The waveform monitor and vectorscope need to be able to show individual video lines in each field and provide for convenient measurement of differential gain and phase. The picture monitor is not a place to cut corners. Keeping a close eye on a good-quality, fine-pitch picture monitor can sometimes reveal problems that are missed on the scopes.

Rounding out the basic test equipment package are a good-quality 100MHz oscilloscope, a frequency counter and a multimeter with current and high-voltage probes. The oscilloscope should be at least a dual input, be set up specifically for television and have specialized triggers for locking to vertical and horizontal sync rates. Even better is a scope with on-screen measurement cursors and user menus for frequently selected setups. The frequency counter should be capable of resolution to 1Hz at transmitter output frequencies, and should offer variable slope, trigger levels and coupling. It should

also be sent to the manufacturer annually for an NIST traceable calibration.

A useful addition to the toolbox is the spectrum analyzer/sideband adapter combo. Use a spectrum analyzer that is capable of handling input frequencies approximately 20% higher than the first visual harmonic. Most spectrum analyzers on the market today go to 1GHz right out of the box. Also, be sure that your analyzer has an interface for the sideband adapter — it's an option on most analyzers, and it frequently gets forgotten.

What system have you got?

With the basic toolkit, let's look at the specifics of different transmitters. Today's transmitters offer an array of technologies that cover the map from basic to exotic. In many cases, today's VHF engineer is dealing with transistors — lots of transistors. Newer VHF transmitters make extensive use of solid-state amplifier chains, which greatly simplifies maintenance. The most pressing items are cooling system components and control systems. Not to say that the VHF engineer's job has become sleepy by any means, it takes a great deal of clean, filtered air to cool 50kW worth of RF transistors.

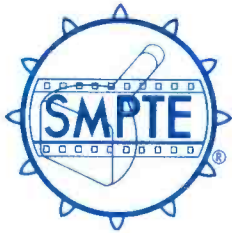
By contrast, today's UHF engineer has to keep up with a seemingly ever-expanding list of transmission technologies. The klystron is rapidly fading from view in favor of its more efficient cousins. Although it is beyond the scope of this article to go into each of these technologies in detail, we can examine the basic differences in the systems and differences in maintenance.

First, a quick review of klystron fundamentals. Table 1 summarizes the similarities and differences between different types of transmitter amplifiers. The high-power UHF TV klystron is a large, heavy device — whether of integral or external cavity design. The collector is operated near ground potential inside a cooling water jacket. Cooling systems are usually water or vapor, less often air. Multiple-focus magnets are required to keep the beam coherent as it travels between drift tubes. Gain is high, so power input to these devices is low. Power outputs range as high as 65kW. Overall efficiency of an unpulsed klystron is usually around 20%. (For this article, efficiency figures refer to actual tube or amplifier efficiency, not whole transmitter facility efficiency.) Pulsed, the efficiency rises to a respectable 45% or so. Expected tube life, if well

	Klystron	MSDC	IOT	Tetrode	Diacode
Available outputs (peak visual)	60kW	60kW	60kW	30kW	80kW
Typical input drive	5-20W	5-20W	200-400W	1kW	2.5kW
Gain (approx)	40dB	40dB	20dB	15dB	15dB
HVPS requirements	26kV	26kV*	32kV	8.9kV	8.5kV
HVPS Current**	2-5A	2-5A	.5-1.5A	4-5A	9-10A
Filament V Filament I (typ)	6-9V 25A	6-9V 25A	6-7V 25A	8-9V 185A	8-9V 180A
Typical cooling	Water or vapor	Water, 2-stage system	Water or air	Water or air	Water
Weight	400-600lbs	500-700lbs	50lbs	25lbs	15lbs
Tube Cost**	\$40,000	\$45,000	\$33,000	\$20,000	\$25,000

* Several taps taken off at 25kV, 18.75kV, 12.5kV and 6.25kV for different collector segments.
** All at 50% APL, beam currents in drift tube devices, plate currents in tetrode and diacode.
*** Average tube costs compiled from data from several tube manufacturers and distributors. Costs shown are approximately mid-range.

Table 1. Some of the basic similarities and differences between UHF transmitter amplifiers.



30th SMPTE Advanced Motion Imaging Conference

***“The Convergence Continues...Computer
Technology
and Television”***

February 1-3, 1996
Sheraton Seattle Hotel & Towers
Seattle, Washington

*The industry's most advanced forum on
integrated motion imaging and
computer technology...*

A day-long course
and technical introduction to digital video
on February 1st

For registration and conference info, contact:

SMPTE
595 W. Hartsdale Ave.
White Plains, NY 10607

Tel: (914) 761-1100 Fax (914) 761-3115
E-Mail: mktg@smpte.org

maintained, can be in excess of 40,000 hours. Maintenance focuses mainly on cooling systems and on touching up cavity tuning, focus currents, filament voltages and exciter pre-correction adjustments.

The multiple-stage depressed collector klystron (MSDC) offers all of the advantages of a traditional klystron — high gain, good linearity, long life — while gaining fairly impressive efficiency figures due to the multiple-stage collector. Efficiencies of well-maintained MSDCs approach 75% or better. This is due to the multistage collector that uses stepped high voltages on the collector segments to decelerate the electrons in the beam and recover much of the energy that would be lost as heat in a traditional klystron.

The MSDC also has all of the traditional klystron's disadvantages; it's still big and heavy, still requires multiple focus magnets, tuning cavities and so on. It also offers what some consider a major disadvantage that traditional klystrons do not. Sections of the collector are operated at full HV potential, meaning that cooling water purity is a critical operational and safety issue, but transmitter manufacturers design water purification and conductivity monitoring equipment as an integral part of the system.

Overall, the MSDC offers an attractive alternative to a traditional klystron, and has



A spectrum analyzer and sideband adapter are not required, but can be a nice addition to a facility's inventory of test equipment.

found favor in retrofit applications. Little has to be done to a klystron transmitter to upgrade it to MSDC service other than beam supply retrofit. Therefore, the increased efficiency provides a fairly short payback period. Other than the extreme cooling water

purity and dual-stage cooling system, general maintenance and tuning of an MSDC is similar to that of a traditional klystron rig.

Moving away from klystrons, we enter the world of the inductive output tube (IOT), which is fast becoming the standard in high-power broadcast applications. The IOT design has existed in laboratories since the 1930s, but is just now seeing real-world application. This is mainly due to recent advances in materials science and manufacturing technology allowing a grid made of pyrolytic graphite to be mounted only fractions of a millimeter from the cathode. The IOT is actually a hybrid device that uses the cathode/grid arrangement to inject RF and modulate the beam, and traditional klystron-like drift tubes and collector. Efficiencies range at 85% or better. The IOT is small, lightweight and requires only one magnet for beam focus. Output tuning is accomplished with two cavities operating as a double-tuned tank circuit.

The IOT has its downside as well. It has a lower gain, so input drives in the range of 200W to 400W are typical to achieve 40kW to 60kW output. It also requires a beam supply in excess of 30kV. The technology is quite new, so there is not a long track record of these types of transmitters for purposes of determining expected tube life.

MPEG



NTL is today the acknowledged world leader in digital compression systems. Our continuing commitment to research and development has produced a range of MPEG-2 and DVB compliant products which are second to none.

At the core is our tried, tested and trusted System



3000 offering the encoding, multiplexing, modulation and decoding capacity for broadcasting up to 16 video channels through a single satellite transponder.

From digital SNG, to professional receivers, to digital consumer set-top box technology, NTL delivers total end-to-end systems capability.

All of this has ramifications for the retrofit market. Basically, all that is left is the original transmitter cabinet upon upgrading an existing system to an IOT, since the beam supply, exciter and drivers all need to change. Most stations are simply buying whole new transmitters, rather than retrofitting older units. Still, even with the downside, many broadcasters are choosing the IOT over other technologies. At last count, there were eight manufacturers of IOT transmitters worldwide. Because the tube is stable and tuning is a snap, maintenance issues come back to the basics of the cooling system and voltage checks.

Materials science and manufacturing technology advances have also breathed new life into the basic tetrode in recent years with the addition of pyrolitic graphite grids. It is possible to achieve similar power levels from tetrodes as have been common from medium-power klystrons in the past. A tetrode is quite efficient, and modern UHF tetrode transmitters typically show efficiency figures of 40% or better, with power outputs to 40kW peak visual. Power supply systems are much simpler, because the tube requires only around 9kV. Maintenance is simple, involving basic voltage checks and tuning touchups.

A recent entrant into high-power UHF transmission technology is the diacode from Thomson. Again, a design that has been in



Test equipment doesn't have to be the latest and greatest, but it does need to be kept in good repair and calibrated regularly.

the lab for many years is now practical due to pyrolitic graphite, new ceramics and new manufacturing technologies. The diacode is a tetrode with the addition of a tuning cavity that creates a one-quarter wave RF "short circuit" on one end of the tube. This effectively doubles plate current, and as a result, doubles output power. In visual service alone, this tube is rated at 80kW peak sync, 60kW is achievable in common amplification mode. The diacode uses the same technology as a tetrode as far as RF input and output, plate supply voltage and screen voltages. This technology shows great promise for the future because tube cost, size and complexity are all

small. Other advantages include simple power supply design and no requirement for external arc-quenching crowbar circuits. One possible drawback is the high input drive power needed. Inputs on the order of 2,500W are required for 60kW common amplification output. Maintenance is identical to a tetrode transmitter, involving checks and adjustment of plate, screen and filament voltages, along with cooling system maintenance.

It all comes back to the fundamentals

Even though new rigs are being installed in record numbers today, TV transmitter engineers all over the country are successfully keeping 20-, 30- and even 40-year-old transmitters on the air looking and sounding sharp, crisp and clean. Regardless of the type of transmitter you own — VHF solid-state, UHF tube, older klystron technology or the latest and greatest whiz-bang — one fact remains: Keep up with basic maintenance and the system will continue to perform at top level for years to come. ■

Edward E. Williams, CBTE, is chief engineer for KPDX-TV, Portland, OR.



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

end 2 end

Digital

video

compression

systems



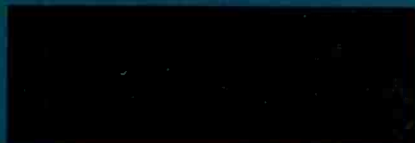
For more information contact us on :

NTL Advanced Products - UK

Tel: +44 (0)1703 438042

NTL Advanced Products - Hong Kong

Tel: +852 2526 2028



NTL 
RELIABLE BROADCAST
& COMMUNICATIONS
WORLDWIDE



On March 11, 1980, The Harold Ennes Scholarship Fund Trust was adopted by Indianapolis Chapter 25 of the Society of Broadcast Engineers. The trust was created in memory of Harold Ennes who was a member of the National Certification Committee and author of many books on broadcast engineering. The fund was transferred to the SBE in May of 1981. In March 1994, the name was amended to The Harold Ennes Educational Foundation Trust.

Since its inception, the Ennes Foundation has looked for new and exciting methods to further its goals of education for the broadcast engineer. The foundation has grown to provide technical workshops at regional and national conventions. It evaluates educational courses and cooperates with other industry organizations to develop and enhance common technical training courses.

Education

In 1989 there were 503,000 people employed as bank tellers. In 1993 that figure was down to 446,000, and statistics indicate that by the year 2003, it will fall to 223,000. In a local paper, it was reported that in the next 10 years, half of all U.S. bank branches will be gone as the banks turn to electronic transactions. In 1956 more than 250,000 people were employed as telephone operators, and in 1995, that number stands at 60,000 and is still falling.

What does this have to do with the SBE and the Ennes Foundation? One of the goals of the society is to ensure that its members have the tools to guarantee they won't go the way of bank tellers and telephone operators. How is the society working to accomplish this? *Education*. General George Patton probably said it best, "Intelligence is like eggs, the fresher the better." To ensure that members have access to this fresh information, the SBE and the Ennes Foundation offer educational grants, sponsor regional and national workshops and maintain an internationally recognized program of certification for engineers. There is also a certification program for educational institutions to make sure the right courses are being offered.

Ennes — your key to the future

The re-evaluation process

The Certification Committee has been in the process of re-evaluating the institutions that offer SBE certification, either by test or course grade. Currently, 17 of the approximately 50 on its list have been recertified. Some of the criteria used in this re-evaluation process were:

- Current technology curriculum
- Ability to deliver the information to the student
- Ability to measure their results
- Ability to document their efforts
- Ability to assist their graduates with job placement
- Ability to provide continuing education
- Number of students enrolled in their electronics or management programs
- Qualified faculty
- Academic standards
- Evaluation of student scores
- Quality of resources

As part of its ongoing effort, the SBE will re-evaluate each school on an annual basis. This process will ensure that you will always receive the most current information. This is important for a couple of reasons.

Sophisticated computers and telecommunication technologies are fast replacing entire job categories. As these jobs are eliminated, new ones will open up due to the newer technologies. As the new technologies come forth, they will not absorb as many jobs as they eliminate, therefore, you may need to investigate new avenues of employment.

Education is vitally important, and in upcoming years, it will be even more crucial. We need to work together to create the road map that will take us to a new skill level. This new level could be with your current employer, but just in case unforeseen changes are on the horizon, you need to be prepared. By answering the following questions, you can help us with our task of helping you meet your future goals.

1. What educational institutions in your area would you recommend?
2. What should we look for when evaluating a school, university or technical college?
3. What topics would you like to see in an Ennes Workshop in your area?

You may think you don't need these programs. But when I think of education, I'm reminded of a story about a sea captain and his chief engineer who were having an argument as to which of them had the most important job on the ship. Failing to agree, they swapped places. The chief engineer ascended to the bridge and the captain went into the engine room. After a couple of hours the captain suddenly appeared on the deck cov-

ered with oil and soot.

"Chief!" he yelled, wildly waving a monkey wrench. "You'll have to come down here; I can't make 'er go!" "Of course you can't," replied the chief engineer. "We're aground!"

You cannot predict what challenges or opportunities you will face in the future. So you must prepare yourself now so you will not find yourself in the same situation as the sea captain and the chief engineer.

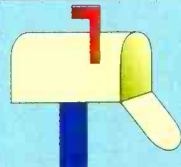
Continuing education

Learning is a lifelong process. Continued education is a link to a lifetime of learning and earning. In 1994, a *U.S. News and World Report* indicated that 42% of the college student population is over the age of 24. This means the competition for your current or future job is increasing. To remain competitive, you must also get on the path to continuing education. Many educational institutions offer a variety of credit and non-credit academic programs. These programs have been developed to meet varying schedules and individual needs. What do you need to move to the next level of expertise? Look over the changes that have occurred in the broadcast industry over the past few years and visualize what changes might occur in the next few years.

I was traveling though Virginia a few weeks ago, and I came across a sign that said, "You'll never steal second when your foot is still on first." Where is your foot? Don't be afraid to take risks. Remember that timing is extremely important. Stay *focused*, continue your *education* and do what all successful Americans have done, *work* hard. Plan every move or significant action you intend to take. Never stop paying attention to the details. Surround yourself with the best people you can. Remember the seven famous words of Winston Churchill: "Never give up, never, never give up." See you at home plate. ■

To respond to the three survey questions or to request the SBE National Certification Committee certified school listing, contact the SBE by phone at (317) 253-1640 or by fax at (317) 253-0418.

Richard A. Farquhar is president of RAF Associates, Canal Winchester, OH, and former president of SBE.



Internet:
be@intertec.com

CompuServe:
74672.3124

FAXback:
913-967-1905

Shure Brothers founder dies at 93

Sidney N. Shure, chairman and founder of Shure Brothers Inc., passed away on Oct. 17 in Chicago. He was 93 years old.

In his early days, Shure was an amateur radio hobbyist who worked in a radio factory and as a distributor salesman. He began building his company in Chicago in 1925. The Shure Radio Company began as a small wholesale parts supplier for home radio set builders.

In 1928, the company's name was officially changed to Shure Brothers Company when S.N. Shure was joined by his brother, S.J. Shure. The company soon became Shure Brothers Inc.

The stock market crash of 1929 affected Shure's parts distribution business. And it was during this period that Shure began to concentrate on the microphone business —



engineering, manufacturing and marketing.

In 1932, Shure Brothers produced its first microphone, a 2-button carbon microphone. In 1935, a department was dedicated to research and development.

In 1937, Shure introduced the first modern noise-cancelling microphone, then the first controlled magnetic microphone. By 1939, Shure had invented the Unidyne, a single-element directional microphone.

Over the years, the company has continued to grow and develop innovative products.

For more than 70 years, Shure's philosophy of innovation and quality and his unique vision and vigor have made the company a worldwide success. ■

COMING IN JANUARY ...

Remotes

Engineers either love them or hate them. For many of us, the thrill (and terror) of working remote broadcasts never goes away. In the January issue of *BE*, we provide the opportunity for you to relive those times while providing a glimpse into some leading-edge technology.

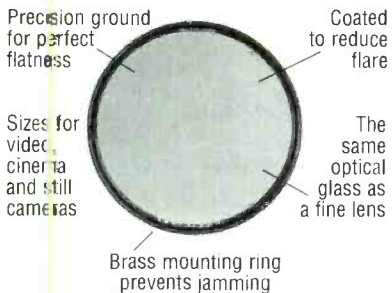
This issue will look at the construction of two multicamera sports trucks. Each truck relies on digital cameras and signal processing to provide the utmost in quality. Whether it's an ENG van or 10-camera, diesel tractor trailer rig, this article will teach you how to incorporate these innovative construction techniques and production capabilities in your remote truck.

Also in January:

Power Conditioning Systems

Jerry Whitaker will review the basics and advance techniques of power systems. He will also show you how to plan a clean power supply system for your station or production facility. Don't let dirty power rob you of a quality signal. See the January issue for answers to your questions.

IMPORTANT FEATURES TO LOOK FOR WHEN LOOKING FOR A FILTER



When taking the shot, you need a filter that's optically as good as your lens, and made to take all the punishment you can dish out. So, don't settle for distorting "window" glass and aluminum rings that bind when the pace heats up. Trust only B+W filters to keep you out of a jam and picture-perfect.



For a catalog or name and address of your nearest dealer, contact
Schneider Corporation of America
 400 Crossways
 Park Drive
 Woodbury, NY 11797
 TEL: 516 496-8500
 FAX: 516 496-7508

Circle (64) on Reply Card



For AM, FM, SCA and TV modulation monitors.

WHEN ACCURACY COUNTS...COUNT ON...

Call (610) 687-5550 or write for more information on Belar Am, FM, Stereo, SCA and TV monitors.
 FAX: 610-687-2686



Circle (63) on Reply Card

9.5" x 2.5" x 1"

Remote Control By Telephone

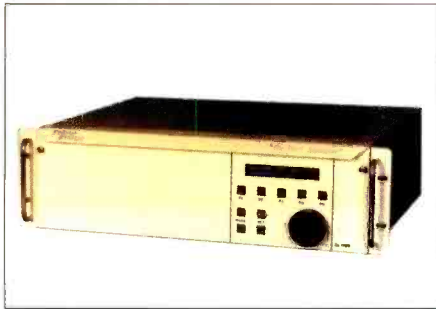


Control 10 latching relays and check 10 log c-level inputs from any touch-tone phone. User determined access code. Just \$339.00

CONEX ELECTRO SYSTEMS
 P.O. Box 1342 Bellingham, WA 98227

1-800-645-1061

Circle (65) on Reply Card



Prime Image Time Machine

audio passages with minimal impairment to sound and video quality. Furthermore, the quantity of time added or subtracted to these passages can be changed dynamically and during real time. This allows the time-changed signal to be mixed with other

dropped without any noticeable effects.

Applications for the Time Machine include shortening and lengthening programs to fit time slots or to provide room for additional commercials. In live applications, the Time Machine can be used to shrink and grow delays for censoring phone calls or meeting network time at the end of a show. The concept of the Time Machine is based on Prime Image's A/V delay, which is a 1- to 30-second delay device capable of delaying video and up to four channels of audio. An offset provides for different delays of audio and video to accommodate different audio and video path lengths. Video can be adjusted up and down by 40ms (one frame) and audio can be adjusted in 8ms increments. Once set, delays in the A/V delay unit are left unchanged.

The Time Machine provides for variable delays over time. By adding or subtracting frames over time, the amount of delay can accrue upward or downward. By doing this over relatively large amounts of time, the dropped or added packets of audio and video go unnoticed by the viewer. Packets

Since the beginning, broadcasters have been plagued by time. Either there was too much material for too little time or vice versa. In the late 1940s, the tape machine became Bing Crosby's time machine. It allowed him to go on for hours on good days and use the extra for fill material on bad days. Prime Image now has a time machine for the 1990s. Today's time machine is a digital solid-state device capable of increasing or decreasing time. This process, unlike on some units, does not include stretching or squeezing, the result of which is pitch shifting.

The Time Machine changes video and

By adding or subtracting frames over time, the amount of delay can accrue upward or downward.

non-time-changed signals if necessary. To understand the Time Machine, you must think of digital audio and video streams as being made up of individual packets, rather than as a continuous stream. These packets, if handled properly, can be repeated or

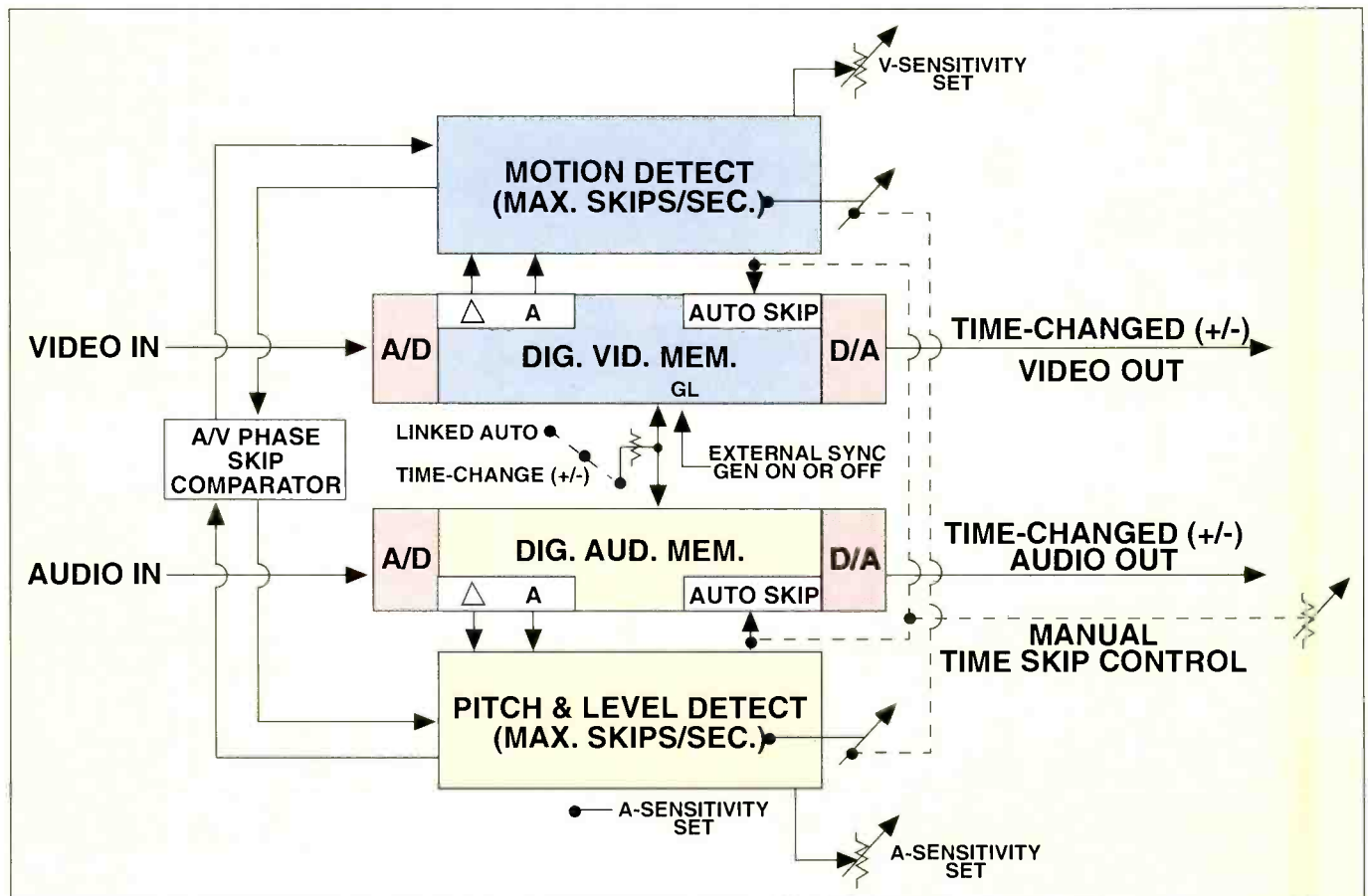


Figure 1. Basic block diagram of the Time Machine. Controls allow pitch/motion sensitivity adjustments as well as manual control of time shifting.

are added or subtracted during similar passages. For video, this means little or no motion. For audio, it means little or no pitch or level change. Several proprietary methods have been developed by Prime Image to drop or insert packets during motion or pitch and level shifts, but they go beyond the scope of this article. Audio and video packets can be removed at different times as long as the audio/video synchrony remains ± 1 frame, thus maintaining lip sync.

Audio and video packets can be removed at different times as long as the audio/video synchrony remains ± 1 frame, thus maintaining lip sync.

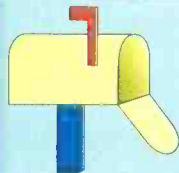
The Time Machine operates on a few basic principles. The first is that audio and video can be delayed variable amounts. The second is that total audio delay must be within one frame of the total video delay. The first assumption holds for exact lip sync, while the second provides for periods of minimal viewer distraction. The Time Machine can be run in either an automatic or manual mode and can be disabled for segments that cannot be changed (commercial spots). Pitch/motion sensitivity can be adjusted to speed up or slow down time accrual.

The unit cannot be used to make up ridiculous amounts of time in a short period, and based on on-board memory, maximum accruals are limited. However, the unit can be used effectively to change the timing of segments with minimal video and audio degradation. In general, the unit is capable of shifting time by one second per minute or 30 seconds in 30 to 60 minutes. This level of time shifting produces minimal degradation in quality. Larger shifts are possible, but can effect quality. Depending on the circumstances involved, however, the impairments may be acceptable for short durations. ■

Bill Hendershot is president and founder of Prime Image, Saratoga, CA.



For more information on the Time Machine, circle (151) on Reply Card.



Internet: be@intertec.com

CompuServe: 74672,3124

FAXback: 913-967-1905

FREE 44pg Catalog & 80 Audio/Video Applic.
PWR SUPP. EQ. TEST PRODUCTS
PHONO, MIC, TRANS. ACM, TAPE, VIDEO, LINE, OSC PRESS BOXES

1-in/8-out Video/Audio
1-in/16-out Video/Audio
2-in/24-out Audio Only
1-in/32-out Video/Audio

Video & Audio Dist. Amp's
RGB-Sync Dist. Amp's
Routing Switchers

OPAMP LABS INC (213) 934-3566
1033 N Sycamore Av LOS ANGELES CA, 90038

Circle (47) on Reply Card

MEANT FOR MULTIMEDIA

NEW!

DIGITAL DESKS™
By Winsted



From the pioneer in multimedia furniture, designed specifically for the most popular editing and production systems, both linear and non-linear. Ergonomically designed curved work surface. Models designed for *Matrox*, *Pinnacle*, *Fast*, *ImMIX* or other video systems.

- Adjustable monitor shelves • Sizes from 48" to 94" wide
- Black granite laminate surface • Accent trim to complement your electronics

For full details call toll free:

1-800-559-6691

Fax Toll Free: 1-800-421-3839

Winsted®

Preferred by Professionals Worldwide

10901 Hampshire Ave. So. • Minneapolis, MN 55438

Circle (45) on Reply Card



Extend Your Serial Digital Signal with GEPCO VSD2001

UL Listed Type CM
Flame Retardant PVC

Cellular Polyethylene Dielectric

Double Shield
95% TC Braid
100% Alum./Polyester

18 gage
BC Center
Conductor

Gepeco's Video Serial Digital cable outperforms traditional precision video cable because it has a larger center conductor and dielectric which means lower attenuation at higher frequencies. This enables you to make longer cable runs.

The RG/6 Type VSD2001 is suitable for all serial digital applications, post production, TV studios and HDTV. It is a stock item available in bulk lengths, various colors and can be connectorized and custom-cut to your length requirements. All Gepeco cable is made in the U.S.A.

1-800-966-0069

Ask your sales representative for a VSD2001 sample
Cable to carry you into the next millennium



GEPCO INTERNATIONAL, INC. 2225 W. Hubbard, Chicago, IL 60612
312-733-9555 Fax 312-733-6416 TOLL-FREE: 1-800-966-0069

Circle (46) on Reply Card



Acrodyne Au60D 60kW UHF TV transmitter

The klystron UHF TV broadcast transmitter set the precedent for 60kW of visual power back in the early 1980s. Generally, this was accomplished with one tube for the visual and another of the same kind for the aural. Although the klystron has always boasted long tube life, it is terribly inefficient (even with pulsing) and consequently extremely expensive to operate. With so many klystron transmitters in the field, the setting was fertile to find a better way.

The klystrode was the first klystron replacement of any consequence because it moved the class of operation from A to AB — a definite step in the right direction, but fraught with life problems. It was soon replaced with another supplier's equivalent, the *inductive output tube* (IOT). The IOT has been successfully marketed and well-supported by the OEMs using it, but it has had its share of performance and life problems. After five years, it is showing a slow average life improvement as its manufacturer identifies solutions to its problems.

Another player is the MSDC, which shows significant improvement in power efficiency over the klystron, but has been given little support by the industry in general. The MSDC's multiple collector layers also require a complex power supply design.

It is no secret that most UHF TV transmitter manufacturers have opted for the IOT and that dozens are on the air, but even if the tube provided the reliability expected of it, it still has the drawback of not being able to provide the 60kW power level set by the klystron when used in combined amplification. When the klystron reached 60kW, it did so by amplifying only the visual signal. Since then, the trend has been away from separate visual and aural transmitters, so the real challenge has been to do the same thing with one tube in common amplification. All tubes have fallen short of this goal until recently.

A new approach

Physics dictates just how far the state of

an art may go. In the case of the UHF tetrode, this limit appears to be around 55kW peak envelope power without undue compression and distortion. If two major signals are being amplified by a tube like this and their relative power levels are that of the NTSC format (i.e., aural 10% of peak-of-sync), then the highest peak-of-sync signal possible with a tetrode is 31.5kW in common amplification. To go any higher would require more than one tube, or a different approach altogether.

The Acrodyne Au60D takes the different approach. With a tetrode-like tube, the physical limit leading to power-handling capability of the tetrode can actually be doubled without changing any of the tube voltages except the filament. Figure 1 shows the new approach in the form of a comparison between the tetrode and its advanced-concept, double-power tetrode (or *Diacrode*, as it is called).

The Diacrode is not complete without an external cavity connected across its output elements, i.e. between the anode and screen grid. This is a small, DC-blocked cavity that rests on top of the tube. It is a quarter-wave transmission line measured from the top of the cavity to the vertical center of the tube. It is shorted at the top, reflecting an open circuit at the vertical center of the tube. This places an RF open circuit or current minimum at the vertical center of the tube, with a current maximum at the base of the tube like the tetrode, but with a second current maximum above the tube at the cavity short-circuit. This second current maximum is impossible in the plain tetrode, because in the tetrode, the RF current must go to zero at the top end, away from the base end where no connections are made. (If no connections are made, this is an open circuit condition, and the current must go to zero at the top.)

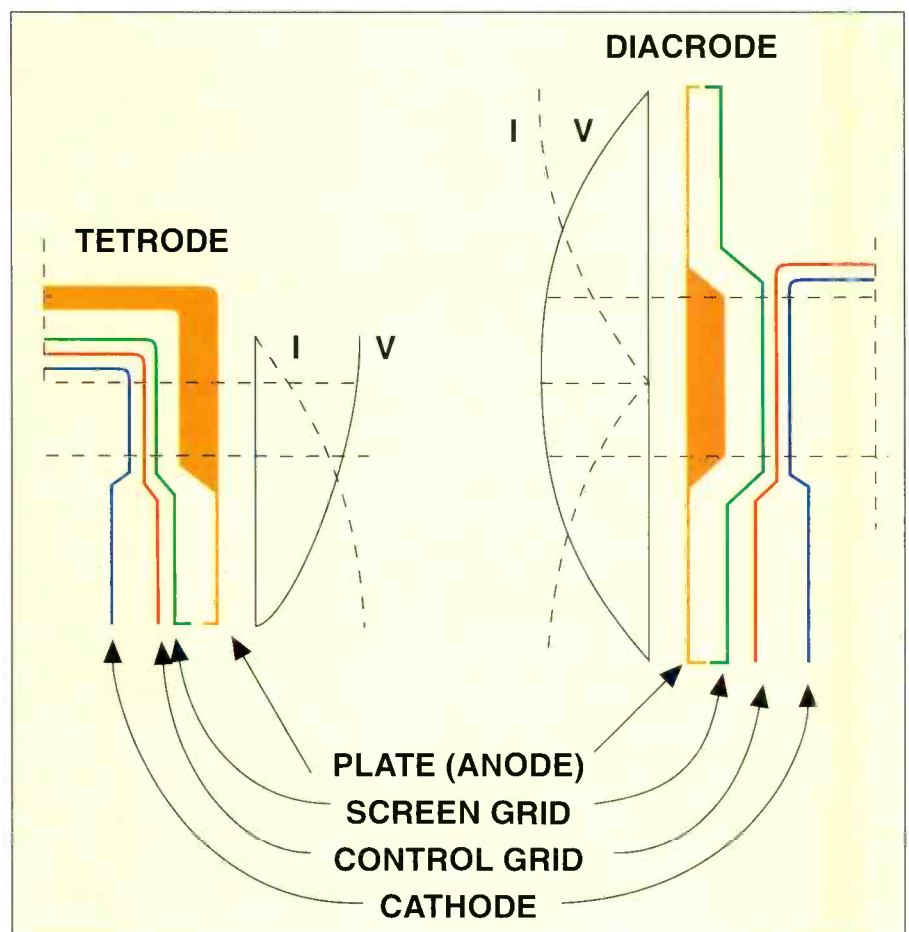


Figure 1. Cutaways of the tetrode and Diacrode comparisons are shown above. The Diacrode is not actually twice as high as the tetrode, but it appears that way electrically because of the Diacrode's upper reflective cavity. Note that RF current (I) peaks above and below the Diacrode's center, while on the tetrode it peaks only once at the bottom.

With two current maximums, the RF power capability of the Diacode is double that of the equivalent tetrode, while element voltages are the same. This is not to say that twice the power comes from doubling the efficiency of the tetrode, but rather that the efficiency is the same (as governed by the AB class of operation) and the DC current is twice that of the tetrode. All other properties and aspects of the Diacode are the same as the tetrode. Gain is typically 14.5dB, heater or filament voltage is twice that of the tetrode (10V at 180A), but anode voltage remains at 8,500V while screen grid voltage is essentially the same at 600V. Control grid bias voltage is the same at about -120V and

Introducing The First Affordable

Go-Anywhere Satellite Phone

The RF-power capability of the Diacode is double that of the equivalent tetrode.

adjusted for 3A of anode idle current.

Therefore, this tube only requires 8,500V and produces 50% more power than the 32,000V IOT in common amplification. Furthermore, because of this low voltage, it doesn't require a crowbar or similar circuit. It is the only technology that stands up to the precedent set by the klystron, and does it with true class AB efficiency.

At this time, there isn't any other way to do this without using more than one tube. Incidentally, this tube weighs only 14 pounds, and replacing it doesn't involve detuning any cavity sections, because the tube is placed externally above the cavity. Its expected life is greater than 20,000 hours, and it is priced at \$25,500. A little arithmetic will display the savings compared to other designs over the life of a transmitter operating at 60kW.

The transmitter

A full 60kW UHF TV transmitter (the Au60D) has been developed around the Diacode, providing 63kW peak-of-sync and 6.3kW of aural power. (The extra power is designed to accommodate output filter losses.) Coupled with new solid-state driver amplifiers (which are capable of twice the power for a given amount of heat-sink real estate as previous designs), the 60kW transmitter only occupies four more inches of floor length than a typical 30kW tetrode transmitter; all other dimensions are the same. Of course, the power



This is not a cellular phone. This is the latest in satellite communications technology that works virtually everywhere in North America and hundreds of miles off-shore.

No roaming complications or expenses— the SKYCELLSM

Service Satellite Phone works directly off of the SKYCELL Service satellite and with the public telephone network.

Make and receive calls as easily as with the phone in your home or office. Have the mobile unit installed in your

vehicle or get the self-contained briefcase size transportable model pictured here. Either way, you will never be out of touch again. Call for more info or to place your order.



Transportable Model

1 - 800 - 872 - 6222
ext. 1046

SKYCELLSM

Satellite Telephone Service

Circle (48) on Reply Card

supply is larger, but it remains comparable to any other 60kW supply, either dry or oil-filled. The heat exchanger is twice the size of the 30kW transmitter because twice the heat is generated. It may use a single distilled-water loop for indoor operation or a double loop for an outdoor installation.

Drive required ahead of the interstage bandpass filter is about 2,500W peak-of-sync, which is a respectable power level using the PA bypass option if the PA needs maintenance (unlike the approximately 400W available with an IOT). You don't need another tube to give you minimum backup power, but if you want it, it isn't difficult to show that over the life of the transmitter, the cost of replacing two Diacrodes will be significantly less than replacing any other power-tube type. Assuming only one Diacrode is used, however, and based on 20,000 hours of life for any tube type, across a 20-year lifespan (175,200 hours), the cost to replace IOTs (in sets of two for 60kW output) is \$665,760, while the cost to replace Diacrodes is only \$219,000.

Because the Diacrode is new, it may have a latent problem somewhere down the road, but no indications of this have become

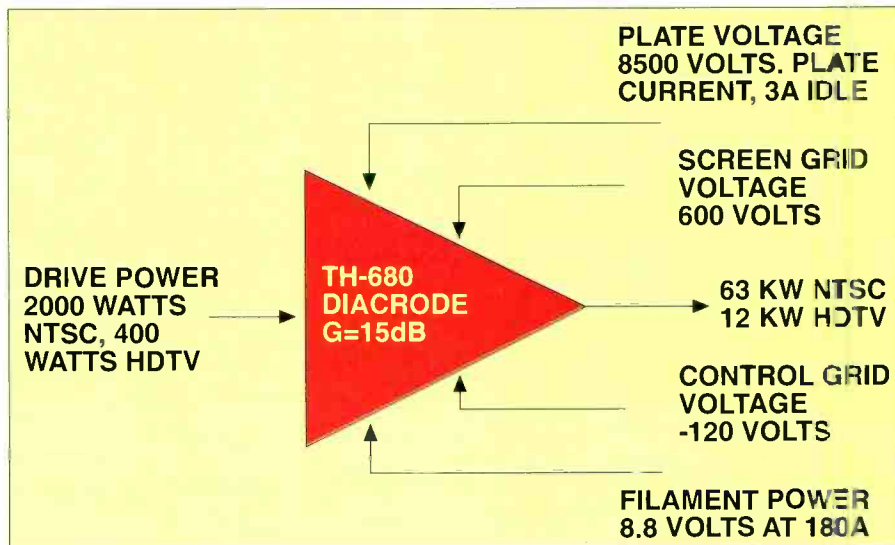


Figure 2. Diacrode support voltages and currents are shown.

evident. There were some start-up problems with the first transmitter, but they were not tube-related. Because so many new components were involved in its design, it was difficult to determine where initial problems came from. For example, at first the upper-cavity tuning seemed to

indicate a bad tube while operating at black picture, but this turned out to be incorrect. Retuning the cavity made everything work fine. Confidence was high, and it was decided to perform a blanking-level heat run at 63kW peak-of-sync and 6.3kW aural power for 24 hours. The entire trans-

**We gave them a year to copy us...
and they still didn't get it right.**



For more information call: 1-800-528-8601 (Upon request enter product code 29)
One Panasonic Way, Secaucus, NJ 07094.

mitter performed magnificently with no failures and no degradation in performance, nor did any parameters or currents drift at all. In addition to all of the other video and audio parameters, the in-band IMD remained constant at an average of -56dB for modulated ramp video and aural pilot protection remained at -48dB at f_H and -42dB at $2f_H$, with all residual modulation out to

Over the life of a transmitter, the cost of replacing Diacrodes will be significantly less than other designs.

200kHz below 7%. Approximate ambient temperature in the room was 32°C.

New introductions are always at risk, and no one likes to make claims prematurely, but the Diacrode transmitter shows every indication of being a well-thought-

out, mature innovation that will prove itself over time. Heat is the great destroyer of transmitters, and unexplainable hot spots just don't exist in this approach. Every BTU is explainable and accounted for, and these numbers point to a successful product that cannot be dismissed simply because it's new. The homework has been done, and there are no unknowns in the equation of tube life.

The product's future

The Diacrode certainly seems to have a bright future in setting a new power and performance standard. Because it is basically a tetrode, it has all the linearity properties of a tetrode enjoyed by only VHF users until now. Required correction is no different than the VHF tetrode, which is far less demanding than the klystron and all of its derivatives.


Digital transmission tests have been run on the Diacrode, and the results have been presented in Europe and the United States, most recently at the IEEE BTS Symposium in Washington, DC, in September. Results are quite good at an average power level of 18kW. A paper written by Michel Langlois of Thomson Tubes Electroniques is avail-

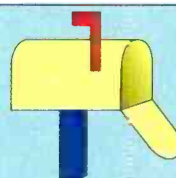
able from Acrodyne.

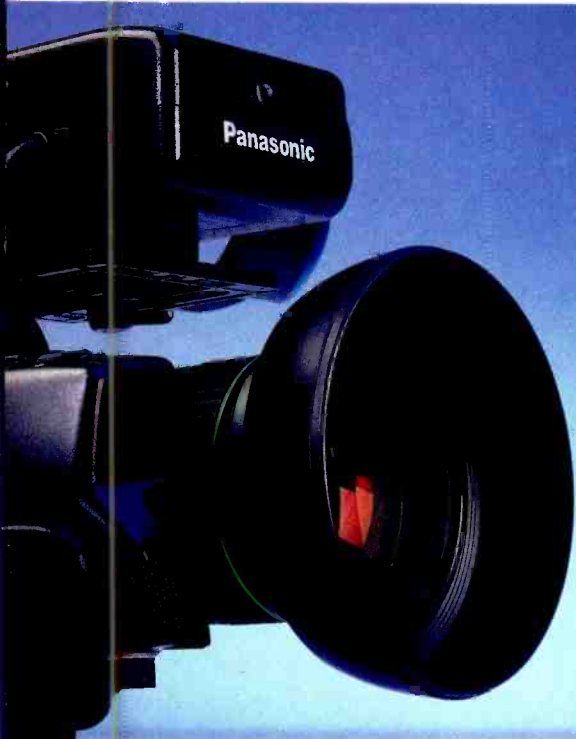
If you haven't yet replaced your old klystron transmitter, the decision process just became a little more difficult with the introduction of the Au60D — or maybe it just became a lot easier. ■

Timothy P. Hulick is vice president, engineering at Acrodyne Industries, Blue Bell, PA.

Diacrode is a registered trademark of Thomson Tubes Electroniques.

 For more information on the Acrodyne Au60D, circle (155) on Reply Card.

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



© 1995 Matsushita Electric Corporation of America

The WV-F565 DSP Camera. Still no competition.

When it was introduced, Panasonic's WV-F565 Digital Signal Processing camera set new performance levels with its outstanding resolution, high signal-to-noise ratio and innovative digital processing features. Now, a year later, the WV-F565 still has no real competition.

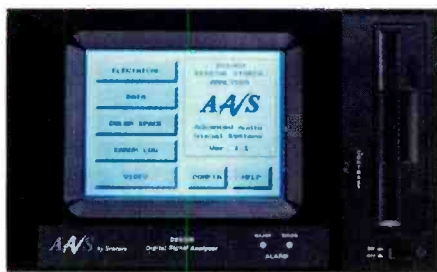
Other DSP cameras that rival the WV-F565's performance carry dramatically higher prices. The other cameras introduced to compete with the WV-F565 are still analog. It's well-nigh impossible to replicate the performance made possible by the WV-F565's digital signal processing package at anywhere near its suggested list price of \$8,000.

Imitation may be a sincere form of flattery, but compared to the WV-F565, it's still only an imitation.

Key Features: 10-bit digital processing, FIT chip, 65 dB S/N, 1 lux minimum illumination, 850 lines horizontal resolution, J8 at 2000 lux, 600% highlight compression



Panasonic
Broadcast & Television Systems Company
The Official Broadcast Equipment
of the 1996 Olympic Games.



AAVS DSA309 digital studio analyzer

Digital video processing, storage and transmission have undeniable advantages over conventional analog methods. The near transparency of dubbing in the digital domain, coupled with the seemingly endless variety of special effects, have made digital video indispensable in post-production and increasingly prevalent in broadcasting. Although digital video has eliminated many problems common in the analog environment (generation loss, noise, crosstalk and others) digital video is not as problem-free as you would like to believe. Incompatibilities between different manufacturers' equipment, equipment that does not meet published specifications or accepted standards, mechanical/wiring problems, and old-fashioned breakdowns have challenged the engineering staff of many facilities.

Problems with digital video

In theory, digital video should be flawless. However, in reality, a variety of intermittent and interface problems exist in digital systems. Unlike analog specifications, digital specifications are new and are not always fully understood. In addition, while most analog video system problems affect picture quality and are readily apparent, most digital video system problems manifest themselves during processing and transmission, and rarely, if ever, affect the picture; that is, until the faulty digital video causes a complete loss of picture.

AAVS, a subsidiary of Sencore, recognized this and has developed and introduced a line of test instruments to evaluate digital video system performance and determine the level of deviation from standard specifications. These units can determine the quality of the digital transmission and provide a warning before a failure occurs. The latest instrument to be introduced, the DSA309 digital studio analyzer, not only provides detailed displays depicting measurements of critical digital video signal attributes, but also incorporates conventional analog displays (waveform and vector). This was done to help bridge the gap between analog and digital technologies and make it easier for

the technical support staff to transition from the analog to the digital environment.

Digital video (composite and component) is transmitted in two basic formats; parallel and serial. The mechanical difficulties of parallel cable, along with the length limitations of parallel transfers, have made serial interfaces the method of choice. Parallel connections in new installations tend to be used only for extremely short runs, usually between equipment lacking serial interfaces. Serial routing switchers and parallel-to-serial converters are rapidly becoming standard in digital facilities. The DSA309 provides all of the tests and measurements necessary to evaluate serial data transmission. (Other AAVS products, such as the S310, provide parallel digital video testing.)

Critical test attributes

What follows is a list of critical test attributes within a serial digital video system. These need to be monitored and tested to ensure the smooth operation of any digital video facility.

- **Signal jitter:** Serial digital video is transmitted on a single line, without a separate reference clock. The receiving instrument must capture the signal and derive a reference clock from the datastream. To facilitate this, an NRZI (non-return to zero inverted) system is used, maximizing transitions and

enhancing clock recovery. At transfer rates of up to 270Mb/s, variations in the point of the transitions can cause havoc at the receiving end, rendering the receiving instrument useless (or error prone) by defeating its ability to recover the proper data from the serial stream. (See Figure 1.) Furthermore, jitter errors can introduce signal non-linearities that can directly affect the final product (picture). The serial digital video interface is described under SMPTE 259M. The maximum allowable jitter on the serial datastream is 0.50ns (+/-0.25ns) measured over the period of one horizontal line. The DSA309 measures high- and low-frequency jitter and warns the operator in the event that jitter exceeds preset limits.

- **Amplitude measurements:** In contrast to slower-speed data transfers where checksums and handshaking procedures allow errors to be detected and the data resent, high-speed serial digital video transmission provides no error-correcting protocol. As a result, it becomes imperative to monitor the signal's electrical characteristics, including peak-to-peak voltage, DC offset and common mode voltage to ensure the transmission is free from electrical problems. These problems can cause intermittent operation and/or total failure. The DSA309 monitors these parameters and permits the operator to set alarm threshold trigger limits.

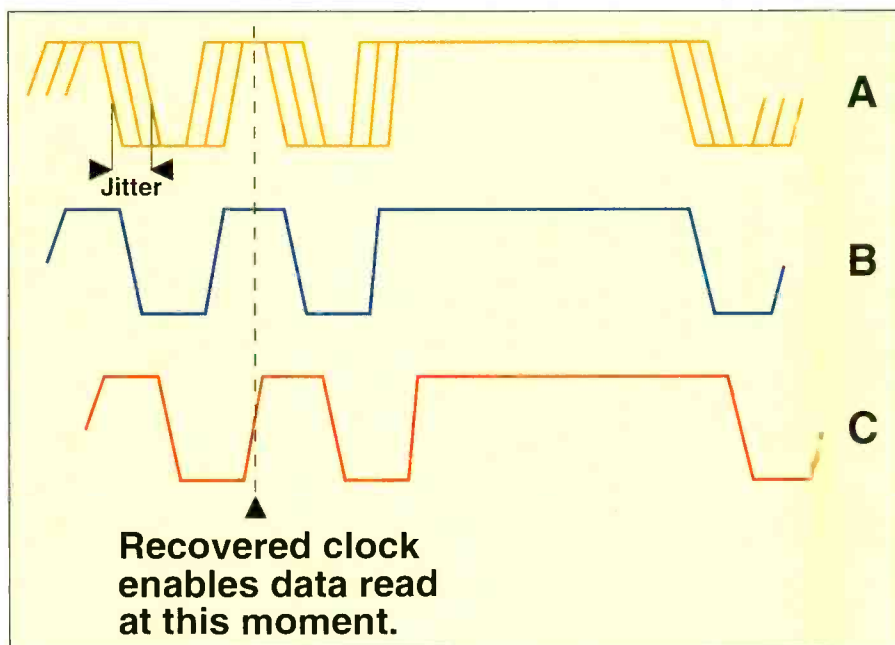


Figure 1. Figure A depicts serial data with jitter. Figures B and C represent possible deviation due to jitter. The recovered clock enables data to be read correctly (B). However, jitter can cause errors in the recovered clock, resulting in data being read incorrectly (C). Reading data during a transition destroys data integrity and produces unwanted errors.

Top photo: The DSA309 is one of the latest test instruments from AAVS.

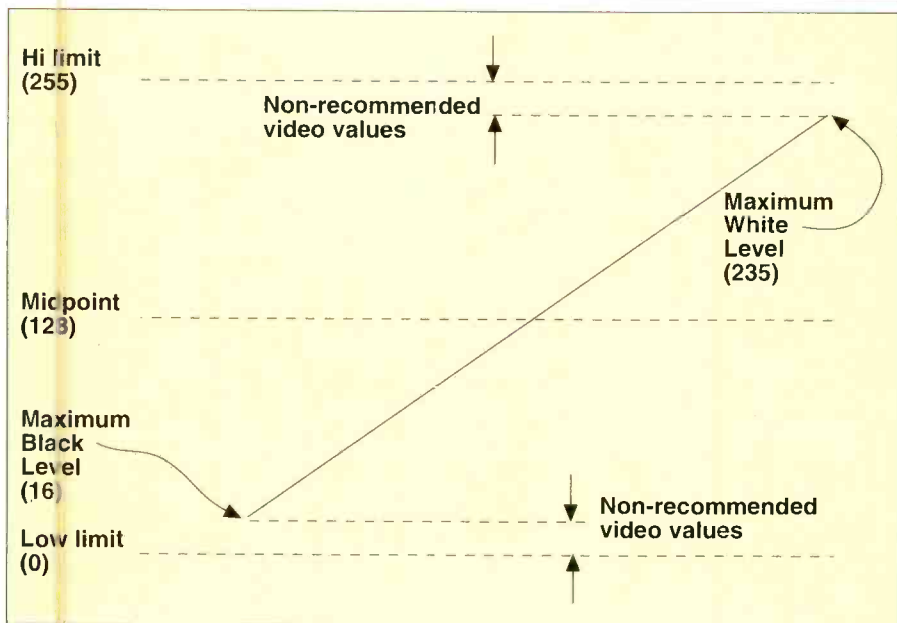


Figure 2. Non-recommended video values have been determined due to their "close" digital nature to reserved code numbers. These restrictions reduce color and luminance headroom. When these limits are exceeded, the result is possible errors in the digital video data.

- **Bit activity indicators:** All serial digital video data is derived from (and translated back to) parallel digital video. One common problem is the failure (either shorts or opens) of the parallel transmission lines. The DSA309 provides bit activity indicators to monitor the serial datastream for "stuck" bits, providing the operator with a warning in the event of a failure.

- **Datastream errors:** In addition to the electrical "carrier" of the data, the actual datastream can contain errors that can adversely affect quality. Timing reference signal (TRS) codes are used with preambles (reserved digital words) to signify the start and end of active video. The presence of reserved codes during active video can cause some equipment to react as if a sync period has arrived, causing false sync triggering.

The DSA309 continually monitors for the presence of reserved codes during active video and indicates their presence. In addition, by connecting a monitor to the test output of the DSA309, the location of these reserved codes can be determined. The position is indicated on an external color monitor, allowing an analysis of the position of the reserved code in relation to picture elements. In addition to monitoring reserve code placement, the DSA309 also monitors and warns the operator regarding non-recommended values. (See Figure 2.)


The DSA309 also provides full error-detection handling (EDH) compatibility. EDH is detected and pre-existing error flags are displayed to warn the operator of possible errors detected in previous processing stages. EDH errors detected but not previously flagged are also displayed.


Additional analysis tools


Extensive analysis of the digital video transmission can be performed by using the DSA309's frame buffer. One full frame of video is stored and can be thoroughly analyzed by the operator — a bit-by-bit analysis can be performed if needed. Live video can be displayed on the DSA309's LCD screen for source identification purposes (SID). Built-in 8-bit D/As provide analog video outputs to an external monitor for detailed video inspection.

The user interface consists of a touch-screen LCD that eliminates the need for cumbersome and failure-prone controls while providing a user-friendly environment. A standard PC-compatible parallel port is provided for printing reports and user-selected information, while the built-in 1.44M disk drive allows the operator to store error reports for continuous off-site monitoring. The unit's firmware is field-upgradeable through the disk drive, permitting the easy installation of upgrades. This allows the DSA309 to keep up with the changing world of digital video, a feature designed into the DSA309 digital studio analyzer. ■

Jason Job is a member of SMPTE's jitter subcommittee and a design engineer for AAVS, Sioux Falls, SD.

 For more information on the DSA309, circle (150) on Reply Card.

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

 ShibaSoku

Test Equipment:
On the Mark
Every Time.



ACCURATE TEST EQUIPMENT

The ShibaSoku tradition of accuracy is demonstrated in a wide range of superior test instruments. Optimum ShibaSoku performance is demanded by top professionals all over the world in R&D labs and leading audio/video equipment, TV, VCR, disc and tape manufacturers. They look to Asaca/ShibaSoku for test equipment which offers many years of reliable, stable service. From digital, monoscope, and multi-standard generators, to color video noise meters, dropout counters, and audio analyzers, Asaca/ShibaSoku's precise and modular test instruments offer unparalleled accuracy and dependability.

ASACA[®]
The true measure of performance

ASACA/SHIBASOKU Corporation of America
12509 Beatrice Street, Los Angeles, California 90066
Telephone (310) 827-7144 Fax (310) 306-1382

Circle (59) on Reply Card

BUSINESS

Following its acquisition of ImMIX last year, **Scitex Corporation Ltd.**, Herzlia, Israel, has acquired **Abekas Video Systems** from Carlton Communications PLC for approximately \$52 million in cash.

Discreet Logic Inc., Canada, has acquired **The Brughetti Corporation**, Canada. In addition to accelerating Brughetti product development activities, the acquisition will combine distribution channels and local customer support resources.

Also, Brughetti has signed an agreement with **Time Inc., New Media** for the provision of graphics assembly, editing, library management and automated scheduling and transmission software for The News Exchange (TNX), North America's first News-On-Demand service.

FloriCal Systems, Gainesville, FL, has expanded to a larger office. The company's new address is: 1206 NW 8th Ave., Gainesville, FL 32601.

The ESPN cable sports network has ordered two **Vistek Electronics Ltd.** Vector standards converters to be installed at ESPN's Broadcast Center in Bristol, CT.

BSkyB, UK, has awarded **Drake Automation Systems** a turnkey automation and systems contract to refurbish the current BSKyB analog transmission facilities. The contract is based on the Drake Multichannel Automation System (D-MAS) managing under program and interstitial materials under automation control to the on-air Tektronix Profiles.

Videotek, Pottstown, PA, is expanding its research and development activities to Beaverton, OR. The Pottstown headquarters engineering group will continue to develop instruments and devices for analog and digital video users. The Northwest Design Center, focusing on emerging markets, began operation last August.

Pixel Power Ltd., UK, has sold two Collage CGs and a Collage to French public broadcaster **TF1**, Paris, France. The two Collage CGs were provided by TF1 for LCI, a 24-hour news and broadcasting channel. The Collage will be used in TF1's news studio.

NewTek Inc., Topeka, KS, and **DeskStation Technology** have announced a joint venture. The companies have created The NewTek Systems Group to provide a set of tools for 3-D graphics and desktop video

that allows for greater functionality and better performance. The first product from the new venture is the NewTek Raptor Designer, a LightWave workstation running the Digital Semiconductor 300MHz Alpha 21164 processor, a powerful Windows NT RISC-based processor.

Oren Semiconductor Ltd., Santa Clara, CA, has made available its OR43100, a new ghost canceler integrated circuit (IC) that performs more than 16 billion operations per second to remove ghost images from TV pictures.

Andrew Corporation, Orland Park, IL, has begun an automated fax-on-demand system. "Answers from Andrew" is a blend of interactive voice and fax that provides information, technical documents and news publications. By dialing 800-861-1700 (or 708-873-3614 internationally), anyone with a Touch-Tone phone and fax machine can access the system.

Sonosax S.A. has announced the second order of Stelladat digital recorders from **NHK** (Japan), making NHK one of the company's largest customers.

Thomson Broadcast Inc., Englewood, NJ, has announced the sale of five of its new 7830 motion-compensated standards converters to **NBC** in Asia.

Also, the company has sold a 9500 component digital switcher to **Roland House**, Virginia.

AMS Neve, UK, has sold a Logic 2 digital mixing desk to **Walt Disney Studios** for its new flagship facility.

Segue Services, Merrifield, MN, a low-power TV (LPTV) engineering and consulting firm is installing and testing equipment for a 17-channel LPTV system in Nebraska. Designed to broadcast scrambled programming, it is equipped with **Acrodyne** solid-state transmitters, a **Communications and Energy Corporation** combiner and a **Jampro** 6-bay, 24-panel broadband antenna system.

GEPCO, Chicago, has announced the installation of its cable in **LIFE Outreach International's** new media center in Euless, TX. Almost 66 miles of cable has been installed in the 84'x84' studio, three post suites, separate video and audio production suites, and a climate-controlled videotape library.

GWNS, Stamford, CT, has received a multi-year, multimillion dollar contract to handle program origination, playback and trans-

mission of **The Learning Channel (TLC)**.

Sony customers who purchase qualifying videocassettes from July 1 through Dec. 31, 1995 will be eligible to participate in the Sony Professional Media Betacam/D-2 Parts & Service Program and receive certificates for parts, service contracts, service training and/or technical bulletins for its Sony Betacam/D-2 video recorders. Qualifying products include BCT-MA series Betacam SP, BCT-D series Digital Betacam, BCT-G series Betacam, UVWT-MA series Betacam SP and D-2 series digital master videocassettes.

Canon's new DIGI-SUPER 70 lens was used by **ABC**, the first company to take delivery of the lens, at Giants Stadium during the Sept. 4 Monday Night Football game between the New York Giants and the Dallas Cowboys.

Euphonix, Studio City, CA, has announced the installation of its new CS2000B computerized console at WFLD-TV, Chicago. The WFLD Euphonix package includes the DSC digital studio controller and the CUBE automated routing matrix.

Quantel, UK, has sold its Paintbox to CBS and Classic Teleproductions, Cleveland. The company has also sold its Paintbox Express to Classic Teleproductions.

Also, **Future Media Concepts (FMC)**, New York, has been named the authorized North-eastern U.S. training center for Quantel's Editbox and Newsbox non-linear, on-line editing systems.

Video Production Systems (VPS), Miami, has signed an agreement with Paxson Communications Corporation to modernize eight TV stations that Paxson has recently purchased across the United States. The deal is expected to bring in approximately \$4 million in revenues for VPS over the course of the year.

Pixel Power Ltd, UK, has announced the purchase of six of its Collage systems, including a fully optioned Collage 2-D system with Ramcorder, to London's **QVC**, the shopping channel. All six Collages will be networked together using Ethernet to form the heart of a system known as L Gen, which will produce in excess of 300 detailed captions a day, live to air.

A fully equipped TV mobile unit, valued at approximately \$3.5 million, has been designed and equipped by **BTS** in Europe for The People's Republic of China. In July, it was delivered to **China Central Television**

(CCTV), the government-run broadcast organization headquartered in Beijing.

Also, NBC affiliate **KOB-TV**, Albuquerque, NM, is renovating its studio routing and control with a complete BTS system installation. The station acquired a Venus routing switcher with a 96 input/64 output and three levels of switching, including video and stereo audio. In addition, a Jupiter control system, Saturn master control switcher and several CP-3000 control panels were purchased.

Panasonic, Secaucus, NJ, has announced the sale of its D-5 digital component equipment to **General Television Network (GTN)**, Oak Park, MI. The equipment will be used for its on-line editing room, which sustains a 10-bit digital component format across the board.

Also, WNRW, Winston-Salem, NC, has purchased four AT-H1905DP digital monitors, a M.A.R.C. 100 automated record/playback system, 36 MII VTRs, two AQ-11D 3-CCD DSP cameras and seven field packages consisting of WV-F565 3-CCD DSP cameras docked to AU-45H MII recorder/players.

PEOPLE

Jeff Gierhart has become systems engineer for FloriCal Systems, Gainesville, FL.

Also, **Alan DeVaney** has been named director of sales for FloriCal.

Michael MacDonald now serves as director of product marketing for TimeLine Vista Inc., Vista, CA.

Also, **Cynthia F. Jones** has become the first marketing communications manager for TimeLine.

John Nemeth has been promoted to product support director of Solid State Logic, Oxford, England.

Roi Agneta has been appointed to the newly created position of vice president, strategic planning for Chyron, Melville, NY.

Michael Cox, consulting director of Vistek Electronics, has been awarded a Fellowship of the Society of Motion Picture and Television Engineers (SMPTE). The award was made in recognition of Cox's contribution and achievements to the TV industry.

Glen Green has been appointed southwest regional sales manager and general manager, southwest operations for Quantel.

Richard A. Cooper has joined the sales staff of Tekniche, Northvale, NJ.

Also, **Richard Zabel** has become eastern sales manager of Tekniche.

Arthur W. Allision III has become a senior engineer with the National Association of Broadcasters, Washington, D.C.

Gary Schurte has been appointed as manager of the central United States sales region for Accom, Menlo Park, CA.

After 15 years in the telecommunications industry, **Howard N. Miller** has retired from the Public Broadcasting Service (PBS).

Rick Lamb has become an application manager for switching products for BTS, Simi Valley, CA.

Also, **Eric Fabianac** has become director of operations for the company's Salt Lake City manufacturing and development facility for BTS. ■

Tapeless Technology in Radio Applications - the Users Point of View

SYPHA has published the results of an extensive survey into the use of tapeless technology for cart replacement, station automation and production. More than 500 radio stations in the United States and United Kingdom took part and the issues examined include:

- Awareness and opinion of systems and technology
- Reasons for system selection and purchase
- Expectations of system performance
- Operational and technical support
- Applications and features required
- Investment decisions and future plans
- Sources of information and advice

Broadcast Engineering magazine, AMS Neve, Basys, Broadcast Electronics, Computer Concepts, Harris Allied, Korg, RCS, Sony and Studer Digitec provided the sponsorship necessary to conduct the survey. However, the method and results were independently managed by SYPHA.

SYPHA specializes in providing consultancy and research services on the use of random access technologies for audio and picture recording, editing and replay. Other publications available from SYPHA include:

- **The Nonlinear Buyers Guide** - a buyers guide to random access video systems covering nonlinear and mixed mode editors, digitizing cards and software, video disks, video servers and RAM stores;
- **The Tapeless Directory** - a buyers guide to digital audio workstations covering production, post production, cart replacement and station automation systems.

Broadcast Engineering readers are entitled to a reduced price of \$325 (reg. \$380). To order your copy of *Tapeless Technology in Radio Applications - the Users Point of View*, enclose this ad with your order and mail to:

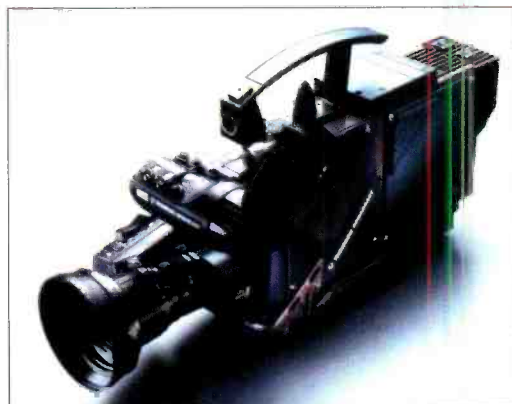
SYPHA, 216A Gipsy Road, London, SE27 9RB, UK
or telephone +44 181 761 1042, fax +44 181 244 8758

Circle (400) on Reply Card

Portable camera Thomson Broadcast

• 1657: a camera featuring high-performance 600,000-pixel $\frac{2}{3}$ -inch CCD sensors that are fitted to the 1657 WIDE FX for 16:9 operation; the dual format camera has a switch selector, 16:9 or 4:3, providing pictures of outstanding quality; a pixel correction feature ensures complete uniformity of black level, regardless of the shooting conditions; the user may choose the color temperature, ranging from 2,500°K to 9,900° in 100° steps avoiding the use of colored optical filters and improving the camera's sensitivity; the 1657 incorporates digital technology to ensure better reproducibility and stability of the camera adjustments; digital adjustments are available in three modes: basic, custom and maintenance.

Circle (350) on Reply Card



Digital video analyzer SyntheSys

• DVA184: a digital video analyzer that measures the quality of a serial digital video signal; it can generate still test images, log error events and complete errored frames; the output can be live input or images from the internal frame buffer; either output can be corrupted with bit errors as well as varied amounts of jitter; trigger events can be defined and automatic errored frame logging to the internal disk drive will occur; analysis includes jitter histogram, component waveform, component histogram, jitter frequency, error detection and handling and much more.

Circle (351) on Reply Card

Surround-sound system Soundcraft/Interact Systems

• DC2020 Surround: a built-in surround-sound system based on the same format as Magtrax TV, a multifunction monitoring panel designed as an outboard device; DC2020 Surround is available in 24-, 32- and 40-channel in-line formats (with or without patchbay), and features 4-band split semi-parametric EQ, six flexible auxiliaries and the unique Soundcraft "floating bus" routing system; the C3-based automation encompasses motorized faders, SMPTE-driven automated cuts and aux sends, with integrated machine control for popular audio multi-tracks as well as 9-pin VTRs; the console offers straightforward connection to 4-, 5- and 6-channel surround-sound systems with integrated monitoring, routing and dual LCRS panners; processor-controlled replay/direct switching, calibrated monitor level adjustment and assignable speaker cut groups add to the console's flexibility.

Circle (352) on Reply Card



Diversity receivers Sennheiser

• EM2004-UHF and EM2004-VHF: diversity receivers that can be tuned to one of 16 preprogrammed channels; with a total bandwidth of up to 24MHz, the EM2004-UHF spans four U.S. TV channels; the EM2004-VHF's bandwidth of up to 4MHz is capable of spanning a TV channel band edge; these bandwidths allow the receivers to be used virtually anywhere in the world; matching transmitters include the SK50-UHF, SK50-VHF and SK250-UHF body packs, and the hand-held SKM5000-UHF and SKM1032-VHF; systems are available in frequencies ranging from 450MHz to 800MHz for the UHF range or 168MHz to 216MHz for the VHF range.

Circle (353) on Reply Card

Continued on page 96

FOR ORDERS CALL:

800-947-9928
212-444-5028

OR FAX (24 HOURS):

800-947-9003
212-444-5001

OVERNIGHT AND RUSH SERVICE AVAILABLE

E-Mail at 7623.570@compuserve.com

Visit our newly expanded Video Store
and Computer Video Showroom

SONY

EVW-300 3-CCD Hi-8 Camcorder

- Equipped with three high density 1/2" IT Hyper HAD image sensors. Has an excellent sensitivity of F8.0 at 2,000 lux, high S/N of 60 dB, and delivers over 700 lines of horizontal resolution.
- Provides high quality PCM digital stereo and single channel AFM Hi-Fi recording. Has XLR balanced audio connectors.
- Quick start 1.5" viewfinder with 550 lines of resolution plus Zebra pattern video level indicator and color bar generator. Also, quick-start recording – takes only 0.5 seconds to go from REC PAUSE to REC MODE for immediate recording in the field.
- Built-in 8mm Time Code generator records absolute addresses (Either non-drop frame or drop frame mode may be selected.) Furthermore the EVW-300 incorporates a variety of time code features such as Time Code PRESET/RESET, REC RUN/FREE RUN and User Bits.
- A variety of automatic adjustment functions for different lighting conditions are incorporated into the EVW-300:
 - ATW (Auto Trace White Balance) – when ATW is turned on optimum white balance is always ensured during recording, even for changes in color temperature. Conventional white balance adjustment is still provided with the Auto White Balance.
 - AGC (Automatic Gain Control) – in addition to manual Gain Up AGC provides Linear gain up in the range of 0 dB to 18 dB.
 - Intelligent Auto Iris – for situations where the lighting between subject and background is different (subject is underexposed) the Intelligent Auto Iris automatically examines the scene and adjusts the lens iris for proper exposure.
- Selectable Gain-up from 1 dB to 18 dB in 1 dB steps for Mid and High positions.
- Clear Scan function – provides a variety of selection of shutter speeds ranging from 60-200 Hz allowing recording of almost any computer display without flicker.
- Compact, lightweight (12 lbs with NP-16) ergonomic design provides well balanced and extremely comfortable operation.



Quick-Draw Professional FOR CAMCORDERS OR STAND ALONE CAMERAS

The Quick-Draw Camera Case provides a convenient way to carry and protect your camera on the ground, in your car and in the air. While much lighter and more compact than shipping cases, this padded nylon case has hard-shell construction and an aluminum viewfinder guard for 100% protection and security. It is particularly designed for working out of the back of a van or the trunk of your car. The top loading case has a wipe-open fold back top that stays out of the way.

FEATURES:

- Heavy-duty shoulder strap and comfortable leather hand grip.
- Crush proof aluminum guard protects viewfinder.
- Fits into back seat and fastens securely with seat belt.
- Holds camera with on-board battery attached.
- Lid closes with Velcro for quick opening or secures with full-length zippers.
- Two trim exterior: pockets and clip board pocket.
- Dual purpose rear pouch is an expandable battery chamber or all-purpose pocket.



antonbauer

Logic Series DIGITAL Gold Mount Batteries

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



DIGITAL PRO PACS

The Digital Pro Pac is the ultimate professional video battery and is recommended for all applications. The premium heavy-duty Digital Pro Pac cell is designed to deliver long life and high performance even under high current loads and adverse conditions. The size and weight of the Digital Pro Pac creates perfect shoulder balance with all cameras/camcorders.

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

DIGITAL COMPAC MAGNUM

Extremely small and light weight (almost half the size and weight of a Pro Pac), the powerful Digital Compac Magnum still has more effective energy than two NP style side-in batteries. The high voltage design and Logic Series technology eliminate all the problems that cripple conventional 12 volt side-in type batteries. The Digital Compac Magnum is the professional choice for applications drawing less than 24 watts. Not recommended when using an U1 raliight.

- **DIGITAL COMPAC MAGNUM 14 LOGIC SERIES NICAD BATTERY** 14.4 v 43 Watt Hours. 2 3/4 lbs. Run time: 2 hours @ 20 watts, 3 hours @ 13 watts
- **DIGITAL COMPAC MAGNUM 13 LOGIC SERIES NICAD BATTERY** 13.2 v 40 Watt Hours. 2 1/2 lbs. Run time: 2 hours @ 18 watts, 3 hours @ 12 watts

GOLD MOUNT BATTERIES

The Logic Series Gold Mount batteries are virtually identical to their respective DIGITAL versions (above) with respect to size, weight, capacity, IMPAC case construction, and application. They are similarly equipped with micro-code logic circuits and comprehensive ACS sensors that communicate directly with all Logic Series chargers, providing the essential data critical for optimum performance, reliability and long life. They do not, however, include DIGITAL microprocessor features such as the integral diagnostic program "Fuel Gauge", LCD/LED display and InterActive viewfinder fuel gauge circuit.

- **PRO PAC 14 NICAD BATTERY** (14.4v 60 Watt Hours)
- **PRO PAC 13 NICAD BATTERY** (13.2 v 55 Watt Hours)
- **MAGNUM 14 NICAD BATTERY** (14.4v 72 Watt Hours)
- **MAGNUM 13 NICAD BATTERY** (13.2 v 66 Watt Hours)
- **COMPAC MAGNUM 14 NICAD BATTERY** (14.4v 43 WH)
- **COMPAC MAGNUM 13 NICAD BATTERY** (13.2v 40 WH)

MP-40 DIGITAL FAST CHARGER w/LCD and DIAGNOSTIC PORT

The most advanced and versatile Anton/Bauer charger. In addition to features such as four-position one-hour sequencing fast charge, five fast charge termination systems, it also has:

- SSP (Selective Sequence Programming) which automatically arranges the charging order among the 4 batteries to assure fully charged batteries in the shortest time possible.
- Multifunction LCD checks each of the four battery positions and indicates charge status, available capacity, battery type/aging, percent of maximum charge, battery serial number, date of manufacture, accumulated charge/discharge cycles and other data.

JVC

KY-27C 3-CCD Color Video Camera



- New 1/4" CCDs with 380,000 pixels (360,000 effective) with advanced electronics delivers resolution of 750 horizontal lines and reduced smear.
- Sensitivity of 1/9.0 at 2000 lux. Min. illumination 7.5 lux with f/1.4 lens, +18dB.
- LOLLUX mode allows shooting scenes that were previously impossible due to insufficient lighting. CCDs are maximized for low light sensitivity equivalent to an electronic gain of 24dB plus a JVC pixel readout system which provides an additional 6dB. Together they provide +30dB without the noise and picture degradation normally associated with this much gain. Excellent color balance is maintained even down to 1.5 lux illumination.
- Auto Shooting Mode where you only have to zoom, focus and record. All other parameters are controlled automatically.
- Enhanced ALC (Automatic Level Control) mode for continuous shooting in all light levels. This allows continuous automatic focusing from dark interiors to bright outdoors. Also features an aperture priority mode. Manually set iris for desired depth of field, and ALC circuit automatically achieves correct video level.
- The Multi-Zone Iris Weighting system gives preference to objects in the center and lower portions of the picture. The Automatic Peak/Average Detection (APB) provides intelligence to ignore unusual objects such as bright lights.
- Auto knee circuitry extends a scene's light to dark dynamic range reproduction by up to five times without overexposure.
- Has large 1.5-inch viewfinder with 500 lines of resolution and SMPTE color bars. Status system provides auto levels, accumulated or remaining recording time and VTR operation. Also battery voltage and camera setup. Zebra pattern indication and safety zones with a center marker are also provided.
- Equipped with Variable Scan function. This allows flicker-free shooting of computer screens. Variable scan enables a precise shutter speed from 1/60.2 to 1/196.7 of a second in 256 increments to be set, matching a computer's scan rate. Almost any computer display can be clearly recorded.
- Star filter creates dramatic 4-point star effects. Users can also select from a wide range of optional filters.
- Advanced Memory System (AMS) stores customizable settings for various shooting conditions.
- Docks directly to the JVC BR-S422U, BR-S411UB and BR-S420CU professional S-VHS recorders. Optional adapters for docking to Hi-8 and Betacam SP are also available.

Vinten

THE ADVANCED RANGE OF VISION LIGHTWEIGHT HEADS AND TRIPODS



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

The Vision SD 12 and SD 22 are the first heads with the "Serial Drag" pan and tilt system. The system consists of a unique, permanently-sealed fluid drag and an advanced lubricated friction drag. So for the first time, one head gives you all the advantages of both fluid (viscous) and lubricated (LF) drag systems – and none of their disadvantages. Achieve the smoothest pans and tilts regardless of speed, drag setting, and ambient temperature. The Serial Drag system provides the widest range of infinitely variable precise settings with repeatable, consistent drag in each pan and tilt direction.

Features:

- Simple, easy-to-use external control for perfect balance.
- Patented spring-assisted counter-balance system permits perfect "hands-off" camera balance over full 180° of tilt.
- Instant drag system breakaway and recovery overcome inertia and friction for "excellent" "whip pans"
- Consistent drag levels in both pan and tilt axis
- Redesigned flick on, flick off pan and tilt caliper disc brakes
- Greater control, precision, flexibility and "touch" than any other head on the market.
- Touch activated, time delayed illuminated level bubble.
- Environmental working conditions from as low as -40° to as high as +60°C
- SD 12 weighs 6.6 lbs and supports up to 35 lbs.
- SD 22 weighs 12.7 lbs and supports up to 55 lbs.

Vision Two Stage ENG and LT Carbon Fibre ENG Tripods

The ultimate in lightweight and innovative tripods, they are available with durable tubular alloy (Model #3513) or the stronger and lighter, axially and spirally wound carbon fibre construction (Model #3523). They each incorporate the new torque safe clamps to provide fast, safe and self-adjusting leg clamps that never let you down. Two stage operation gives them more flexibility when in use as well as greater operating range.

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

Vision 12 Systems

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

SD-12A System

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

SD-12D System

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

SD-12LT System

- 3364-3 SD-12 Pan and tilt head
- 3219-52 Second telescoping pan bar and clamp
- 3363-3 Lightweight calibrated floor spreader
- 3425-3A Carry strap
- 3340-3 Soft case

Vision 22 Systems

All Vision 22 systems include #3386-3 SD-22 dual fluid and lubricated friction drag pan and tilt head, single telescoping pan and clamp with dual 100mm/150mm ball base.

SD-22E System

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

SD-22 LT System

- 3386-3 SD-22 Pan and tilt head
- 3219-52 Second telescoping pan bar and clamp
- 3383-3 Two-stage carbon fibre ENG tripod w/100mm bowl
- 3314-3 Heavy-duty calibrated floor spreader
- 3425-3A Carrying Strap
- 3341-3 Soft case

SD-22 ELT System

- 3386-3 SD-22 Pan and tilt head
- 3219-52 Second telescoping pan bar and clamp
- 3383-3 Two-stage carbon fibre EFP tripod w/150mm bowl
- 3314-3 Heavy-duty calibrated floor spreader

WE BUY, SELL AND TRADE USED VIDEO EQUIPMENT

FOR PHOTO & VIDEO



TO INQUIRE ABOUT YOUR ORDER:

119 WEST 17TH STREET, NEW YORK, N.Y. 10011

800 221-5743 • 212 807-7479

Store & Mail Order Hours:

Sun 10-4:45 • Mon & Tues 9-6 • Wed & Thurs 9-7:30 • Fri 9-1 • Sat Closed

OR FAX 24 HOURS: 212 366-3738

RUSH OR OVERNIGHT SERVICE AVAILABLE (extra charge)

HORITA

WG-50 Window Dub Inserter

- Makes buried-in SMPTE TC window dub copies
- Indicates drop-frame or non-drop-frame time code
- Also functions as play speed SMPTE time code reader
- Adjustable for horizontal and vertical size and position
- Dark mask or "see-thru" mask surrounds display
- Provides (backed-time) output for copying TC
- Displays time code or user bits • Display on/off
- Field 1/field 2 indicator • Sharp characters
- Always frame accurate (on time)

\$269

TG-50 Generator / Inserter

Combination time code generator and window dub inserter. It includes all features of WG-50 PLUS—

- Generates SMPTE time code in drop/non-drop-frame format
- Jamsync modes (ams to time code input and outputs new TC
- Simple "on screen" preset of time code and user bits
- Run/stop operation using front panel momentary switch
- Selectable 30/60/90/120-second automatic generator back-time
- Make a window dub copy while recording 1/2 on source tape

\$349

BSG-50 Black Burst/Sync/Tone Generator

- The BSG-50 provides an economical means for generating the most common RS-170A video timing signals used to operate various video switches, effects generators, TBCs, VCRs, cameras and video edit controllers.
- 6 BNC video/pulse outputs
- Now available: 6 blackburst, 4 sync, 2 subcarrier
- Each sync output individually settable for composite sync, composite blanking, H-drive, or V-drive
- Separate filter for each output—maximum signal isolation
- 1KHz, 0dB sine-wave audio tone output, locked to video
- Outputs can easily be configured to meet specific user and equipment needs

\$269



CSG-50 Color Bar/Sync/Tone Generator

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

\$349

TSG-50 NTSC Test Signal Generator

- The TSG-50 generates 12 video test signals suitable for setting up, aligning, and evaluating the performance of various video equipment found in a typical video editing system, such as video monitors, distribution amplifiers, VCRs, switches, effects generators, TBCs, etc. In addition to the video signals, the TSG-50 also generates composite sync and, with a video DA such as the Horita VDA-50, becomes a high quality, multiple output, house sync generator.
- Fully RS-170A SC/H phased and always correct. No adjustments ever required
- Built-in timer automatically switches video output from color bar pattern to black after 30 or 60 seconds. Makes it easy to produce tape leaders of color bars followed by black
- Video signals generated are in accordance with industry standard EIA 170-A/170-A video timing specification
- Audio tone switches to silence and color bars change to black when using 30/60 second timer.
- Convenient pattern selection - 12 position front panel switch. Includes on-seat controlled, 1KHz, 0dB audio tone output
- Generates precise oscilloscope trigger output signal one H-line before start of color field
- Outputs: video, sync, ref frame, 1KHz, 0dB

\$439

WE STOCK THE FULL LINE OF HORITA PRODUCTS INCLUDING:

- WG-50 Window Dub Inserter
- TG-50 Generator/Inserter
- TRG-50 Generator/Inserter/Search Speed Reader
- TRG-80PC - Has all of the above plus RS-232 control.
- VG-50 VTC Generator, LTC-VTC Translator
- VLT-50 VTC-To-LTC Translator
- VLT-80PC VTC-To-LTC Translator / RS-232 Control
- RLT-50 Hi8 (EVO-9800/9850) TC to LTC Translator
- TSG-50 NTSC Test Signal Generator
- SCT-50 Serial Control Titrer "Industrial" CG, Time-Date Stamp, Time Code Captioning
- SAG-50 Safe Area, Convergence Pattern and Oscilloscope Line Trigger and Generator

SONY

SVP-5600 and SVO-5800

S-VHS Player/S-VHS Editing Recorder

SVP-5600 and SVO-5800 features:

- By combining the high resolution (400 horizontal lines) of S-VHS with high quality signal processing techniques like DNR, Digital Field DDC and Chroma Process improvement, they deliver the consistent picture quality so essential to editing. They also incorporate a wide video head gap and track width (58mm) for stable and faithful picture reproduction.
- Each has a built-in TBC plus an advanced Digital Noise Reducer (DNR) for both the chrominance and luminance signals to eliminate noise during playback. At the same time, a field memory incorporated in the noise reducer removes jitter to provide sharp, stable pictures. The field memory also includes a Digital Field DDC (Dropout Compensator), which replaces signal dropout with information from the previous field.
- They also incorporate Chroma Process Improvement circuitry for excellent color picture quality in the playback mode. This advanced circuitry greatly improves the chroma bandwidth, thus enabling sharper and clearer color picture reproduction.



ADVANCED EDITING FUNCTIONS

- For frame accurate editing, both machines employ a sophisticated servo system, an improved quick response mechanism and built-in LTC/VITC time code capability. This makes them ideal for animation and computer graphic recording, where a frame-by-frame editing function is indispensable.
- They are equipped with industry standard RS-422 9-pin serial interface. The 9-pin connector carries edit commands and time code data between the VCR and the edit controller.
- When connected to an RS-422 equipped edit controller, the SVO-5800 functions as an editing recorder. It performs the assemble and insert functions and also provides useful split editing capability of normal audio tracks 1 and 2. In the insert mode, audio and time code can be inserted independently, or in any combination.

FOUR CHANNEL AUDIO SYSTEM

- Each incorporate four channels of high quality video. There are two channels with Hi-Fi (AFM) tracks and two with longitudinal (normal) tracks. The Hi-Fi tracks provide a wide frequency response from 20Hz to 20kHz and a superb dynamic range of 90dB. The normal tracks incorporate Dolby B noise reduction for high quality sound reproduction. XLR connectors are used for the inputs and outputs for all four channels.

MULTIPLE INPUTS & OUTPUTS

- Both machines employ composite and S-Video connectors. With optional SVBK-170 Component Output Board, they provide component signal output through BNC connectors. With the board, the VCRs can be integrated into Betacam SP editing systems.

USER FRIENDLY OPERATION

- Built-in character generator which superimposes characters on the "video monitor output" signal. This allows time code data, control track, menu setup and VCR function status to be shown on a monitor.
- For more efficient operation they have an on-screen setup menu which allows a variety of customized VCR mode operations. Programmed in the form of a layer structure, you simply go through the menu and initialize VCR operation.
- All parameters of the TBC, such as luminance level, chroma level, setup, hue, Y/C delay, sync phase and SC phase are easily controlled from the front panel, and can be remotely controlled from the optional UVR-60 TBC Remote Control. The UVR-60 also accesses held freeze function in the still mode and allows on/off control of the chroma and luminance noise reducer.
- Quick and smooth picture search can be performed by either using an RS-422 equipped edit controller or the optional SVRM-100 Remote Control Unit. Recognizable color pictures are provided at up to 10x normal speed in forward or reverse.

FXE-100 ALL-IN-ONE VIDEO EDITING SYSTEM

The new FXE-100 is an A/B roll editing system designed for quicker, easier video editing, and is well-suited for today's professional audiovisual communications. It is all once an editor controller, which controls basic VCR functions, a special effects generator which cuts, mixes, wipes and composites the video sources with stunning effects; and an audio mixer with various fading and switching abilities. There is no longer a need to configure multiple devices for video editing. With either Hi-8 or S-VHS VCRs and the FXE-100, an ideal professional editing system can be easily configured.



- Switchable machine control of three RS-422 equipped VCRs or three RS-232 equipped VCRs. Basic VCR functions such as play, stop, still, fast forward, rewind and record are controlled through these interfaces. Variable speed control is also possible for VCRs equipped with Dynamic Tracking.
- Accepts time code, control track (CTL), and 8mm time code as editing references. These can be set separately for each VCR.
- Performs assemble and insert editing (Video, Audio 1, Audio 2). The first EDIT mode, which allows you to record sufficient timecode for synchronization to a new tape is also featured.
- Features a split audio edit function which allows setting of audio and video in-points separately. This permits you to bring in the audio source before a visual transition.
- Store up to 99 scenes, including effects settings, in memory.
- Edit list data can be saved and downloaded to an IBM-compatible PC, allowing you to review or modify edit data at any time.
- The FXE-100 has two program buses, the A- and B-bus. Each bus provides Player 1, Player 2, Aux inputs and Background Color. Both composite and S-Video signals can be input.
- Taking advantage of the freeze function, two machine editing with effect transitions is realized by freezing the recorder OUT point picture. Also, by selecting the same video source in both A and B bus, wipe or mix in/out of the digital effects is possible without picture transition. This "Self A Roll" function is another feature which allows effective two machine video editing.

SWITCHER AND SPECIAL EFFECTS GENERATOR

- Multiple wipe patterns, including picture scroll and slides, are programmed in. Wipe patterns are easily accessed, and transition rates can be set. Soft edges or a choice of 15 color borders can be added to most wipes and effects.
- Variety of mix effects, such as mosaic mix, black and white mix, posterization mix and picture-in-picture (PIP). Also fade to black and fade to white effects.
- Digital effects, such as mosaic, paint, pixel trail, multi-picture, monochrome, and zoom. Picture freeze function is also featured in frame or field mode.
- Because all the special effects can be set separately to the video sources of each bus, wipes or dissolves of the sources with the digital effects can be executed. It is also possible to combine multiple effects to create stunning images, such as wiping the multi-picture effect with the paint effect and dissolving color corrected picture with mosaic effects.

ADJUSTABLE TRANSITIONS

Transitions are done using the fade lever, or they can be automatically set. Transition time can be set from 0 to 999 frames. Transition can also be paused and reversed. Other parameters such as GPI timing, wipe selection and pre-roll time can be set.

CHROMA KEYS

The FXE-100 features chroma and luminance keys to superimpose characters, figures, or video sources onto a background. Clip and gain levels can be adjusted to give clean and sharp key edges. Color correction is done via the joystick for both buses with memory to hold a favorite setting for storage and recall.

WIPE CONTROL

By moving the location stick, you can move the closed wipe patterns such as square, circle and heart, around the screen. This function also enables you to start the wipe transition from any desired position on the screen.

AUDIO MIXING

Audio follow-video editing can be performed with the FXE-100. Two channels are assigned to each player VCR's input and one channel for the recorder VCR's input. Two channels of AUX inputs and a MIC input are available for mixing background music with voice-over. All audio input levels can be adjusted separately. Two Program output channels and one monitor channel are provided. A switch for -7.5dB and +4.0 dB is provided for flexibility in choosing input levels for VCRs with either RCA or XLR connectors.

USER FRIENDLY OPERATION

All keys and buttons are logically grouped by function, and are color coded for quick identification and economy of keystrokes.

- Permits one monitor operation. No need for multiple monitors.
- Various editing data, such as edit mode and time code address of each VCR, can be monitored on the same screen.

VERSATILE SYSTEM INTEGRATION

- No need to configure multiple devices. By simply connecting three VCRs, a professional video editing system is formed.
- Two frame synchronizers allow perfectly synchronized wipes and dissolves without time base correctors.
- Equipped with two GPIs for control of external devices, such as character generators and audio mixers. Also has a GPI input, allowing it to be controlled from an external edit controller.
- Has four backburst outputs to distribute internally generated sync signal, synchronizing connected devices. There is no need for an external sync generator.

We are an authorized Service Center for Sony and Panasonic Industrial and Professional video equipment. Call (800) 963-2525. In NYC (212) 206-8861 (24 hour service available)

MAGNI



MM-400

- The MM-400 is a combination waveform and vector monitor especially configured for the cost-conscious producer. A low-cost alternative to CRT-base waveform monitoring the MM-400 produces a video picture of the input signal's waveform and displays it on any video monitor. It provides a simple, affordable and accurate way to set camera levels before a shoot, or to check time base correctors and color fidelity in editing. Problems like hue shift, smearing, muddy contrast and loss of detail are easily identified for correction.

FEATURES:

- Converts waveform or vector display information into a standard video signal which can be displayed on a video monitor or routed around a video facility, no need for additional expensive monitors. Switch between pictures and waveforms at the push of a button.
- Incorporates an advanced SC/H phase and color frame indicator that is a must for editing and post production. At a glance it tells you if a signal's subcarrier-to-horizontal phase is properly adjusted and if the signal's color frame matches the house black burst connected to the MM-400 external reference input.
- Works anywhere and with any analog video format—NTSC, PAL, Component or S-Video. It has automatic detection between NTSC and PAL formats.
- Three loop-through inputs can accept three composite signals or one component, or RGB signal.
- No complex displays or special test signals are required for component video monitoring.
- Interchannel timing and amplitude display make component analog monitoring easy, has color bar limit markings for Betacam, M-II and SMPTE formats.
- Waveform and vectorscope controls, including channel sweep speed, position control, phase rotation are on easy-to-see dedicated pushbuttons.
- Besides instant toggling between picture and waveform, a mix mode combines waveform and picture displays for simultaneous viewing.
- The MM-400 can be readily used by even novice operators. It has easy-to-understand set-up menus for displaying color, interchannel timing, SC/H phase alarm.
- Useful in any video facility of any size for displaying signals. Its low cost makes it affordable by the smallest studio, while its features and performance make it ideal for monitoring in high-end facilities as well.

LEADER

Model 5850C

Vectorscope

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

Model 5860C

Waveform Monitor

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

Model 5844A

Waveform Monitor



A fully portable waveform monitor for field use, the Model 5844A is a two-channel unit that provides 2H and 2V sweeps with MAG, FLAT and IRE response, and normal and X4 gain.

Model 5854

Vectorscope

2-channel portable vectorscope is ideal for field use and features A and B phase reference, lock and variable gain. Both units shown with optional battery holder and NP-1 type battery.

Minimum shipping USA (Except AK & HI) \$7.00 up to 3lbs. Add 60¢ for each additional lb. For ins. add 40¢ per \$100. Prices valid subject to supplier prices. Not responsible for typographical errors. © 1995 Photo-Video

Circle (51) on Reply Card

STATEMENT OF OWNERSHIP

Statement of Ownership, Management and Circulation (Act of Aug. 12, 1970: Section 3685, Title 39, United States Code).

1. Title of publication: *Broadcast Engineering*. 1A. 00071794.
2. Date of filing: Sept. 28, 1995.
3. Frequency of issue: Monthly, except for additional issue in November.
- 3A. Number of issues published annually: 13.
- 3B. Annual subscription price: FREE TO QUALIFIED.
4. Location of known office of publication (street, city, county, state, zip code): Intertec Publishing Corporation, 9800 Metcalf, Johnson County, Overland Park, KS 66212-2215.
5. Location of the headquarters or general business offices of the publishers (not printers): Intertec Publishing Corporation, 9800 Metcalf, Johnson County, Overland Park, KS 66212-2215.
6. Names and addresses of publisher, editor and managing editor: Publisher: Dennis Triola, 9800 Metcalf, Overland Park, KS 66212-2215. Editor: Brad Dick, 9800 Metcalf, Overland Park, KS 66212-2215. Managing Editor: Tom Cook, 9800 Metcalf, Overland Park, KS 66212-2215.
7. Owner (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1% or more of total amount of stock. If not owned by a corporation, the name and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given. If the publication is published by a non-profit organization, its name and address must be stated.): K-III Corporation, 745 5th Avenue, New York, NY 10151.
8. Known bondholders, mortgagees and other security holders owning or holding 1% or more of total amount of bonds, mortgages or other securities (if there are none, so state): None.
9. For completion by non-profit organizations authorized to mail at special rates: Not applicable.
10. This item must be completed for all publications except those that do not carry advertising other than the publisher's own and are named in sections 132,231, 132,232 and 132,233, postal manual (Sections 4355a, 4354b and 4356 of Title 39, United States Code).

Average No. Copies Each Issue During Preceding 12 Months	Single Issue Nearest To Filing Date
--	-------------------------------------

A. Total No. Copies Printed (Net Press Run).....	39,303	37,700
B. Paid and/or Requested Circulation		
1. Sales through dealers and carriers, street vendors and counter sales.....	0	0
2. Mail subscriptions.....	34,230	32,463
C. Total Paid and/or Requested Circulation.....	34,230	32,463
D. Free Distribution (including samples) by mail, carrier delivery or other means.....	3,809	4,598
E. Total Distribution (Sum of C and D).....	38,039	37,061
F. Office use, leftover, unaccounted, spoiled after printing.....	1,264	639
G. Total (Sum of E and F should equal net press run shown in A).....	39,303	37,700

I certify that the statements made by me above are correct. (Signature of editor, publisher, business manager or owner.)

Dennis Triola,
Publisher

Data cartridge

HHB Communications

• **DDS90M:** 4mm DAT data cartridge developed to deliver increased reliability and security in a variety of bulk data back-up applications; the recording surface is exceptionally smooth, with a high density of evenly distributed, non-corroding metal particles; immediately beneath the recording surface, the density of the particles is reduced allowing an increased concentration of binding polymers; these developments, combined with a system that precisely controls the migration rate of a special lubricant, result in high-output, low-block error rates and reduced head wear; quoted archival stability for the DDS90M is in excess of 30 years under recommended storage conditions.



Circle (354) on Reply Card

Software
Optivision

• **mpegStudio 2.0:** enhanced software designed to support Optivision's new OptiVideo MPEG-2 encoder and MPEG-2 decoders; the software optimizes compression and decompression performance and the quality of Optivision's new MPEG-2 products; the software provides full compatibility with VideoCD and CD-i players, as well as high-end videotape recorders (VTRs); numerous features for precise control of video encoding and/or decoding with Optivision's MPEG-2 hardware are also included.

Circle (355) on Reply Card

Hand-crank column for OB tripod

Sachtler AG

• **Hand-crank column OB 2000:** a hand-crank column for the Sachtler OB 2000 heavy-duty tripod for outdoor broadcasting that extends the area of application; due to the tripod's lifting range of 36cm (14.2"), the height of the OB 2000 (with integrated rubber feet) is increased to a maximum of 172cm (67.8"); the hand-crank column allows the user to lift heavy equipment mounted on top by simply turning the crank until the desired working height has been reached; the stabilizer integrated into the OB 2000 is designed to clamp the column in a fixed position, avoiding additional costs for a conventional spreader; the crank column OB 2000 permits use of all standard flat base heads and quick-fix devices without an adapter.

Circle (356) on Reply Card



Rotoscoping feature

Abekas

• **RotoPhoto 2.0:** faster running roscoping feature for the Abekas A65, A66 and Diskus DDRs; RotoPhoto is a plug-in driver for Adobe Photoshop and version 2.0 now runs in the native mode on the Macintosh PowerPC models 7100 and 8100; in addition, RotoPhoto now includes the plug-in for Adobe Premiere version 4.0 that provides a direct link via the SCSI bus between an Abekas digital disk recorder and the Adobe Premiere user's Macintosh; with the plug-in, the user can import video clips from the A65, A66 or Diskus DDRs into Adobe Premiere, manipulate them and export the finished results back to the DDR; the RotoPhoto package includes a new program called Disknet that performs batch file transfers between Macintosh PowerPC and the A65, A66 and Diskus DDRs.

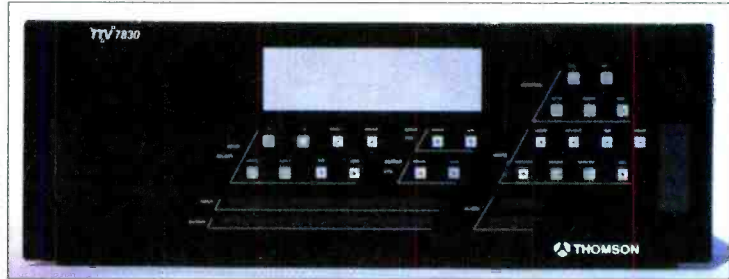
Circle (357) on Reply Card

Motion-compensated standards converter

Thomson Broadcast

• **7830 motion-compensated standards converter:** the 7830 ensures a totally transparent conversion between 625/50/2:1 and 525/59,94/2:1 and accepts any conventional broadcast standard (composite, component and digital); powerful interfaces make use of the most sophisticated digital filtering techniques; the 7830 may also be used in post-production houses to convert 24-frame pictures in the transfer of film sequences; the selected motion-compensation technique fits CCD camera pictures with fast displacements (up to four picture width/s and one picture height/s) and achieves a high precision interpolation (1/4 pixel) — this technique also handles complex motion as contained in zoom, rotation and crossing moving objects.

Circle (358) on Reply Card



Digital video multimeter

ComSonic

• **VideoWindow:** a digital video multimeter designed to meet today's NTSC and PAL formats while preparing for tomorrow's technology; the VideoWindow integrates many video instrument functions for complete video signal measurement; the hand-held unit is powered by AC or battery power (eight hours); VideoWindow is fully programmable for automated testing and features more than 90 individual measurements within 49 tests; the readings are in absolute numbers and the measurements are in IREs or volts; the unit features switchable NTSC and PAL formats and has the ability to store and edit readings; other features include selectable averaging and resolution, LIMIT files for PASS/FAIL measurements and a real-time clock for measurement date stamping.

Circle (359) on Reply Card

Editing system

Discreet Logic

• **Fire:** a fully scalable non-linear, on-line, full-resolution digital editing solution on an open platform; Fire features powerful audio and video editing tools and a unique gestural interface that specifically addresses the needs of on-line editors; Fire's EditDesk is a picture-based interface that includes timeline and storyboard editing of uncompressed images; the SoftEdit features allow transitions to be modified at any point in an edit; users can slip, trim or adjust the duration of transitions in real time at full resolution with immediate feedback; the system provides professional quality audio capabilities, including up to 64 tracks of audio with real-time level EQ and crossfaded for simultaneous audio and video editing; the system also features industry-standard EDLs and OMF support.

Circle (360) on Reply Card

Real-time effects software

Pinnacle Systems

• **Alladin StudioPak option:** adds powerful new digital effects and functional enhancements to the Alladin digital video workstation; some of the Alladin StudioPak capabilities include manual highlights, trail flare, strobe, posterize and solarize, variable border color, separate front and back live sources on rotational effects and axis cursor.

Circle (361) on Reply Card

A CREATIVE SOLUTION TO YOUR STL PUZZLE



If you've been puzzling over your STL options, consider how digital T1 fits.

A digital STL over T1 lines is a reliable, cost effective alternative to radio STL. T1 STLs handle CD quality uplinks and backhaul, as well as transmitter alarm

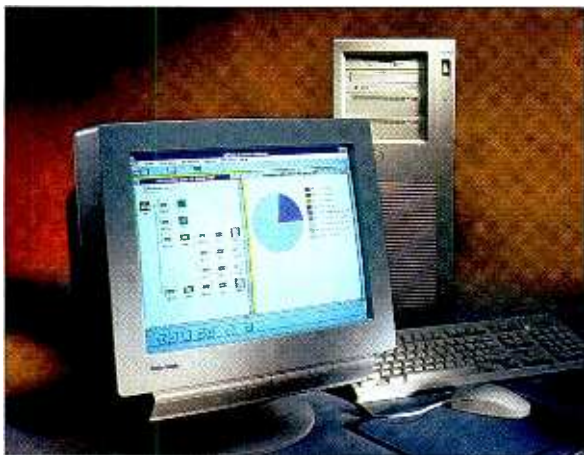
monitoring and conventional voice with ease. And, plenty of room to expand without FCC type approval concerns.

Intraplex offers the broadest range of digital T1 solutions for your STL, TSL, and LMAs. Talk to us about a creative digital T1 solution to your STL puzzle. Today.

Intraplex, Inc. (508) 692-9000.
In Europe, (44) 296-66-1748.



Circle (67) on Reply Card



Hand-held radiation monitors

Wandel & Goltermann

• EMR-10 (photo) & EMR-11: hand-held radiation monitors designed for use in the field by non-technical operators; the EMR-10 measures magnetic fields from 30kHz to 30MHz; the EMR-11 measures electric fields from 100kHz and 3GHz; the measurement ranges and operating parameters of both instruments are optimized to meet the requirements of personal safety applications from the IRPA, WHO, IEEE/ANSI, IEC and NRPB; the monitors are extremely lightweight and compact, and incorporate a unidirectional probe with a wide dynamic range; the instruments are highly resistant to sand, dust, water and temperature extremes and will operate for more than eight hours from their rechargeable NiCad batteries and for about 15 hours from two AA alkaline batteries; operation is simple and all operational functions, as well as measurements parameters and measured values, are displayed on the bright backlit LCD display.

Circle (365) on Reply Card



MPEG-2 gen-lock decoder

Optivison

• MPEG-2 gen-lock decoder: an EISA-based playback card for PCs; the new MPEG-2 gen-lock decoder decompresses broadcast-quality NTSC and PAL video and CD-quality audio simultaneously; MPEG-2 video is decompressed at full CCIR-601 (704x480 resolution) and 601 variants (544x480 and 352x480 resolutions); MPEG-1 source material is decompressed at the full source image format (SIF) resolution of 352x240 pixels for NTSC; the board also supports PAL from SIF resolution of 352x288 to CCIR-601 resolution at 704x576.

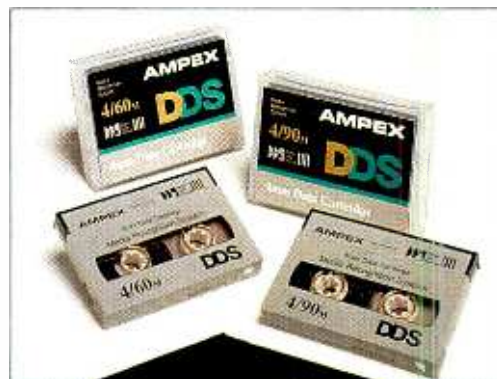
Circle (366) on Reply Card

Data storage product line

Ampex Media Corporation

• DDS series: digital data storage line designed specifically for work with digital workstations and non-linear editing systems; the 4mm DDS format is available in 60- and 90-meter lengths; the cartridges use an advanced metal particle tape formulation that ensures high output levels, extremely low error rates and exceptional durability; cartridges also incorporate the Media Recognition Systems that is designed to prevent the accidental intermixing of incompatible media between audio DAT and DDA formats.

Circle (367) on Reply Card



MPEG generator/analyzer

Tektronix

• MTS100 MPEG test system: a Windows NT workstation is the platform for the MTS100 that includes a datastore system and five application programs; transport stream I/O is provided on a variety of hardware interconnections including TTL serial and ECL parallel; analysis of transport stream data is accomplished with a Windows-based MPEG transport stream analyzer; the MTS100 is fully configured and uses five 2GB SCSI hard drives with a custom I/O board capable of handling MPEG transport streams at throughputs up to 45Mb/s; features include MTS multiplexer, MTS analyzer, MTS datastore control, MTS channel coder and MTS table editor.

Circle (362) on Reply Card

Post-production graphics

Pixel Power

• Collage: a new concept for post-production graphics that provides seamless integration of the tasks normally performed by separate character generators, still-stores and painting systems; a Collage graphics page is composed of a background source (picture or live video) and unlimited number of floating foreground layers — each foreground layer can contain graphics shapes, text, brush strokes, pictures and logos; layers can be animated independently, and a wide selection of interpage transitions are provided; real-time animation effects within a page include smooth rolls and crawls in any direction, reveals, cel animation, fade in/out and logo resize.

Circle (363) on Reply Card

10-bit frame synchronizer

Hotronic

• AT61: a frame synchronizer featuring 10-bit processing that eliminates visual quantization noise; the 20-bit matching audio delay provides audio-to-video lip sync correction; the 1-rack-mount space package features pass VIR/VIT, 10-bit digital comb filter, gen-lock, freeze frame/field and full proc-amp control with no interruption presets; digital audio/video outputs meet new digital requirements.

Circle (364) on Reply Card

PROFESSIONAL SERVICES

JOHN H. BATTISON P.E.
CONSULTING BROADCAST ENGINEER,
 FCC APPLICATIONS AM, FM, TV, LPTV
 Antenna Design, Proofs, Fieldwork
 2684 State Route 60 RD #1
 Londonville, OH 44842
 419-994-3849

HE **HAMMETT & EDISON, INC.**
 CONSULTING ENGINEERS
 RADIO AND TELEVISION
DANE E. ERICKSEN, P.E.
 Box 280068
 San Francisco, CA 94128
 707/996-5200 707/996-5280 Fax

NETCOM
 STATE OF THE ART ENGINEERING
 FOR AUDIO AND VIDEO
 ENGINEERING DESIGN • CAD DRAFTING SERVICES
 CABLE FABRICATION • PRE-WIRED PATCH PANEL RACKS
 SYSTEM INSTALLATIONS • EQUIPMENT SALES
(201) 837-8424
 FAX: (201) 837-8384
 1465 PALISADE AVE. TEANECK, NJ 07666


CHAN & ASSOCIATES
 BUSINESS DEVELOPMENT • STRATEGIC MARKETING • PUBLIC RELATIONS
CURTIS J. CHAN
 PRESIDENT
 2212 HERITAGE WAY
 FULLERTON, CA 92633
 PHONE: (714) 447-4993
 FAX: (714) 578-0284
 PAGER: (714) 506-1357

D.L. MARKLEY
 & Associates, Inc.
CONSULTING ENGINEERS
 2104 West Moss Ave.
 Peoria, Illinois 61604
 (309) 673-7511
 FAX (309) 673-8128
 Member AFCCE

CLASSIFIED

FOR SALE

Tape Resources, Inc.
 Video • Audio • Data Media
 Special Pricing for FCC
 Call Letter Stations
SONY
(800) 827-3462 PROFESSIONAL MEDIA

Factory Direct Cases
 Our prices can't be beat.

 Custom or Stock Sizes
 800-645-1707
 In NY 516-563-1181
 Fax: 516-563-1390
 Call for Catalogue or Quote
 Roadie Products, Inc.

Want more information on advertised products?
 Use the Reader Service Card.

Scratch and Dent Sale!

BTS

BTS has a broad selection of used and blemished equipment available at reduced prices.

Studio and ENG Cameras • Digital Effects Systems
 • Monitors • D1, D2, D5 Betacam equipment
 • Digital Production Switchers

Call a BTS Sales representative in your area today!
 Northeast 201-818-4050 • Southeast and Latin America 305-594-4444
 Southcentral 214-556-2400 • Northcentral and Canada 708-803-8060
 Western 818-945-0900

Broadcast Engineering Test & Maintenance

✓ Cables/Connectors ✓ Tools/Tool Kits
 ✓ Cases/Shipping Containers
 ✓ Test Equipment . . . and more!

Make one call for quality products from many major manufacturers. Working on site? Need just-in-time delivery? Your satisfaction is guaranteed. Request your free catalog today.

800-426-1194

JENSEN® 7815 S. 46th St., Phoenix, AZ 85044
 Ph: 602-968-6231 FAX: 800-366-9662

FREE CATALOG

Circle (100) on Reply Card

CLASSIFIED ADVERTISING RATES

Advertising rates in **Broadcast Engineering** Classified Section are \$119⁰⁰ per column inch, per insertion, with frequency discounts available. There is a one inch minimum and ten inches maximum.

Ads may also be purchased By-The-Word for \$1.75 per word, per insertion. Initials and abbreviations count as full words. Minimum charge is \$40 per insertion.

Bind box ads (replies sent to **Broadcast Engineering** for forwarding) are an additional \$40⁰⁰. Reader Service Numbers are available for \$50⁰⁰ per insertion. Ads 4 inches or larger receive a Reader Service Number free.

Spot color, determined by **Broadcast Engineering**, is available at \$95⁰⁰ per insertion.

No agency discounts are allowed for classified advertising.

Call **Matt Tusken, Classified Sales Manager**
 1-800-896-9939 or fax 913-967-1735

Buy Consign Sell Service Trade

Broadcast Store

Non Linear
Avid
 Lightworks
 Digital Magic

All Equipment Warrantied!

Sony BVU-950-8,000
 Sony BVE-9000-12,500
 Grass Valley 200-48,500
 Abekas A-53D-30,000
 Sony BVM-1910-3,000
 Sony PVW-2650-14,000
 Sony BVW-507 w/18X-21,000
 Tektronix-1750 wf/vect-3,500
 Grass Valley 3400 DA-2,000

Upgrade your PVW and UVW Betacam machines to a BVW series with 4 channel audio playback and record.

Phone LA-818-551-5858
 NY-212-268-8800 **Fax** LA-818-551-0686
 NY-212-268-1858

BECK BROADCAST PRODUCTS



TBC-RMT (TBC Remote Control Unit)

Remote control of up to 3 TBC's. For use with internal TBC's on BVW, DVW, PVW, UVW, and BVH Beta machines or any machine using Sony BVR-50 controller. Purchased with 1, 2, or 3 modules. With 3 modules. \$960



SCR-4X8 (Serial Machine Control Router)

Input/Output: Twelve rear mounted DB9-F connectors (four controllers, eight devices). EIA RS-422 send and receive. Controls: Twelve lighted push-buttons for channel assignment. \$980



SCP-10 (Serial 422 Patch Panel) 10x10 passive non-normalizing serial data patch panel. Two rack units high. Legend strips and 10 patch cords included. \$350



VU2-P (VU/Peak Meter with Phase Indicator)

Simultaneous peak and VU display. Solid state phase indication. Highly readable LED arrays. Adjustable headphone output. Hi-impedance looping inputs. \$890



SPK-2 (Two Channel Audio Monitor)

Two channel audio confidence monitoring. Accepts both balanced and unbalanced inputs. Five switchable listening modes. Headphone output with speaker mute. \$650



LM 2+2 (Audio Level Matcher)

Provides a complete interface between an unbalanced audio device and a balanced environment. Two channels of balanced to unbalanced conversion complement two channels of unbalanced to balanced. Independent gain trims. \$212



LM VCA (Audio Level Matcher w/Remote Gain)

Two channels of independent voltage controlled gain with gain trims. Balanced or unbalanced inputs and outputs. 100 dB range with 0 to +5V control. True logarithmic response. Used for remote gain riding, remote monitor gain. \$255



STG (Stereo Tone Generator)

With simultaneous, unbalanced and balanced outputs, digital precision and crystal controlled accuracy. Provides a source of digitally generated 400 Hz and 1KHz tone for any consumer or professional input. \$305

Beck Associates Inc
1-800-728-3725

2403 Howard Lane Austin, TX 78728
Phone 512-388-9777 Fax 512-388-1833

CLASSIFIED

FOR SALE

• STUDIO EXCHANGE • BURBANK

(818) 840-1351 • FAX (818) 840-1354

NEW & USED VIDEO EQUIPMENT

BUY, SELL, CONSIGN; 25 YRS EXP

EQUIPMENT WANTED

WANTED: USED VIDEO EQUIPMENT Systems or components. PRO VIDEO & FILM EQUIPMENT GROUP: the largest USED equipment dealer in the U.S.A. (214)869-0011.

TRAINING

FCC GENERAL CLASS LICENSE. Cassette recorded lessons for home study. Our 30th year preparing radio technicians for the license. Bob Johnson Telecommunications. Phone (310) 379-4461.

SERVICES

IDEAL FOR:

N.H. PRIMARY

Restored broadcast facility includes

• lighting • mixing • fiber optics

Rent by hr, day, wk.

Call: 603-622-6604 • FAX: 603-626-0090

Write: Molloy Sound and Video

155 Front St.

Manchester, NH 03102

FOR SALE: 100' PIROD self supporting triangular steel tower. 5 years old. Presently standing in Nashville. \$5000.00. Call Ralph at (615) 256-7700.

SAVE 50% OR MORE AMPEX ADO 3000 DVE parts. Manuals, fans, full circuit boards, keyboard, disk drive...more!!! Solid Gold Video 305-581-0026, Fax: 305-581-0206, 1-800-400-8930.

FIX RF ON HEADSETS, HANDSETS & PHONES. Filters Tuned for AM, FM & CB. Modular for Handset or Base Cords. Even if you've tried others...Ours WILL Work! 30 Day Moneyback Guarantee. Call for 4 Page RFI Tech Bulletin & Catalog, or on the web at <http://www.sandman.com>. Mike Sandman...Chicago's Telecom Expert. 708-980-7710.

Invest your advertising dollars where your prospects invest their time...

BROADCAST
engineering

Mobile Production Vehicle For Rent

- 3 to 5 Cameras
- Beta SP, 3/4" SP, SVHS
- Abekas DVE
- Still Store

From \$2000 per day with EIC

Video Works, Inc.

(800) 844-4404

SERVICE COMPUTER AND BROADCAST picture monitors vcrs cameras switchers and much more. Installation and design of entire broadcast studios. You buy the equipment we install. Call Pathway Electronics (216) 654-3392.

Monitor Service Center

Varitek specializes in high resolution broadcast video monitors.

Digital or analog.

In all formats NTSC, PAL, SECAM.

We at Varitek have been providing quality service to our clients throughout the United States since 1982.

IKEGAMI, SONY,
HITACHI, MITSUBISHI
JVC, PANASONIC,
CONRAC, NEC
BARCO, TEKTRONIX,
And More...

(800) 346-4380 Ext. (16)

VARITEK

415 W. Taft Ave., Orange, CA

Circle (102) on Reply Card

Circle (101) on Reply Card

DIGITAL VIDEO ENGINEER/PRODUCTION MANAGER Manufacturer of industrial, broadcast and military digital video processing systems seeks production supervisor with video engineering experience. Individual to manage quality control, track production of electronic and mechanical assemblies and test completed PCB's. Company offers outstanding benefit package. Midwest location. Send resume and salary history/requirements to: Classified Ad Coordinator, Broadcast Engineering, Dept. 771, 9800 Metcalf, Overland Park, KS 66212-2215.

TV MAINTENANCE ENGINEER: Opening for qualified maintenance engineer. Individual must be energetic, self-starter with experience in component level troubleshooting, and maintenance of a wide variety audio, video and RF equipment, to include Ampex 1 inch, Sony Beta Cart, Grass Valley production, master control, and routing switchers. Candidate must also have high power UHF transmitter, C band satellite, and 2/7 CHZ microwave maintenance experience. Send resume and salary requirements to Chief Engineer KWEX-TV, 411 East Durango Blvd., San Antonio, Texas 78204. KWEX-TV is an equal opportunity employer.

TELEVISION CHIEF OPERATOR. New England UHF station needs Chief Operator to assume responsibilities for systems maintenance of transmission facilities. Must be able to troubleshoot switching equipment, video tape and satellite receive systems. Strong technical skills necessary. FCC license required, SBE certification a plus. Send detailed resume and salary requirements to: Classified Ad Coordinator, Broadcast Engineering, Dept. 769, 9800 Metcalf, Overland Park, KS 66212-2215.

TELEVISION MAINTENANCE ENGINEER. Repairs and adjustments to television broadcast equipment, construction and installation of new equipment. FCC radiotelephone operator license or other certification and analog and digital troubleshooting required. TV UHF and FM radio transmitter experience desirable. Resume to: Classified Ad Coordinator, Broadcast Engineering, Dept. 770, 9800 Metcalf, Overland Park, KS 66212-2215. EOE.

MAINTENANCE ENGINEER Black Entertainment Television Inc. Ability to troubleshoot to the component level production switchers, digital video effects systems, routing switchers, vtr's character generators, cameras, editing systems and audio equipment. This will include system interfacing to computers and compatible components, equipment installation for studio and remote productions. Must be knowledgeable of system timing theory, broadcast specifications, and electronics course study. Ability to perform fiber switches and satellite downlink. Must have 3 years experience. BET, Corporate Human Resources, 1905-E 9th Street, N.E., Washington, D.C. 20018

STAFF ENGINEER: Charlotte, NC. Post Production/Broadcast Facility has immediate opening for a staff engineer. Candidate must have a degree in electronics. Candidate must also have five years experience as an engineer, EIC or maintenance technician at a post production facility or advanced television broadcast operation. Send or FAX letter, resume, references and salary requirements to David Whaley, Chief Engineer, Creative Post And Transfer, 377 Carowinds Blvd., Suite 101, Fort Mill, SC. 29715, (803) 548-3153.

TV ENGINEER Immediate opening: Maintenance engineer for small market PBS station. 3-5 yr Broadcast/Production engineer experience. Ultimate req. 1" Sony a plus. Competitive salary/benefits. EOE. Resume & references to Personnel Mgr, KIXE-TV, 603 N. Market St. Redding, CA 96003.

MAINTENANCE ENGINEER Dominant NBC in the beautiful Appalachian Mountains. Excellent local public education system and quality of life with low crime rate and great fishing, hunting, boating and other outdoor activities. Experienced, with maintenance, repair, and operation with state of the art equipment throughout. Should possess basic knowledge of VHF transmitters and be skilled in computer operations including networks using Microsoft NT server. College degree preferred. Resumes to Judy Baker, WCYB-TV, 101 Lee Street, Bristol, VA 24201. No phone calls. EOE/M/F/H/V.

BROADCAST MAINTENANCE ENGINEER: Self-starter with experience repairing digital & analog studio equipment, all types of Sony VTR's & automation systems. Sony LMS or high power UHF transmitter experience a plus. General class radio license preferred. Send resume to: KTXH-TV, 8950 Kirby Drive, Houston, TX 77054. EOE.

ATLANTA CHIEF ENGINEER Trinity Broadcast station in the Atlanta area. Experienced in maintenance of UHF transmitter, studio systems as well as personnel supervision and training. SBE certification a plus. Send resumes to Ben Miller, Mail P.O. Box C-11949, Santa Ana, CA 92711; E-mail: BMILLER614@AOL.COM; Fax: 714/665-2101. M/F EOE.

TELEVISION MAINTENANCE ENGINEER CBS affiliate seeking experienced engineer. Must have 3 to 5 years experience in repair and installation of broadcast related equipment. RF and computer experience is preferred. Send resume to: Chief Engineer, KDBC-TV, P.O. Box 1799 El Paso, TX 79999. (915) 532-6551 E.O.E.

HANDS ON CHIEF ENGINEER for growing UHF broadcast TV station. Minimum 10 years broadcast engineering experience, and General Class FCC license required. Must have extensive knowledge of UHF transmitters, VTR repair, microwave, studio maintenance, and satellite. Able to train and supervise staff. Send resumes to Director of Operations, P.O. Box 410472, San Francisco, CA 94141-0472. EOE.

JOB OPENING OCTOBER 6, 1995 Broadcast Maintenance Engineer: Requires 2 years broadcast engineering experience. Job entails maintenance of all TV equipment including cameras, video tape machines, switchers, transmitters, etc. Send resume and salary requirements to: WPEC-TV-12, P.O. Box 24612, West Palm Beach, FL 33416-4612. Attn: Personnel. WE ARE A DRUG-FREE WORKPLACE. AA/EOE. NO PHONE CALLS PLEASE! Equal Employment Opportunity Employer.

WBRE-TV, WILKES-BARRE/SCRANTON MARKET, seeks the right person to assume Assistant Chief Engineer responsibilities. Hands on repair and maintenance with multiple formats, studio and ENG equipment and problem solving abilities needed. Experience with high power UHF a plus. This position is for a mature self-starter with at least two years experience and a FCC General Class License or SBE Certification. Forward resume and salary requirements to: Personnel, WBRE-TV, 62 S. Franklin Street, Wilkes-Barre, PA 18773. EOE.

BROADCAST MAINTENANCE ENGINEER. Must have minimum three years experience in broadcast television maintenance, and an Associates degree in electronics, broadcasting or related field. Must be able to troubleshoot to component level. FCC General Class license or S.B.E. Certification required. This position provides technical support to broadcast facilities in the form of repair, maintenance, design, installation, and modification of broadcasting equipment. Salary: \$24K to \$32K, this position is open until January 15, 1996 or until filled. Immediately send resume to: Broadcast Search Committee, WNIT, P.O. Box 3434, Elkhart, IN 46515. WNIT is an Equal Opportunity Employer. Women and minorities are encouraged to apply.

FM BROADCAST ENGINEER Position requires excellent ethics, and character, previous, and current employment in rated markets, knowledge and experience in contemporary theory and practice. Chris Hicks, 900 East Washington Street, Suite 315, Colton, California 92324. No calls. EOE/EE.

YOUR LINK TO GREATER ACHIEVEMENTS

The Massachusetts Corporation for Educational Telecommunications (MCET), is a quasi-public corporation currently advancing a multi-technology distance learning network for the Commonwealth through the Mass LearnPike and Mass Ed Online LearnNet.

Director of Operations and Production

Reporting to the Executive Director, you will be responsible for the design, and operation of studio and communications facilities for the Corporation's telecommunications network, including all satellite activity, internal and external information systems, and related television production services. Monitoring the network on a daily basis, you'll identify operational problems and formulate and implement solutions to improve performance. Assist with the design and implementation of new telecommunications and educational products, including CD Rom. You'll also train and supervise technical personnel and serve as a technical expert to the network and its members. Requires a Master's degree in Telecommunications Engineering and at least 5 years' experience as a Director of Telecommunications Engineering, with experience in satellite broadcast systems and computer network architecture and content. Also requires an FCC General Class license, and experience supervising technical personnel, preparing budgets, and constructing and operating studio, satellite, microwave, fiber optic, and broadcast systems.

Mobile Driver/Technician

You'll oversee the operation of satellite and telecommunications equipment, as well as transportation and maintenance of the vehicle. Involves driving the mobile unit to assigned locations and setting up satellite and telecommunications equipment. Requires an Associate's Degree in Electronics, with 3 years' experience as an engineer on a satellite truck and the ability to set up and troubleshoot satellite and telecommunications systems. US Dept. of Transportation CDL is required, along with SBE certification and/or FCC license. Experience with waveform monitors, vectorscopes, spectrum monitors, oscilloscopes, test signal generators, i.v. production equipment, and satellite uplink/downlink equipment also needed.



We offer a competitive salary and benefits package, and a convenient location that's accessible by public transportation. Please send or fax resume, by November 15, to: Human Resources, MCET, One Kendall Square, Bldg. 1500, Cambridge, MA 02139; FAX (617) 621-0291. MCET is an Equal Opportunity Employer. Women and minorities are strongly urged to apply.

Projects Department Manager

Within the Systems Integration Division, you will orchestrate the management of resources to execute complex, fully integrated broadcast systems. The ideal candidate will bring thorough project management experience and will be expected to further enhance project management techniques and new quality assurance programs. Your major responsibility will be to ensure project completion, both within schedule and budget. You will work in concert with our marketing and sales groups for future project budgeting. You will also prepare and update budgets and capital expenditures.

Requires 10+ years' experience in broadcast or production systems, as well as project management with 6 years' supervisory experience. Job Code: CCY-PDM

Proposal Manager

Utilize your sales and marketing expertise to oversee the development, coordination and preparation of sales proposals. This will include specifying strategy formulation and plan generation, as well as designing proposal formats and ensuring that guidelines meet customer and company needs. Requires 4+ years' broadcast or television production experience emphasizing operations. Excellent writing skills a must; familiarity with value-added sales processes desirable. Job Code: CCY-PM

Sr. Video Systems Design Engineers

Regular Full-time and Contract/Temporary

We're looking for very seasoned Engineers to work on designing large scale digital audio and video facilities. Candidates must be strong in system level engineering design, technical problem solving, team building and communications. Responsibilities will include the design of floor plans, equipment rack elevation layouts, and detailed signal flow construction diagrams. Fluency in Microsoft Excel for Windows is required; AutoCAD, MS Word and MS Access software knowledge a plus.

Requires 5+ years' experience in the design, operation, maintenance and testing of large scale state-of-the-art analog and serial digital audio and video production, as well as broadcast facilities. Job Code: CCY-VSD

Send responses to: **Sony Electronics Inc., 3300 Zanker Road, MS: SJ-2C2, San Jose, CA 95134; FAX (408) 955-5166. Or e-mail youngc@ccmail.nhq.sony.com. EOE.**

Video Service/Maintenance Technician

Swiderski Electronics, Inc. a leader in the Audio/Video/Telecommunications field, has an immediate opening for a qualified Audio/Video Service/Maintenance Technician. 2 yrs. exp. Position works with Broadcast/Industrial 1/2", 3/4" and 1" VTR's & related equip.

Send resume & salary history to:
H/R Dept., 1200 Greenleaf Ave.
Elk Grove Village, IL 60007
Fax resume (708) 364-5019

WE PLACE

(Technical Engineers-Post Production Editors, Colorists, Graphics & Animators)

• All Levels, Locations, & Disciplines •

Employer Paid Fees
Guaranteed Confidential
15 Years Service

FAX and/or Mail your Resume to Mike Kelly



KEYSTONE INT'L, INC.
16 Laffin Road, Suite 900
Pittston, PA 18640

Fax 717-654-5765 • Phone 717-655-7143

PROJECT ENGINEER, WBTV, Charlotte. CBS Network. An opening exists for an experienced Broadcasting Engineering professional. First class facility is in need of an additional engineer with superior systems, installation and maintenance abilities. Self-direction and thorough knowledge of studio/remote broadcast systems essential. This position requires a highly qualified, experienced individual with practical, hands-on, problem solving abilities to assist with ongoing construction, maintenance and projects at one of the Southeast's finest television facilities. This position will report to the Chief Engineer. An excellent opportunity for a true Broadcast Engineer who appreciates the challenge of fast paced television and varied assignments with an excellent station located in a great place to live. **RESPOND TO: DEPT. HR, JEFFERSON-PILOT COMMUNICATIONS COMPANY, ONE JULIAN PRICE PLACE, CHARLOTTE, NC 28208, 704-374-3640. EOE/M/F/D**

CONTINENTAL CABLEVISION OF JACKSONVILLE, a progressive Multi-Service Operation has an immediate opening for a video maintenance engineer. The ideal candidate will have a thorough understanding of video systems maintenance, measurements, post-production/editing, master control and production studio operations, and will assist in preparing financial budgets. Must be available for 24-hour on-call emergencies. SBE Certification or FCC General Class License preferred. Please send resume and salary requirements to: Paul Christensen, Continental Cablevision, 5934 Richard Street, Jacksonville, FL 32216. No phone calls please. E.O.E. M/F/D/V A DRUG FREE WORKPLACE.

INTERACTIVE EXPRESSWAY

Prepare for the Ride of a Lifetime.

General Instrument is the leader in satellite television encryption and broadband digital compression technologies. We currently have several opportunities available for Field Engineers at GI Communications Division in San Diego, CA.

FIELD ENGINEERS

Positions require at least 2 years' experience in field service, VAX/VMS Systems and/or basic knowledge of broadcast and CATV technologies. Excellent customer service skills and AS degree essential (BSET or BSCS desired). Domestic and/or international travel required. One position requires 5+ years' experience in DEC and another requires bilingual English/Mandarin.

For more information about General Instrument, see us on the Worldwide Web at <http://www.gi.com>

Please send resume with salary history/requirements to: **General Instrument, Attn: HR Dept., Code JFEBE, 6262 Lusk Blvd., San Diego, CA 92121. Or E-mail to: jobs@gi.com Equal Opportunity Employer. Principals Only, Please.**

GI General Instrument

CHIEF ENGINEER Washington DC area. Must have experience with UHF transmission systems as well as studio equipment. Transmission plant will be completely rebuilt in 1996. This job requires a self-starter who works well without close supervision. FCC general class license for SBE certification required. Competitive salary and fringe benefits. Minorities/women encouraged to apply. Excellent opportunity for growth within a major broadcasting company. Equal Opportunity Employer. Send resume and salary requirements to: **ATTN: Jim Somich, MicroCon Systems Engineering, 1208 Stoney Run Trail, Broadview Hts., OH 44147.**

For a small investment, and a large return!

CALL CLASSIFIEDS NOW
800-896-9939

KUMV-TV IN WILLISTON, ND, has in immediate opening for Chief Engineer. Applicants should be familiar with transmitter, microwave, translator, and video/audio plant maintenance, design, and installation. Salary depends on experience. Send resume to: Deborah Murphy, General Manager, KUMV-TV, PO Box 1287, Williston, ND 58802; FAX (701) 572-0118. EOE.

VIDEO APPLICATIONS ENGINEER

En Technology Corporation is bringing to market a revolutionary technology which distributes data and software to PCs at high speeds through TV broadcast signals. The applications are endless, as are the opportunities for our employees.

This key individual will provide customer site assistance with the installation, evaluation, and maintenance of video data broadcasting hardware. Requires advanced knowledge of video signal distribution (broadcast, cable, and satellite delivery systems). Minimum five years' experience in video systems design, maintenance, and/or installation. Strong computer skills and MS Windows experience essential.

En Technology offers a solid compensation and benefits package, a smoke-free environment and the excitement of a young, fast-paced company all in beautiful, tax-free southern NH (the Greater Nashua area). Please forward your resume and salary history in confidence to: **Maggie Hinkle, En Technology Corporation, P.O. Box 732, Keene, NH 03431 or fax to: (603) 358-5121.** Equal Opportunity Employer.

Acentech

Senior Video Consultant

Boston area acoustics/audiovisual consulting firm with 45 year history seeks senior level video/audiovisual system designer. Experience and interest should include videoconferencing, video production and high-end audiovisual facilities. Computer/CAD literacy is required; good communication skills are essential. The successful applicant will be involved in major projects nationwide.

Direct all resumes to:

Personnel Manager
Acentech Incorporated
125 CambridgePark Drive
Cambridge, Massachusetts 02140
Fax: 617-499-8074

An Equal Opportunity Employer

TELEVISION ENGINEER

There's tremendous opportunity in our studio

...for an experienced, hands-on Engineer who can handle live TV production, editing, and day-to-day maintenance of cameras, VTRs and switchers. We're ValueVision, the "Brand Name Channel", one of America's top TV home shopping networks, operating 24 hours a day, 7 days a week, to provide millions of customers with great buys and entertaining programming.

To qualify for this potential-packed position, you'll need proven experience in live TV and TV equipment maintenance as well as at least an associate's electronics degree. We'll reward your technical expertise with a competitive salary, outstanding benefits, and a fast-track opportunity for growth in a highly successful, rapidly expanding business.

If you have the background we seek, you owe it to yourself to explore this exciting opportunity. Please send your resume with salary expectations to:

VALUE
VISION
The
BRAND NAME
Channel

6740 Shady Oak Road
Eden Prairie, MN 55344
Fax: (612) 947-5264
Phone: (612) 947-5221

Equal Opportunity Employer

ITS CORPORATION

information
transmission
systems

Visibly Better Technology

ITS Corporation is a leading manufacturer of television transmitter systems located in a suburb of Pittsburgh. We are seeking candidates for the following positions:

FIELD SUPPORT ENGINEER--This position requires a strong technical background in UHF/VHF transmitters, RF experience, and a 2-4 year electronics degree. Excellent customer relation skills and domestic/international travel is also required.

RF DESIGN ENGINEER--This position requires a BSEE and RF circuit design experience. A MSEE is desirable.

Interested candidates should forward their resume with salary history to:

**ITS CORPORATION, HR Department,
375 Valley Brook Road, McMurray, PA
15317, FAX: (412) 941-4603 EOE**

AlphaStar
DIGITAL TELEVISION

Alphastar is introducing the first world standard DBS television service to the American marketplace. Building on the strengths of the United States' satellite television industry we are opening a full service Uplink Center in Oxford Connecticut and are looking for dedicated, energetic individuals to join our team as:

PRODUCTION SERVICES MANAGER

Working on acquiring origination material and building relations with outside studio and tape houses to ensure prompt delivery of quality programming the successful candidate will have a strong background in Television Network operations and excellent managerial skills.

OPERATIONS SUPERVISORS

Our Operations Supervisors will be responsible for the day to day activities in Master Control. This includes transmission schedules, quality control of satellite feeds and managing a team of operators. Ideally the successful candidates will have 3-5 years experience in Network operations and strong team building and managerial skills.

VIDEO SERVER AND MASTER CONTROL OPERATORS

Monitoring file servers, machine control equipment for PPV services, turn around services and commercial insertion and maintaining the broadcast logs these positions are key to ensuring top quality transmissions. The ideal candidates will have previous experience in the broadcast industry and have strong communication and interpersonal skills.

LIBRARY SUPERVISOR, TAPE OPERATORS, TRAFFIC ASSISTANT

These positions will be responsible for maintaining and screening all incoming programming materials including PPV and promotion products. The ideal candidates will have 2-4 years experience in video library services in a network environment. Additionally strong communication and interpersonal skills are essential to success in this position.

As this facility will be operating 24 hours a day, 7 days a week some of these positions will be shift work. To pursue this challenging opportunity and a rewarding career with Alphastar please fax or mail your resume to: **Human Resources, Alphastar, 208 Harbor Dr., Building One, First Floor, Stamford, CT 06904 Fax 1-(203)-359-8281**

Alphastar is an equal opportunity employer. We apologize we are only able to contact those individuals who will be offered an interview.

	Page Number	Reader Service Number	Advertiser Hotline		Page Number	Reader Service Number	Advertiser Hotline
AAVS/Div. of Sencore	3	5	800-769-AAVS	Intraplex, Inc.	97	67	508-692-9000
AAVS/Div. of Sencore	64 A-B		800-769-AAVS	Jensen Tools Inc./Axia Ent.	99	100	602-968-6231
AAVS/Div. of Sencore	64 C-F		800-769-AAVS	JVC Professional Products Co	29	9	800-JVC-5825
Accom, Inc.	41	32	415-328-3818	Leightronix Inc.	48	61	517-694-5589
Acrodyne Communications, Inc.	7	12	800-523-2596	Leitch	BC	3	800-231-9673
Anvil Cases, Inc.	65	38	800-359-2684	Miller Fluid Heads	64	44	201-857-8300
Asaca/Shibasoku	89	59	310-827-7144	Motorola-Multimedia Group	38-39	30	1-800-2WAY4HFC
Avid Technology	9	13	800-949-2843	National Transcommunications	78-79	56	+441703-498042
Beck Associates	100	102	512-388-9777	Odetics, Inc.	51	41	800-243-2001
Belar Electronics Laboratory	81	63	610-687-5550	Opamp Labs, Inc.	83	47	213-934-3566
B&H Photo-Video	93-95	50, 51	800-947-9928	Panasonic Broadcast & TV	63		800-524-0864
Broadcast Video Systems Ltd.	74	57	905-764-1584	Panasonic Broadcast & TV	86-87		800-524-0864
BTS Broadcast TV Systems	5	11	800-962-4BTS	Rane Corporation	52	26	206-355-6000
Canon USA Broadcast Lens	37	29	201-816-2900	Sachtler Corp. of America	25	18	516-867-4900
Clear-Com Intercom Systems	27	20	510-527-6666	Schneider Corporation of AM	81	64	516-496-8500
Com Sonics Inc.	40	31	703-434-5965	Shure Brothers Inc.	33	21	800-25-SHURE
Conex Electro Systems	81	65	206-734-4323	Skycell Satellite Telephone Service	85	48	703-758-6272
Cybematics	23	17	804-833-9100	SMPTTE	77	43	914-761-1100
Datatek, Inc.	61	27	800-882-9100	Snell & Wilcox Ltd.	17-19	8	+730-821-1188
DNF Industries	48	60	213-650-5256	Snell & Wilcox Ltd.	54-55	35	+730-821-1188
Duracell USA	72-73	55	800-548-5489	Snell & Wilcox Ltd.	56-57	36	+730-821-1188
Dynatech Video Group	21	16	800-453-8782	Sony Business & Professional	42-43		800-635-SONY
EEV, Inc.	67	53	800-DIAL-EEV	Sypha	91	400	+441817611042
ESE	10	14	310-322-2136	Tascam/Teac America, Inc.	69	42	213-726-0303
Fast Electronic US Inc.	47	23	800-248-FAST	Tektronix Inc.	13-15		800-998-3588
Fujinon, Inc.	59	37	201-633-5600	Telemetrics, Inc.	70-71	54	201-848-9818
Futuretel Inc.	11	15	408-522-1400	Varitek	100	101	714-283-8980
Gepco	83	46	312-733-9555	Videotek, Inc.	IBC	2	800-800-5719
Hamlet/Grunder & Assoc.	26	19	800-331-2019	Vinten TSM	45	22	914-268-0100
Harris Allied	1	4	606-282-4800	Viz Technology	68	40	718-714-9873
Henry Engineering	74	58	818-355-3656	Wheatstone Corporation	IFC	1	315-452-5000
Herman Electronics	68	39	305-477-0063	Winsled Corporation	83	45	800-447-2257
ITS Corp.	53	34	412-941-1500	3M Pro Audio/Video Products	31	10	612-733-1959
International Teleproduction	50	62	212-629-3266	360 Systems	49	24	818-991-0360

EDITORIAL

Brad Dick, *Editor*
Skip Pizzi, *Technical Editor*
Steve Epstein, *Technical Editor*
Dawn Hightower, *Senior Associate Editor*
Deanna Rood, *Associate Editor*
Carrie Poland, *Associate Editor*
Tom Cook, *Senior Managing Editor*
Carl Bentz, *Directory Editor*

ART

Stephanie L. Masterson, *Associate Art Director*

BUSINESS

Raymond E. Maloney, *President*
Cameron Bishop, *Group Vice President*
Dennis Triola, *Publisher*
Judson Alford, *Marketing Director*
Stephanie Hanaway, *Group Director, Special Projects*
Kathryn Buckley, *Promotions Manager*
Dee Unger, *Director Advertising Services*
Nancy Hupp, *Advertising Production Manager*
Annette Hulsey, *Classified Advertising Coordinator*
Pat Eisenman, *Senior Ad Production Coordinator*
Susan Jones, *Advertising Coordinator*
Doug Coonrod, *Corporate Art Director*
Barbara Kummer, *Circulation Director*
Meghan Wright, *Circulation Manager*
Customer Service: 913-967-1711 or 800-441-0194

TECHNICAL CONSULTANTS

Jerry Whitaker, *Contributing Editor*
Richard Dean, *European Correspondent*
Eric Neil Angvine, *Broadcast Acoustics*
John H. Battison, *Antennas/Radiation*
Dennis Ciapura, *Radio Technology*
Dane E. Erickson, P.E., *Systems Design*
John Kean, *Subcarrier Technology*
Donald L. Markley, *Transmission Facilities*
Harry C. Martin, *Legal*
Curtis Chan, *Audio/Video Technology*

MEMBER ORGANIZATIONS

Sustaining Members of:
• Acoustical Society of America
• Society of Broadcast Engineers
• Society of Motion Picture and TV Engineers
• Society of Cable & Telecommunications Engineers

Affiliate Member, International Teleproduction Society

Member, American Business Press

Member, BPA International

Member, International Teleproduction Society

BROADCAST ENGINEERING is edited for corporate management, engineers/technicians and other management personnel at commercial and public TV stations, post-production and recording studios, broadcast networks, cable, telephone and satellite production centers and networks. Qualified persons include consulting engineers and dealer/distributors of broadcast equipment.

SUBSCRIPTIONS: Non-qualified persons may subscribe at the following rates: United States and Canada; one year, \$50.00. Qualified and non-qualified persons in all other countries: one year, \$60.00 (surface mail); \$115.00 (air mail). Subscription information: P.O. Box 12937, Overland Park, KS 66282-2937.

Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by Intertec Publishing, provided that the base fee of U.S. \$2.25 per copy, plus U.S. \$00.00 per page is paid directly to Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. The fee code for users of the Transactional Reporting Service is ISSN 0361-0942/1995 \$2.25+00.00. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. Prior to photocopying items for classroom use, contact CCC at (508)750-8400. Organizations or individuals with large quantity photocopy or reprint requirements should contact Chris Lotesro, (312)435-2359. Microfilm copies of *Broadcast Engineering* magazine are available by calling or writing UMI, 300 North Zeeb Rd., P.O. Box 1346, Ann Arbor, MI 48106-1346. Phone: (313)761-4700 or (800)521-0600.

©1995 by Intertec Publishing **INTERTEC PUBLISHING**
All rights reserved.

SALES OFFICES

NEW YORK, NY
Gordon & Associates
Josh Gordon
210 President Street
Brooklyn, NY 11231
Telephone: (718) 802-0488
FAX: (718) 522-4751

Joanne Melton
888 7th Avenue, 38th Floor
New York, NY 10106
Telephone: (212) 332-0628
FAX: (212) 332-0663

OXFORD, ENGLAND
Richard Woolley
Intertec Publishing Corporation
Unit 3, Farm Business Centre,
Clifton Road, Deddington,
Oxford OX15 4TP England
Telephone: +44 (0) 1869 338794
FAX: +44 (0) 1869 338040
Telex: 837-469 BESG

AGOURA HILLS, CA
Duane Hefner
Lianne Fairchild
5236 Colodny Ave., Suite 108
Agoura Hills, CA 91301
Telephone: (818) 707-6476
FAX: (818) 707-2313

SANTA MONICA, CA
MC² Magazine Communications
Marketing Corporation
Jason Perlman: (310) 458-9987
Sue Horwitz: (310) 458-8080
501 Santa Monica Blvd., Ste. 401
Santa Monica, CA 90401
FAX: (310) 393-2381

CHICAGO, IL
Bill Wendling
55 East Jackson, Suite 1100
Chicago, IL 60604
Telephone: (312) 435-2361
FAX: (312) 922-1408

TOKYO, JAPAN
Orient Echo, Inc.
Masuyoshi Yoshikawa
1101 Grand Maison
Shimomiyabi-Cho 2-18
Shinjuku-ku, Tokyo 162, Japan
Telephone: (3) 3235-5961
FAX: (3) 3235-5852
Telex: J-33376 MYORIENT

**CLASSIFIED ADVERTISING
OVERLAND PARK, KS**
Matt Tasken
P.O. Box 12901
Overland Park, KS 66282
(913) 967-1732 Fax: (913) 967-1735

**LIST RENTAL SERVICES
REPRESENTATIVE**
Lori Christie
9800 Metcalf
Overland Park, KS 66212-2215
Phone: 913-967-1928
FAX: 913-967-1872

Broadcast engineering

P.O. Box 12937 Overland Park, KS 66282-2937 USA

SUBSCRIPTION CARD

Please complete entire form, fold, tape and mail.
Or FAX to: 913-967-1903.

Please allow 4 to 6 weeks for processing.

Is your address correct? Please make any necessary changes.

Name _____
Title _____
Company _____
Address _____
City _____ State/Province _____
Country _____ Zip/Postal Code _____
Phone (____) _____ FAX (____) _____

S5K

1 Do you wish to receive/continue to receive *Broadcast Engineering* FREE?

YES

No

Signature required

Title

Date

2 Which type of facility or operation best describes your primary business classification? (Please check only ONE box.)

- 20 TV Station (including Networks & Low-Power TV)
- 26 Combination TV & Radio Station
- 39 Cable (including Networks)
- 45 Telephone Companies (Telcos)
- 28 Business TV (including Non-Broadcast TV)
- 29 Recording Studio
- 30 Teleproduction Facility/Independent Program Producer
- 40 Post-Production Facility
- 31 Microwave, Relay Station or Satellite Company for TV and Cable
- 32 Federal, State, Municipal Government
- 33 TV Consultant (Engineering or Management)
- 34 TV Dealer, Distributor or Manufacturer
- 41 Medical Facility
- 42 Law Enforcement/Training Facility
- 43 Military Broadcast or Video Production Facility
- 44 Defense Contractor
- 35 Other (please specify): _____

3 Which of the following best describes your title? (Please check only ONE box.)

- A. **Company Management:**
 - 01 Chairman of the Board
 - 02 President
 - 03 Owner
 - 04 Partner
 - 05 Director
 - 06 Vice President
 - 07 General Manager (other than in charge of Engineering or Station Operations)
 - 08 Other Corporate/Financial Official
- B. **Technical Management & Engineering:**
 - 09 Technical Director/Manager
 - 10 Chief Engineer
 - 11 Other Engineering or Technical Title
- C. **Operations & Station Management/Production & Programming:**
 - 12 Vice President Operations
 - 13 Operations Manager/Director
 - 14 Station Manager
 - 15 Production Manager
 - 16 Program Manager
 - 17 News Director
 - 18 Other Operations Title
- D. **Other** (please specify): _____

4 Which statement best describes your role in the purchase of equipment, components and accessories?

- A Make **final decision** to buy specific makes, models, services or programs
- B **Specify or make recommendations** on makes, models, services or programs
- C Have **no part** in specifying or buying

Please
continue
on to
Questions
5 and 6
below.

5 Which of the following types of equipment will you be evaluating for purchase in the next 12 months? (Check ALL that apply.)

1. **Audio Products**

- 1A Audio consoles
- 1B Digital audio workstations
- 1C Distribution amplifiers
- 1D Headphones, headsets, intercoms
- 1E ISDN telephone interface
- 1F Magnetic tape, audio
- 1G Microphones
- 1H Mixers
- 1I Monitors (speakers)
- 1J Recorders, players
- 1K Switchers, routing

2. **Video Products**

- 2A Camera heads, tripods, pedestals, booms, dollies
- 2B Cameras; lenses
- 2C Graphics, titling systems
- 2D Desktop editing systems
- 2E Digital effects, paint, animation systems
- 2F Editing controllers, systems
- 2G Frame synchronizers, time base correctors
- 2H Lighting systems
- 2I Magnetic tape, video
- 2J Monitors (picture, studio quality)
- 2K Recorders, players
- 2L Robotic camera controls
- 2M Signal processing
- 2N Signal routing, distribution
- 2O Standards, format & scan converters
- 2P Still store systems
- 2Q Switchers, production
- 2R Video servers
- 2S HDTV Equipment

3. **Test & Measurement Products**

- 3A Analyzers, audio, video, RF
- 3B Audio, video signal generators
- 3C Waveform, vectorscope monitors
- 3D Digital signal testing

4. **Miscellaneous Products**

- 4A Battery packs, chargers
- 4B Cabinets, racks, consoles
- 4C Cables, connectors
- 4D Carts, cases (equipment, shipping), tools

5. **RF Products**

- 5A ENG components
- 5B Exciters
- 5C Fiber optics
- 5D Modulators
- 5E Power amplifiers, cavities
- 5F Receivers
- 5G Remote production vehicles, program relays
- 5H Satellite T/R components, electronics
- 5I STL components, electronics
- 5J Switches, RF coaxial
- 5K Transmitters
- 5L Antenna systems, towers
- 5M Transmitter, remote controls
- 5N Tubes
- 5O Weather, radar RF products

6. **Automation & Computer Products**

- 6A Accessories/peripherals, Macintosh
- 6B Accessories/peripherals, Amiga
- 6C Accessories/peripherals, PC
- 6D Accessories/peripherals, SGI
- 6E Automation systems
- 6F Cards, NTSC graphics interface
- 6G Cards, time base corrector
- 6H Business automation
- 6I Commercial insertion systems
- 6J Cards, technical monitoring
- 6K Machine control
- 6L Newsroom automation
- 6M Platforms, Macintosh
- 6N Platforms, PC
- 6O Platforms, SGI
- 6P Record/playback automation
- 6Q Software, engineering
- 6R Software, production, planning
- 6S Software, videographics

7. None of the Above

6 What is the budget for equipment you are evaluating for purchase in the next 12 months?

- 1 Less than \$10,000
- 2 \$10,000 - \$24,999
- 3 \$25,000 - \$49,999
- 4 \$50,000 - \$99,999
- 5 \$100,000 - \$299,999
- 6 \$300,000 - \$499,999
- 7 \$500,000 and up

S5K

Incomplete forms cannot be processed or acknowledged. The publisher reserves the right to serve only those individuals who meet the publication qualifications.

NO ENVELOPE NECESSARY
FOLD — TAPE — MAIL
PLEASE DO NOT STAPLE



PLACE
FIRST-CLASS
POSTAGE
HERE

BROADCAST
engineering

P O BOX 12937
OVERLAND PARK KS 66282-2937
USA



Two Sharp.



Sharp solutions for 601 digital and analog testing.

The revolutionary new VTM-100D Digital Test Instrument brings you the convenience of on-screen waveform/vector displays and provides features never before seen on 601 test instruments. 10-bit signal processing provides bright, sharp images, even in the line select mode. Videotek's unique self-calibrating circuitry constantly assures absolute accuracy.

Auxiliary displays are provided for stereo analog audio levels and stereo phase. On-screen readouts report illegal or invalid digital values.



Like our VTM-100 analog test instrument, easy to use menu controls allow for customizing the display to your preference, via front panel, PC, or even a mouse. Now there are two choices: the VTM-100 for analog video and the new VTM-100D for serial digital component video. Call us today to learn why they are the perfect choice for your system.

VIDEOTEKTM
A Zero Defects Company



A Digital System
Integration Product



243 Shoemaker Road, Pottstown, PA 19464 1 800-800-5719 (610) 327-2292 Fax: (610) 327-9295

Circle (2) on Reply Card

Starving For Digital?

Feast on Leitch's DigiBus digital system like a buffet. You can choose any combination from a vast selection of digital modules to fill your DigiBus.

Need a single digital function? Order AlaCarte. Leitch Digital Glue is an entire product line of independent digital applications and frames.

Leitch satisfies even the largest digital appetites.

For digital catering call:
1-800-231-9673

LEITCH®

Circle (3) on Reply Card



DigiBus Buffet

FEATURING:

- Composite Analog to Serial 4:2:2 Decoder
- Composite Analog to Parallel 4:2:2 Decoder
- Composite Analog to Parallel 4:2:2 Frame Synchronizer
- Composite Analog to Serial 4:2:2 Frame Synchronizer
- Component 4:2:2 Serial Input/Serial Output Frame Synchronizer
- Component 4:2:2 Serial Input/Parallel Output Frame Synchronizer
- Component 4:2:2 Parallel Input/Serial Output Frame Synchronizer
- Component 4:2:2 Parallel Input/Parallel Output Frame Synchronizer
- Composite Serial Input/Serial Output Frame Synchronizer
- Composite Serial Input/NTSC Output Frame Synchronizer
- Composite Serial Input/Parallel Output Frame Synchronizer
- Composite NTSC Input/Composite Serial Output Frame Synchronizer
- Composite NTSC Input/Composite NTSC Output Frame Synchronizer
- Composite Parallel Input/NTSC Composite Output Frame Synchronizer
- Composite Parallel Input/Composite Parallel Output Frame Synchronizer

AlaCarte Digital Glue

ENTREE

- Serial Distribution Amplifier
- Equalizing, Reclocking Serial Distribution Amplifier
- Error Detection and Handling Serial Distribution Amplifier
- 4:2:2 Serial Test Signal Generator
- 4:2:2 Serial Logo/Trouble Generator
- 4:2:2 Serial Black Generator
- Serial to Parallel Converter
- Parallel to Serial Converter
- 4x1 Serial Video Router Module
- 16x1 270MB/s Clean Switch Serial Video Router Module
- 16x1 Serial Video Router Module
- Component Analog Video to Parallel 4:2:2 Converter
- Component Analog Video to Serial 4:2:2 Converter
- Key Signal to Parallel 4:0:0 Converter

