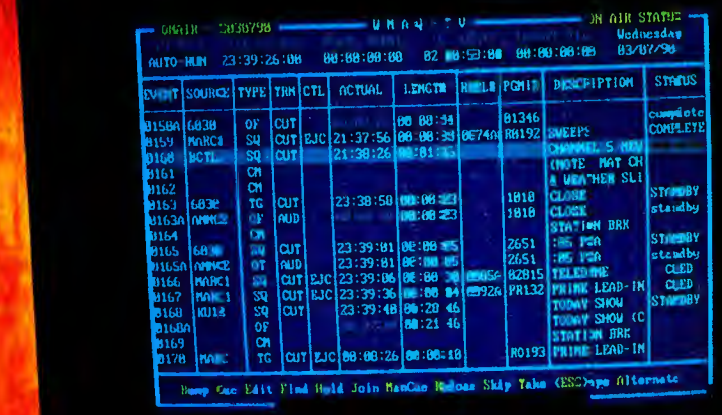
BROADCAST engineering

AN INTERTEC PUBLICATION

April 1990/$4.50



Automation: Solutions for the '90s

Surviving new owners p. 64

When you need extra hands mixing audio, Shure's AMS can help.

Until recently, you needed outstanding hand-ear-eye coordination to mix audio in multiple-microphone broadcast situations.

Now there's a system that gives you broadcast-quality audio when you can't cover all the faders at once. It's the Shure Automatic Microphone System (AMS), featuring patented direction-sensitive gating.

The Shure AMS continuously compares audio signal levels from two matched unidirectional condenser microphone cartridges located back-to-back in each AMS microphone. The rear-facing cartridge monitors ambient sound, while the front-facing cartridge handles sound from the desired source. When the front cartridge output exceeds the rear cartridge output by 9 dB, the AMS mic channel gates on automatically in .004 seconds.

Because of this unique gating concept, an AMS microphone channel will *only* gate on when addressed from within a 120-degree "window of acceptance" centered at the front of the microphone. AMS mics *not* addressed from within this angle remain off. So the number of open microphones is kept to a minimum automatically, with no need for manual control.

Since the Shure AMS automatically keeps track of the number of open microphones and adjusts the overall gain to compensate, your broadcast level stays constant as mics open and close, without troublesome gain-riding.

Direction-sensitive gating makes the Shure AMS the best system to use in multiple-mic situations, from panel talk shows to game shows to hearings on Capitol Hill. More and more broadcast engineers are discovering the advantages of having broadcast-quality multiple-microphone audio without the headaches of manual mixing or the time-consuming setup of so-called automatic mixers.

With AMS you not only get all the advantages of a truly automatic microphone system, you also get the broadcast-quality audio and reliability of Shure microphones.

For a comprehensive AMS literature packet, call us at 1-800-257-4873. For AMS technical support, call Michael Pettersen at 1-708-866-2512.

SHURE®

The Sound of the Professionals®...Worldwide.

Circle (1) on Reply Card

Maximum FX.

Minimum $.

A·C·E

Effects cost. And more effects cost more.

Those were the rules.

Until now.

Because the A.C.E. Arena changes all that. With an incredible array of powerful, creative keying facilities. For both live and post-production use.

At a price that's almost too good to be believed.

The Arena is as flexible and easy to use as it is affordable. With enhanced Memory Controlled Effects, ALPHA-TRACK to fly keys and 16 inputs with four linear key layers. As well as a separate serial interface to recall DVE events, dual pattern generators with 89 wipes, including rotary, 7 color matte generators and optional M.C.E. disk drive.

And so on.

All in a compact, attractive, ergonomic package.

And all this for a very affordable price.

Give your Midwest representative a call. For maximum information on the mini-priced wonder. The A.C.E. Arena Production Switcher.

MIDWEST
Communications Corp.

One Sperti Drive
Edgewood, KY 41017
606-331-8990

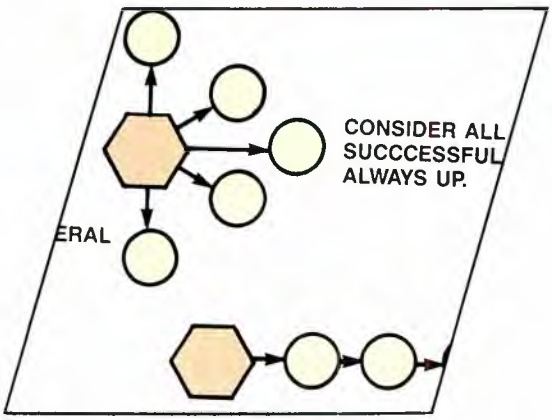
Circle (3) on Reply Card

Contents

April 1990 • Volume 32 • Number 4

Page 32

Page 44



Page 64

BROADCAST engineering

MAKING AUTOMATION WORK:

Automation of radio and TV station operations has become an important tool for increasing the productivity of any facility. With increased competition in the marketplace, stations are looking for ways to reduce overhead and improve on-air performance. Automation is one method to accomplish both objectives.

OTHER FEATURE:

ON THE COVER

Automation continues to improve the operation of today's stations. The technology improves efficiency and eliminates mistakes, making for a successful operation. Best of all, the equipment is easier to use than ever before. (Cover credits: Circuit board supplied by Digital F/X, broadcast automation supplied by Alamar Electronics, design by Eric Muller, photography by Douglas Schwartz.)

DEPARTMENTS

Hitachi makes it easy.

NOW, THE RIGHT CHOICE IN ADVANCED CCD CAMERAS IS CLEARER THAN EVER. THE NEW SK-F3 AND SK-F700.

Hitachi presents two new 3-chip CCD broadcast cameras that give you higher resolution and better image quality than you have ever seen before in a broadcast camera.

The SK-F3 dockable and the SK-F700 studio cameras include the newest Frame Interline Transfer (FIT) CCD technology. Smear is virtually eliminated. Sensitivity is dramatically improved.

A 6-speed electronic shutter and contrast function are both built-in. And as for high resolution, the SK-F3 and SK-F700 hit a crystal clear 700 lines.

Your choice for a high performance camera system has never been easier. Learn more about the new SK-F3 and SK-F700. In the studio or in the field, they are clearly superior. Contact the Hitachi regional office nearest you.

Hitachi Denshi America, Ltd.

NEW YORK 516-921-7200 • ATLANTA 404-451-9453 • CHICAGO 708-250-8050
DALLAS 214-233-7623 • LOS ANGELES 213-328-6116

Chyron and Midwest terminate agreement

Chyron, Melville, NY, and Midwest Communications, Edgewood, KY, have terminated their previously announced agreement in principle to combine the two companies. They were unable to reach agreement on definitive terms for their merger.

Both companies anticipate that Midwest will remain an important distributor of Chryron products. Neither company expects that the failure to reach agreement will in any way disrupt their long-standing commercial relationship.

PTC '91 issues call for papers

The Pacific Telecommunications Council's conference, "Accessing the Global Network: Weaving Technology and Trade in the Pacific," is seeking paper proposals for its 13th annual conference, which will be held Jan. 13-16, 1991, in Honolulu. The deadline for the proposals is June 30, 1990. For further information and a proposal submission form, contact: PTC '91, 1110 University Avenue, Suite 308, Honolulu, HI 96826; 808-941-3789, 808-944-4874 (fax).

132nd SMPTE issues call for papers

A call for papers for the 132nd SMPTE Technical Conference and Equipment Exhibit has been issued. The conference will be held Oct. 13-17 at the Jacob K. Javits Convention Center, New York.

Kerns H. Powers (consultant) has been appointed program chairman. John L. Baptista (Consolidated Film Industries) and Alan S. Godber (National Broadcasting) are the program vice chairmen. John Erwin (Eastman Kodak) is coordinating the film papers.

The theme for the conference is "Film and Television — One World?" Authors should submit a 500-word synopsis and a completed author's form to SMPTE headquarters by June 15 in order to have a paper considered for the conference. The 100-word abstract that was required in previous years has been eliminated. Finished manuscripts of accepted papers are due by Aug. 17. Authors will be notified of acceptance before Aug. 3. Presentation time, including visuals and demonstrations, should be 20 minutes. Author forms are available from program coordinator Marilyn Waldman, 595 W. Hartsdale Ave., White Plains, NY 10607; 914-761-1100.

In addition to the technical program, an equipment exhibit and several social activities are planned. The equipment exhibit will be staged at the convention center Oct. 13-16. Approximately 250 to 300 manufacturers are expected to participate.

The social events begin on Friday, Oct. 12, with the Welcoming reception at the Marriott Marquis Hotel. The Honors and Awards luncheon will be held Saturday in

Continued on page 112

BROADCAST ENGINEERING

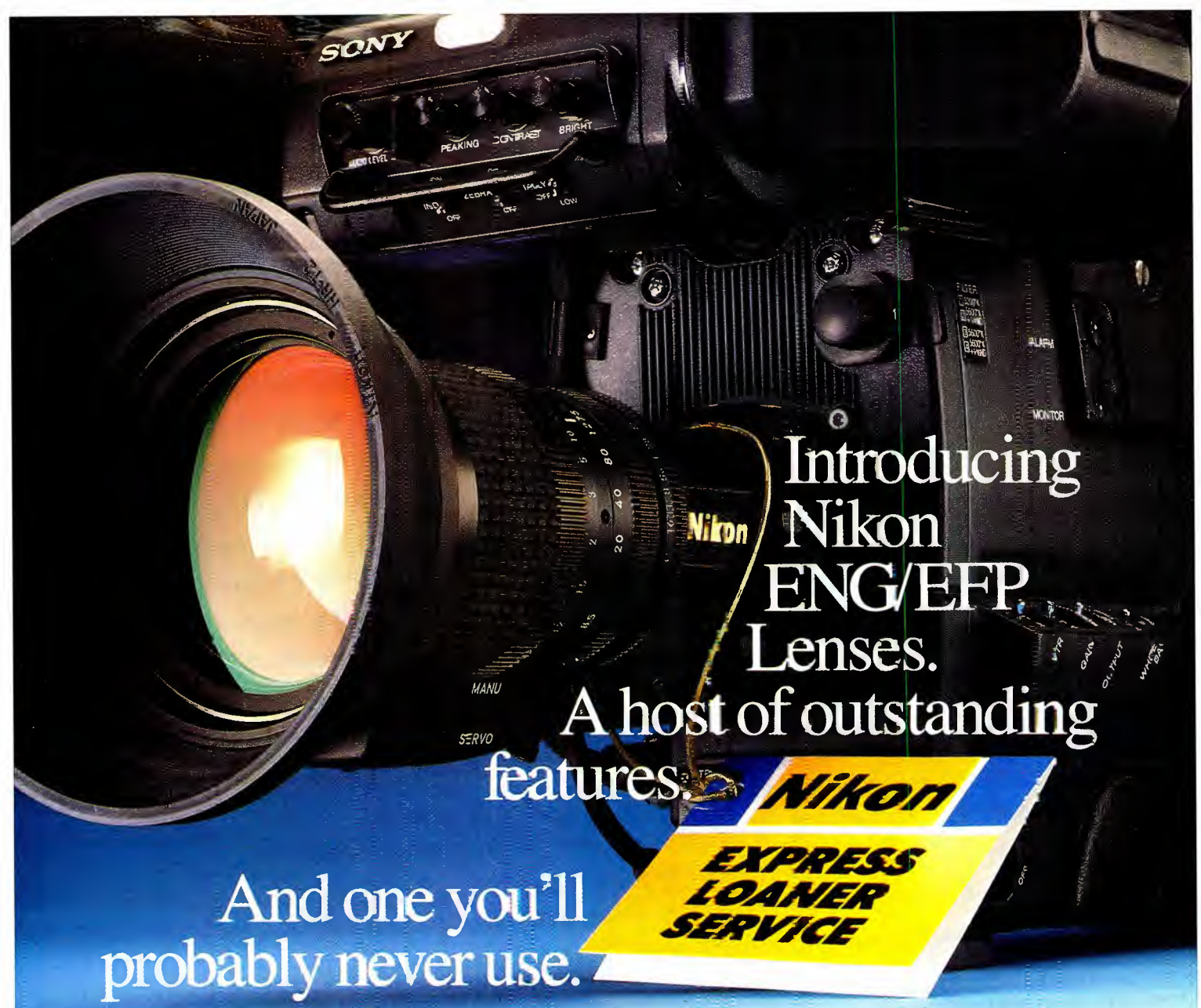
Editorial and advertising correspondence should be addressed to: P.O. Box 12901, Overland Park, KS 66212-9981 (a suburb of Kansas City, MO); (913) 888-4664. Telex: 42-4156 Intertec OLPK. Circulation correspondence should be sent to the above address, under P.O. Box 12937. RAPIDFAX: (913) 541-6697.

BROADCAST ENGINEERING (ISSN 0007-1794) is published monthly (except in the fall, when two issues are published) and mailed free to qualified persons within the United States and Canada in occupations described here by Intertec Publishing Corporation, 9221 Quivira Road, Overland Park, KS 66215. Second-class postage paid at Shawnee Mission, KS, and additional mailing offices. POSTMASTER: Send address changes to **Broadcast Engineering**, P.O. Box 12960, Overland Park, KS 66212.

SUBSCRIPTIONS: Broadcast Engineering is mailed free to qualified persons in occupations described above. Others may subscribe at the following rates: United States, one year, $50; all other countries (surface mail), one year $60. Rates include postage. Foreign air mail and Canadian first class options are available at the annual subscription rate of $115. Single copy price $4.50, except for the annual Buyers' Guide/Spec Book, which is $20. Back issues, when available, $5; Buyers' Guide/Spec Book back issues $23. Adjustments necessitated by subscription termination at single copy rate. Allow six to eight weeks delivery for change of address or new subscription.

Advertising offices listed on page 126.

INTERTEC PUBLISHING CORPORATION



Introducing Nikon ENG/EFP Lenses.

A host of outstanding features.

And one you'll probably never use.

Nikon EXPRESS LOANER SERVICE

Selecting an ENG/EFP lens for your ⅔" CCD camera is a creative decision. It should be lightweight, responsive and zoom smooth as silk at any speed. Its design should utilize Extra-low Dispersion Glass to minimize chromatic aberration. It should include an anti-reflection coating for improved spectrum transmission ratio. And it should have an advanced design that improves corner resolution and produces a high, flat MTF curve. In short, it should be a Nikon.

But selecting an ENG/EFP lens is also a business decision. And on that score we provide something almost as compelling as Nikon quality – our unique Express Loaner Service. Simply register the Warranty, then in the unlikely event your lens needs service we'll get you a loaner lens overnight. All your investment in equipment and crews is more secure than ever before.

A service like this is remarkable in itself. But not quite as remarkable as our lenses.

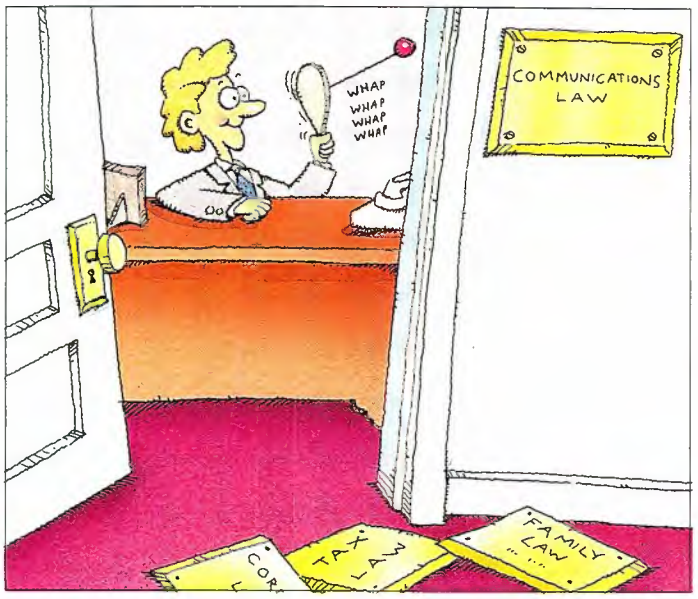
As with all Nikon products, our new ENG/EFP lenses have all our renowned quality, tradition and technology built right in. Our growing line is also fully accessorized, including adapters that allow the use of your entire arsenal of Nikkor 35mm SLR camera lenses for special effects.

To find out more, call or write for our complete brochure: Nikon Electronic Imaging, Dept. D1, 101 Cleveland Avenue, Bayshore, NY 11706, (516) 222-0200 Ext. 324. Or call 1-800-NIKON-US (645-6687) for the dealer nearest you.

Nikon
ELECTRONIC IMAGING

Circle (4) on Reply Card

Legal beagles



I have always thought that people who hold jobs should do something for a living. Firemen should put out fires. Policemen should catch crooks. People who regulate broadcasting should verify that transmitters operate according to the license granted, should not interfere with others' operations and should make sure that the EBS system is constantly viable. Such is not always the case, however.

I recently attended a meeting of communications lawyers, convened at a classy hotel in Washington. We heard regulatory postulations from FCC officials, industry representatives and a wizard from a high-level think tank. I enjoyed the program, but was shocked when I asked the attorney next to me why he had chosen communications law. He replied that he had been between jobs and thought he'd give it a whirl.

This took me aback. To him, broadcasting was just another business. To many of **BE**'s readers, broadcasting is a way of life. Most engineers I know love this industry. We put more into it than we would dare if it was just a job. For instance, once I received almost two dozen sutures when an errant tape deck slipped as I carried it down a stairway. There's a small brown mark on my right wrist where an overzealous co-worker tried to solder on me. Many engineers bear significant injuries from contacting high voltage in the line of duty. Shouldn't we feel indignant when impudent lawyers announce they'll dabble for a while in the field of communications?

Adding insult to injury is the fact that these legal beagles think they really do something. In their meetings, they talk of adjusting the regulatory mix to spur competition. They propose laws to level the playing field, making things just a little bit bad for everyone. And somehow, they manage to do it all on a commission basis.

These wonder kids really do shape the world, unfortunately. They make the rules the rest of us live by, but they often do so without a full knowledge of their potential impact. My personal distrust of regulators began with a stroke of some lawyer's pen when my coveted first-class radiotelephone license was suddenly devalued. My employer changed me instantly from a transmitter operator into a VTR loader and told the rest of the tape crew they now were free to adjust the transmitter — until one of them melted several thousand dollars worth of final output tubes. Management, trusting the government to know best, had mistaken common law for common sense.

Such problems continue today. EBS tones in TV stations are supposed to modulate the transmitter to 40%, but some station chief operators report that different FCC offices render different interpretations of the law. I spoke with one who says the FCC field office that would inspect his station told him it's 40% per tone, 80% overall. It is hard to attain that level without bypassing the station's audio-processing equipment. Seeking further clarification, he called the FCC in Washington and was told that the law says 40%, period. To break the tie, the station's consultant on EBS compliance (whoever needed such a thing before deregulation?) ruled that the FCC would allow 65%, considering audio processing. This chief has since seen a convincing study by a respected consulting engineer, which states that the levels must be, in fact, 80%. In such a case, the frustrated chief knows little more than that no matter what he does with his tones, it will be wrong.

It does no good to pine for the old FCC where "engineer's engineers," by virtue of training and experience, could speak with authority on a given rule and have it stay spoken. And yet, for all the turmoil caused by the great deregulation experiment, we must ask ourselves, "Are we really any better off?"

If we must have rules, let them be good rules, clearly defined and applicable to broadcasting today. It takes good technical people to make such rules, not flighty lawyers who decide to "have a go" at broadcasting before moving on.

Rick Lehtinen

Rick Lehtinen,
TV technical editor

Be prepared.

For the first real improvement in AM sound in more than a decade.

The future offers real promise for AM radio. NRSC AM radios are almost here, factory-installed in new cars. Soon, home stereos and portable sets will also be NRSC-equipped.

NRSC (National Radio Systems Committee) has created a voluntary national transmission standard that makes wideband high-fidelity AM radios practical. As broadcasters adopt the NRSC standard, receiver manufacturers can extend and flatten their frequency response without risk of increasing the audibility of interference.

Is your station prepared?

The 9100B NRSC-standard OPTIMOD-AM® is the first choice of AM stations concerned about improving their sound to compete with FM. OPTIMOD-AM sounds great on both the new NRSC receivers *and* on the millions of narrow-band receivers already in the field that will be in use for years to come.

When replacing older-style processors with OPTIMOD-AM, stations experience a significant increase in coverage area. And when replacing any processor, stations experience a dramatic improvement in sound quality, on both *voice* and *music*, with no sacrifice of loudness.

Superior sound is an important part of an overall strategy to increase ratings and profits. With OPTIMOD-AM, your announcers' voices will have presence and impact, while still sounding very clean. Music will have real bass, with punch and warmth, not boom. The highs will seem to open up. And loudness and tonal balance will be consistent from source to source.

OPTIMOD-AM can be configured to operate optimally in mono, C-QUAM® stereo, or Kahn stereo. Mono units can be field-upgraded later to stereo by simply plugging in additional cards.

Be prepared. Call your Orban Broadcast Products Dealer for more information on OPTIMOD-AM 9100B, or call us direct.

orban

a division of AKG Acoustics, Inc.
645 Bryant St., San Francisco, California 94107 USA
Telex 17-1480 FAX (415) 957-1070
Telephone (415) 957-1067 or (800) 227-4498

Circle (5) on Reply Card

FCC update

Wireless cable service rules proposed

By Harry C. Martin

The commission has proposed rule changes to accommodate "wireless cable," an emerging service that provides multiple video channels, which use a combination of old and relatively new over-the-air technologies.

This service uses microwave radio channels instead of coaxial cable to deliver non-broadcast material, such as HBO and ESPN over-the-air into homes. It typically combines standard television with special microwave reception equipment, and uses a combination downconverter and channel selector to provide a composite of broadcast and non-broadcast signals to subscribers in a simple-to-use format.

The frequencies allocated for this use are those in the multipoint distribution service (MDS) and the multichannel multipoint distribution service (MMDS). Also, there are channels in the private operational-fixed microwave service (OFS), which are suitable for and permitted for MDS-type service. In addition, channels in the instructional television fixed service (ITFS) can be leased for MDS-type use on a part-time basis. Under the FCC proposal, all of these services will be combined under one set of rules. The commission also plans significant deregulation of wireless cable.

Among the specific rule changes are the following:

- Eliminating multiple ownership restrictions on the E, F and H channels.
- Modifying interference requirements and processing practices to accelerate authorization of MDS systems.
- Easing restrictions on the lease terms for MDS use of ITFS excess capacity.
- Prohibiting or restricting ownership and/or control of MDS and OFS channels by cable system operators.
- Increasing power output limits where possible, and conforming technical parameters and channel assignment standards among the services, to the extent possible.
- Making technical rule changes to increase licensees' flexibility in adjusting systems to avoid interference.
- Authorizing use of "signal boosters" or "beambenders" in all services.
- Increasing MDS operators' access to auxiliary frequencies.

Two additional matters will be considered, although no rules are proposed at this time:

- Licensing non-ITFS entities for vacant and unapplied-for ITFS channels, subject to some restriction that will preserve some capacity for future ITFS use.
- Reallocating the H channels from the OFS to the MDS service.

Martin is a partner with the legal firm of Reddy, Begley & Martin, Washington, DC.

Cable signal leakage rules enforced; new form adopted

A cable system in Texas recently was fined $4,000 by the FCC for violating the agency's signal leakage standards. An inspection revealed the system had been radiating in excess of FCC standards on two aeronautical frequencies, and the FAA had complained to the commission regarding the resulting interference.

Because cable systems use closed-delivery systems that are not intended to radiate over the air, a cable system's use of the spectrum is dependent upon its ability to strictly limit any signal leakage. Systems must meet stringent radiation standards to ensure that their use of the same frequencies as aeronautical and other over-the-air services will not cause any interference.

In January, the commission sent copies of its new Form 320 to all cable system operators. The form is to be used to collect the needed information to ensure the safe use of aeronautical frequencies.

Before July 1, 1990, each cable TV system that uses a frequency in the 108MHz-137MHz or 225MHz-400MHz bands is required to file cumulative signal leakage index (CLI) information or the results of airspace measurements, in accordance with section 76.611 of the commission's rules. Effective July 1, 1990, all grandfathered cable operations on aeronautical frequencies, pursuant to section 76.619, will cease. After July 1, 1990, CLI information or the results of airspace measurements is required to be submitted before the activation of aeronautical frequencies on new cable systems or on extensions of existing ones.

The commission has proposed rules to protect children from exposure to telephone dial-a-porn services.

Section 223 of the Communications Act will impose criminal penalties on those who knowingly make obscene or indecent communications by telephone for commercial purposes to persons younger than 18 years of age or to adults without their consent. To the extent technically feasible, the law also requires telephone companies to prohibit access to indecent communications from the telephone of a subscriber who has not previously required access. The law also provides that it is a defense to prosecution if the service provider restricts access to indecent communications to persons 18 years or older by complying with FCC procedures.

The proposed rules would establish the following procedures as means to avoid prosecution:

- Payment by credit card before message transmission.
- Use of an authorized access or identification code before message transmission.
- Scrambling the message.
- When the company offering the service is a message sponsor subscribing to a mass announcement service tariffed at the FCC, requests must be made indicating in writing to the carrier that calls to the message service are subject to billing notification as an adult telephone message service.

The commission believes these alternative options represent, under current technology, the most carefully tailored and least-restrictive procedures available that are consistent with the First Amendment and section 223 of the Communications Act.

FCC forfeiture authority increased

In December 1989, section 503 of the Communications Act was amended to increase dramatically the amount the FCC may access for forfeitures of rule violations.

The forfeiture structure increases the permissible forfeiture limitation from $2,000 for each violation to $25,000 for broadcasters and cable TV operators and applicants, with an aggregate limit of $250,000, up from $20,000.

Innovation.

For ideas that reshape the television industry, nobody supports you like GVG.®

Grass Valley Group®

A TEKTRONIX COMPANY

At the heart of Television

NORTH AMERICA Grass Valley, CA (916) 478-3000 SOUTH AMERICA Miami, FL (305) 477-5488 EUROPE Basingstoke, Hampshire (0256) 817817 ASIA Hong Kong 7874118

Circle (6) on Reply Card

Lightning-quick evaluations

By Margaret Craig

The Lightning display is a useful tool for adjusting component analog video (CAV) signals. You can interpret the Lightning display easily and make the correct CAV adjustments quickly by understanding the implications of dot displacement relative to the graticule.

Connect the dots

Evaluating and adjusting CAV component amplitudes is easy when using the Lightning display; simply adjust the gain of each signal until every dot in the display is located in the center of its respective graticule box. (See Figure 1.)

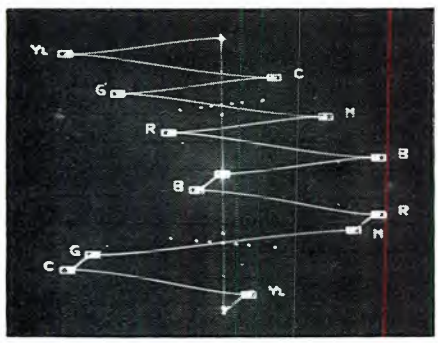


Figure 1. *A Lightning display provides a quick, easy way to check CAV signals.*

The zero signal level (blanking) is represented by the dot in the center of the display. The color bar levels appear as the other dots. If the dots are displaced vertically from the indicated graticule positions, the luminance amplitude is incorrect. A luminance setting that is too high causes vertical displacement of the dots away from the center (blanking) dot. Luminance that is too low causes vertical displacement toward the center dot.

Horizontal displacement of the dots relative to the calibrated graticule positions indicates incorrect B–Y or R–Y levels. The B–Y dots are in the upper half of the display, and the R–Y dots are in the lower half of the display. Again, displacement away from display center indicates a signal level that is too high, and displacement toward display center reveals a signal level that is too low.

The relative timing between component signals also can be evaluated with the Lightning display, which is done by observing the amount and direction of bending in the transitions between dots. The green-magenta transitions in the upper and lower halves of the display are used for this. A series of graticule dots aids this observation and can be used to estimate relative timing error. The best results are obtained with display expansion, as shown in Figure 2.

If there is zero relative delay between components, the green-magenta transition will pass through the center dot of the dot series, as is the case in Figure 1. Bending away from the center of the display indicates that the color-difference signal is advanced from the luminance signal, and bending toward the display center indicates a delay in the color-difference signal. To establish correct relative timing, simply adjust the advance or delay of the appropriate component signal until the Lightning display's green-magenta transition passes through the center dot of the dot series. Remember, the top half of the display is +Y vs. B–Y and the bottom half is –Y vs. R–Y.

How Lightning compares

The advantage of a Lightning display is that it shows all three components in a single, easily interpreted display. Relative channel gain and timing errors can be spotted at a glance, which is particularly advantageous in setting up and evaluating CAV distribution systems.

You also can use parade, overlay and bowtie measurement methods directly for CAV signal evaluation. In fact, these other methods may be preferred for high-resolution amplitude and timing measurements. They are, by their nature, somewhat more demanding to use. Although the parade display is good for absolute and relative amplitude measurements on all three components, it is not as amenable to timing measurement. For timing measurements, it's generally better to switch to an overlay display mode and observe how the component transitions line up. Alternatively, the bowtie method could be used for both relative amplitude and timing measurements, but this method requires a special test signal.

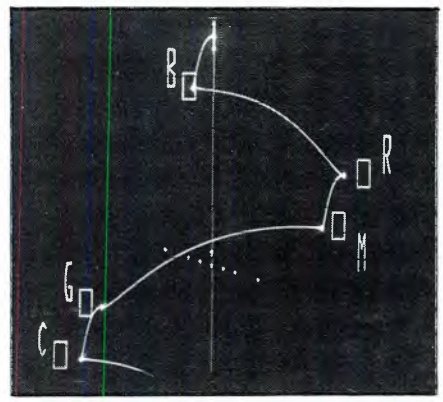


Figure 2. *The Lightning display expansion can show amplitude and timing errors. Component signal timing can be evaluated by observing the green-magenta transition.*

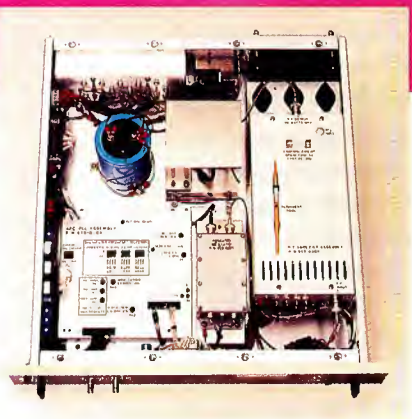
The Lightning display offers two important advantages for evaluation and setup of CAV signals. First, it provides a single display of the important component relationships. Second, the display, which derives from standard component color bar signals, simplifies CAV channel monitoring and initial evaluation. If a quick look at the Lightning display reveals possible gain or timing problems, more definitive measurement methods can be used.

Craig is an engineer for the technology development group, Tektronix Television Division, Beaverton, OR.

New FX 50 Exciter

Audio Performance That Rivals CD's

THD and IMD 0.003%, 93 dB S/N, 50 Watts



Broadcast Electronics introduces the ultimate FM Exciter - the new FX 50 - with performance even superior to the world standard FX 30.

CD Sound
The new FX 50 Exciter has the lowest distortion of any exciter available with THD and IMD of 0.003%.*

CD Dynamic Range
With a signal to noise ratio (S/N) of 93 dB* the FX 50 can handle all of the nuances and power of compact discs.

Move Up To CD Standards
Every new "B" Series FM Transmitter incorporates the FX 50 for true CD transparency. And, the FX 50 is the ideal retrofit for your present exciter.

Set It And Forget It — 50 Watts
Sophisticated automatic control systems assure stable reliable 50 watt MOSFET power output even under mismatch conditions.

*Typical

For information on the FX 50 Exciter and on Broadcast Electronics' new "B" Series FM Transmitters which incorporate the new FX 50 Exciter, call Bill Harland or Russ Erickson at 217-224-9600.

BE® BROADCAST ELECTRONICS INC.

4100 N. 24th ST., P.O. BOX 3606, QUINCY, IL 62305, (217) 224-9600, TELEX: 250142, FAX: (217) 224-9607

Circle (7) on Reply Card

In-line bridge measures actual conditions

By John Battison

In the early days of radio work, an engineer used a *cold bridge*, pre-WWII and probably a BC-210 oscillator and heterodyne receiver to adjust a station's antenna or phasing system. I remember a repair assignment one midnight more than 30 years ago, in Dismal Swamp (the actual name), NC. I was working on an antenna with an old cold bridge and battery-operated equipment with only a Coleman lantern for light because there was no power at the tower base. First, I found a weak heterodyne and then a null, and the job was completed. Compare this antenna maintenance with the equipment setup engineers use today.

Use an in-line bridge

An important advantage of the in-line bridge is that it is *in line* and, therefore, measures the system under actual operating conditions. Other bridges measure system parameters under cold conditions. This requires the station to go off the air to make an antenna system measurement. Also, the readings may be less accurate because coils and capacitors are not at operating temperature when the test is made. Remember, when using either type of bridge, apply the correction factor properly.

Both types of impedance bridges are calibrated for 1,000kHz (1MHz), and reactance dial readings must be corrected for the frequency in use. In the case of the G.R. bridge, the measured reactance must be *divided* by the operating frequency to obtain the actual reactance.

Apply the correction factor

It is easy to make a mistake in interpreting the reactance correcting instructions engraved on the in-line bridge. Many users have mistakenly divided instead of multiplied the operating frequency in MHz by the reactance dial reading. A dial reading of $-j150$ at 1,550kHz turns out to be $-j150$ multiplied by 1.55MHz, which equals $-j232.5\Omega$. This is quite a bit more than the original reading of $-j150$. A worse error would occur if $j150$ was divided by 1.55, the result equaling $j96.7\Omega$, which is a significant difference.

Although the OIB reads hot circuits, and reactance adjustments can be made while hot, inserting an OIB can disturb a circuit. An easy way to check for this problem is to read the antenna monitor with the bridge in circuit, then remove the bridge and re-read the antenna monitor. If retuning is required to regain the original monitor reading, try adjusting the network closest to the bridge insertion point.

Make adjustments carefully

After the ATUs are properly tuned, the line input will see 50 (usual line Z) $\pm j0$. If R is not exactly $50\pm j0$, the output (antenna) arm should be adjusted slightly to make the correction. If output arm tuning will not correct the situation, it will be necessary to adjust the shunt arm slightly. These adjustments probably will upset the reactance so the input arm should be adjusted as necessary to get rid of j.

If it was necessary to adjust the phaser, the phasing networks can be set up in the same way. However, I discourage changing any internal phaser settings until everything else has been tried. It is not often that permanent changes have to be made. Usually the front controls will handle the requirements.

If a control is adjusted fully one way and the parameters still are not correct, it may be necessary to change a coil tap in the phaser to put more power into the antenna. This sometimes happens when jeep coils are tapped across the power divider.

If you change any tap in any coil, be absolutely sure to mark the tap position *before* removing the tap. It is easy to lose sight of a turn after the tap is removed and mark the wrong one.

If you think that the only thing to do is move a tap in a phaser, never go more than one turn in either direction, and, preferably, no more than half a turn. It is easy to go right past the correct position and go from bad to worse because too large of a step was taken.

I mentioned jeep coils in a power divider previously. Before deciding that a coil is a power divider coil, refer to the phaser schematic. If you don't have a phaser schematic, you must make a circuit sketch in your notebook and label the coils with their printed references. In my experience, power divider taps and coils seem to have a habit of not being what I think they are. It is essential to mark the taps before making a move.

Try to avoid making tap changes inside the phaser unless you are completely sure that such a change is imperative. Generally, if the original settings have not been disturbed, the cause of the variation is external to the phaser's circuits, and is due to antenna system changes or lines and ATUs.

Re-measure system parameters

After all of the phaser and ATU adjustments have been made, the common point must be re-measured with the bridge inserted after the common point meter. You should have a phaser with continuously variable series and shunt arms in the common point network. The shunt and series arms then are adjusted for $50\pm j0$, using the shunt leg to vary the resistance.

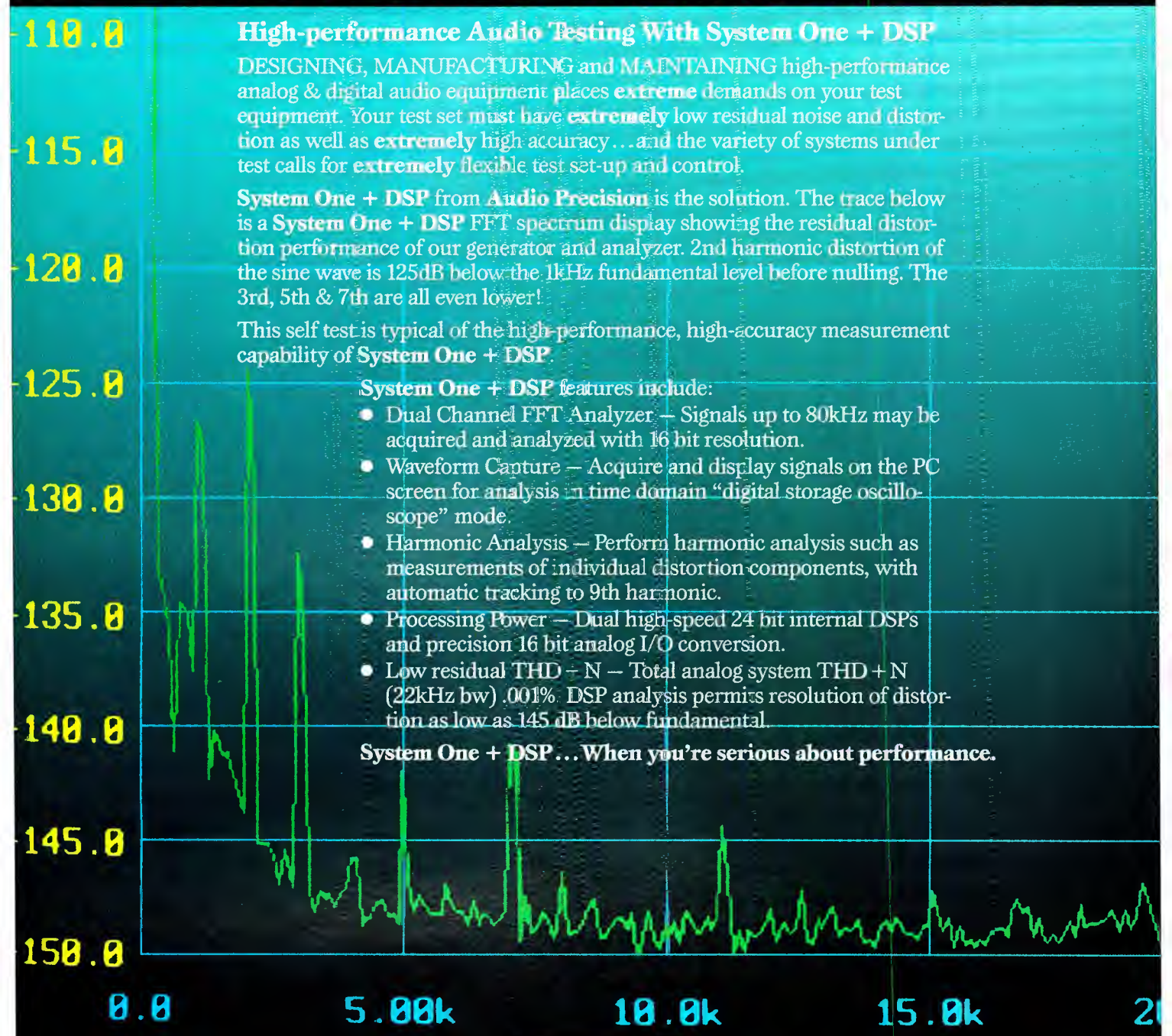
Line damage

Assuming that you have made your adjustments and the bridge's measured values are close to those desired, you should check the line current. Insert an ammeter into the line, leaving the phaser and read line current. Do the same thing at the ATU input jack. These two line currents should be very close to each other. If they are not, check the line impedance with an OIB at the phaser end. If the ATU input impedance is approximately correct on all lines but one line is way out at the phaser end, it's a good indication that actual physical line problems are developing.

Make a dc check, terminate the line at the ATU end with a 50Ω non-inductive resistance and re-measure the line input impedance. Something may have damaged the line. If so (in the absence of a pulsed-line tester), the simple grid dip meter test, which I described in the May 1989 column, will aid in locating the damage. This is especially helpful if the line is long and buried.

Battison, **BE**'s consultant on antennas and radiation, owns John H. Battison and Associates, a consulting engineering company in Loudonville, OH, near Columbus.

Extreme Measures



High-performance Audio Testing With System One + DSP

DESIGNING, MANUFACTURING and MAINTAINING high-performance analog & digital audio equipment places **extreme** demands on your test equipment. Your test set must have **extremely** low residual noise and distortion as well as **extremely** high accuracy…and the variety of systems under test calls for **extremely** flexible test set-up and control.

System One + DSP from **Audio Precision** is the solution. The trace below is a **System One + DSP** FFT spectrum display showing the residual distortion performance of our generator and analyzer. 2nd harmonic distortion of the sine wave is 125dB below the 1kHz fundamental level before nulling. The 3rd, 5th & 7th are all even lower!

This self test is typical of the high-performance, high-accuracy measurement capability of **System One + DSP**.

System One + DSP features include:

- Dual Channel FFT Analyzer – Signals up to 80kHz may be acquired and analyzed with 16 bit resolution.
- Waveform Capture – Acquire and display signals on the PC screen for analysis in time domain "digital storage oscilloscope" mode.
- Harmonic Analysis – Perform harmonic analysis such as measurements of individual distortion components, with automatic tracking to 9th harmonic.
- Processing Power – Dual high-speed 24 bit internal DSPs and precision 16 bit analog I/O conversion.
- Low residual THD + N – Total analog system THD + N (22kHz bw) .001%. DSP analysis permits resolution of distortion as low as 145 dB below fundamental.

System One + DSP…When you're serious about performance.

System One

Audio precision

P.O. Box 2209, Beaverton, OR 97075
503/627-0832 1-800/231-7350
FAX: 503/641-8906, TELEX: 283957 AUDIO UR

Circle (8) on Reply Card

Uncommon engineers

Nathan Hughes

By Elmer Smalling III

By the time Nathan Hughes graduated from high school in Carmarthenshire, South Wales, he had earned multiple credits in physics, math and chemistry. He probably had only an inkling of how much he would come to depend on his educational background. It would serve him well throughout a long and distinguished career that would take him to many parts of the world. But on that day in 1941, the world was at war. Like thousands of his countrymen, he put his future on hold "for the duration of the emergency."

Wartime training

Hughes joined the Royal Navy and was trained to be a radio mechanic. He was awarded an Engineering Cadetship, designed to provide academic and practical training in mechanical and electrical engineering. That training, however, had to be completed in only 21 months, compared with four years for the peacetime course.

With his training concluded, Hughes anticipated that he would be returned to active service in the Royal Navy as an engineering officer. To his surprise, he was transferred to the Army and sent to the School of Signals, where he learned about the latest radio and encryption equipment used in the British army. In Italy he operated and maintained this equipment for various artillery, armored, infantry and air units.

Hughes later was posted at the War Office transmitting station at Droitwich, where he operated 20kW transmitters. This facility provided high-speed telegraphy from the United Kingdom to allied military command stations. His next assignment involved experimental assembly and packaging of radio equipment, which was dropped by parachute and then tested to determine which combination of factors resulted in the least equipment damage. Among his final duties in the service was the decommission of many communications facilities in the South of England used during the Battle of Britain.

As his American counterparts attended school on the GI Bill, Hughes entered the University of Wales at Swansea, where he earned a degree in physics and applied math. He also got his amateur radio ticket, GW3GHT. His ham antenna alignment allowed him to work up and down Europe and into South America. He talked frequently with U.S. servicemen based at Templehof Airfield during the Berlin Airlift.

Profile

- *Chartered Engineer (U.K. equivalent of a Professional Engineer)*
- *Fellow and past council member of the Institution of Electronic and Radio Engineers and chairman of the Panel on Training and Education for electronic engineering*
- *Fellow of the Institution of Electrical Engineers*
- *Member of the Royal Television Society*
- *One of the founding members of the South Wales Center and the North American Center of the RTS*

Launching a career

When Hughes left college in 1951, he had a tough choice. One option was to join the BBC, where he had worked during school vacations. The other was to join the Marconi Company, which paid less but offered a greater opportunity to work in all fields of radio and television. He chose Marconi.

About the time Hughes completed his Marconi post-graduate apprenticeship to become a planning and installation engineer, great things were happening in television. In 1953 he helped design and install technical facilities in Milan, Italy, that included 21 studio camera channels with associated master, production and audio control rooms. Next, he installed the Rome studio facility before Italian television changed from experimental to full service. He also supervised the technical operation of the pioneer broadcast from the Vatican, part of the 10-day "Eurovision" spectacular during which many countries with different line standards shared programming.

In 1957, Hughes joined Television Wales and West in Cardiff, where he designed and built a medium-size TV center. When he was chief engineer, he fine-tuned the high-efficiency, low-manpower operations at ARTV and introduced new features such as the first outside garden studio in the United Kingdom and the first remote unit equipped with a modified Ampex VR-1000. In 1961, he was appointed general manager of Television Wales, where he designed the most modern studio center of the day.

His next appointment, as RCA's sales manager of broadcast and communications systems, took him to Geneva. He negotiated the sale of many different types of systems in Europe, Africa and the Middle East. In 1965, Hughes moved to the United States and, as broadcast technical manager of WTTW in Chicago, planned and supervised the installation and move of channels 11 and 20 to the company's new north Chicago location. WTTW/WXXW had the first semi-automated master control room in educational television.

After more than 25 years of worldwide TV experience, Hughes founded his own consulting firm, which deals with all areas of broadcasting and communications. A recent project included supervising the installation of a self-supporting 120-foot microwave tower. It would have been a straightforward project except that the tower was to be erected within 130 feet of an AM directional tower. With the required precondition against radiation hazards for personnel and close cooperation with the chief engineer of the AM station, acceptable levels of radiation and VSWR were achieved during the installation.

The power of education

Hughes has been keenly interested in education, fostering workshops and chairing committees on electronic engineering education over the years. His background in physics and math has served him well throughout his career. It has provided the basis for his accomplishments of the past 40-plus years, allowing him to do everything from calculating antenna impedances to engineering and troubleshooting TV and radio systems in countries around the world.

Smalling, **BE**'s consultant on cable/satellite systems, is president of Jenel Systems and Design, Dallas.

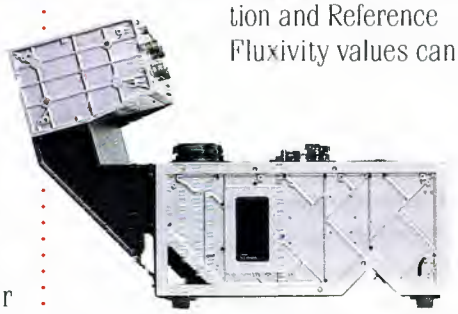
Fortunately for us, most radio engineers look before they leap.

Three cue locations and a zero memory can be accessed via the MX-55NM's built-in locator.

You've always been an analytical bunch, so we're sure you know that our MX-55NM 2-track not only gives you the features you need, but that it's also priced several thousand dollars below its nearest competitor.

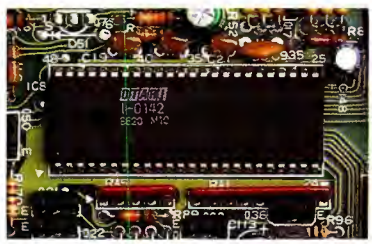
We know you're not about to overlook *major* features, like HX-Pro™ bias optimization, or gapless seamless punch-in punch-out, or that famous Otari sound. However, here's some fine points to examine as you do your "apples-to-apples" with our competitors.

For example, the MX-55NM incorporates a printed-circuit capstan motor (like that used on our MX-80 multitrack machine). This not only gives you low wow and flutter right out of the chute, but very fast start times. It's also worth noting that EQ selection and Reference Fluxivity values can be changed with a flip of a switch. And as you put the deck through its paces, notice that the varispeed control provides 0.01% step resolution. This means you can make precise changes, and perhaps more importantly, you can repeat a change *exactly* when necessary.



A 1.5" cast alloy deckplate plus cast side frames give the MX-55NM the rigidity and ruggedness you've come to expect from Otari. (Do our competitors show you the inside of their machines?)

For your convenience, an optional voice editing module maintains normal pitch at twice normal speed. And the meterbridge keeps knobs and switches out of the way while you're editing.



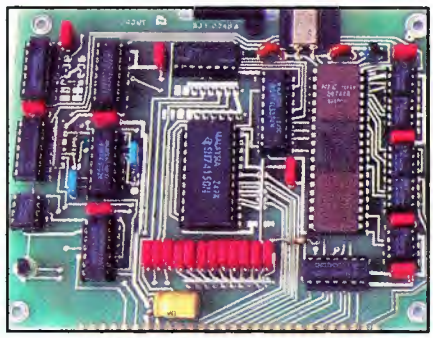
Because we know how hard you use our machines, we use a double-sided glass epoxy transport circuit board, and we silkscreen both sides of our PCBs so you can locate the components easily.

In the Otari tradition, we make the MX-55NM easy to service. Only four screws get you into the transport electronics. And when you get there, all servicing can take place with wiring intact. We also hinge all service panels, and use locking cable interconnects.

The specs? Why not call your nearest Otari dealer, or Otari at (415) 341-5900 and check them out. Like everything else, you'll find them "right on the money."

OTARI®

Circle (9) on Reply Card



Using the Smith chart overlay

By Gerry Kaufhold II

The use of a Smith chart can allow you to obtain an admittance by taking a compass and locating a point 180° from a reactance, with prime center as the center of rotation. Instead of performing this construction step, however, you can use a clear plastic Smith chart overlay, rotated 180° from the paper Smith chart page. Two sets of coordinates will appear. The underlying page is the normal Smith chart, for use in constructing and measuring impedances. Because the clear plastic overlay is rotated 180°, it can be used for plotting and measuring admittances.

Set up the Smith chart with the zero resistance point to the far left. Place the Smith chart overlay on top of the Smith chart sheet and align prime center of the overlay directly over prime center of the Smith chart sheet. Rotate the overlay so that the zero resistance point of the overlay is to the far right. Use thumbtacks to maintain the prime centers and horizontal resistance component lines directly on top of each other.

The overlay now is rotated 180° from the bottom Smith chart sheet, giving you two coordinate systems directly on top of each other. The top layer (the Smith chart overlay) is marked with values around the outside diameter that read clockwise: 0.0, 0.1, 0.2, 0.3... 1.0. Any component value plotted onto the overlay will represent susceptance, with capacitive susceptance measured going down and inductive susceptance measured going up. Any component value plotted onto the underlying Smith chart will represent reactance, with capacitive reactance going down and inductive reactance going up.

If you are careful about plotting points, and make careful note of the changing scales between the underlying Smith chart sheet and the overlay, you can use a few simple construction techniques to solve fairly tricky impedance-matching problems.

Adding capacitive and inductive components

Imagine a clock face superimposed over the Smith chart plus overlay, with the original point at high noon. Capacitive components are added by moving down. A capacitive susceptance, measured along the curves of the overlay, runs to the right and down (through the 3 o'clock position). This is considered going in the positive direction (remember, the overlay is rotated 180°), and the sign is (+). Capacitive reactance, traced along the curves of the underlying Smith chart, is added by tracing to the left and down (through 9 o'clock). For capacitive reactance, this is considered the negative direction, and the sign is (−).

Inductive components always are added by moving up. Inductive susceptance is added by tracing along the curve of the overlay right and up (through 3 o'clock). This is considered the negative direction, and the operation's sign is (−). Inductive reactance is added by tracing along the underlying chart left and up (through 9 o'clock). This is considered the positive direction, with sign (+).

Next month we will combine elements of the previous columns to solve an impedance-matching problem.

Editor's note: A special copyrighted version of the Smith chart, which presents the bottom (impedance) layer in red and the rotated overlay (admittance) layer in black, is available from Analog Instruments Company, Murray Hill, NJ, 201-464-4214. The order number is Smith chart form ZY-01-N.

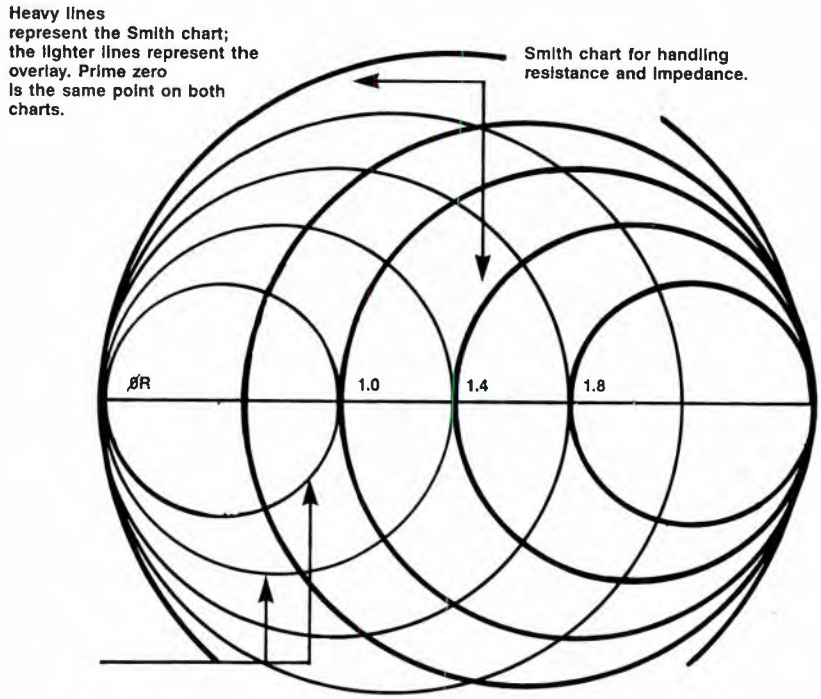


Figure 1. The Smith chart overlay and some simple rules greatly simplify conversion by eliminating the construction step. Values are read directly from chart.

Kaufhold is a market development engineer for SGS-Thomson Microelectronics, Phoenix.

THE STANDARD IN LEVEL CONTROL

Orban's Industry standard automatic level control units excel for one simple reason: They offer extraordinarily transparent control action on a wide variety of program material. Whether being used for multi-track recording or on stereo mixes, Orban compressor/limiters can be counted on to maintain transparency and dynamic integrity while efficiently controlling levels and peaks, with few audible artifacts.

464A Co-Operator™ (Gated Leveler/Compressor/HF Limiter/Peak Clipper): A four-stage, system approach to level control. Features quick set-up with straightforward front panel controls. Two channels in one rack space. Your "assistant operator" for a wide range of production chores. Astonishingly transparent and easy-to-use.

422A/424A Gated Compressor/Limiter/De-Essers: A full featured, "hands-on" production tool. Designed to allow maximum control of individual parameters such as compression ratio, and attack and release times. Contains an effective de-esser. Ideal for voice processing. Widely recognized for its smoothness. 422A mono/424A dual-channel/stereo.

412A/414A Compressor/Limiters: Orban's inexpensive compressor/limiters. Utilize the same basic circuitry as the 424A, but do not include the de-esser, nor the gating. A THRESHOLD control makes them ideal for sound reinforcement. Very effective for basic, cost-effective level control. 412A mono/414A dual-channel/stereo.

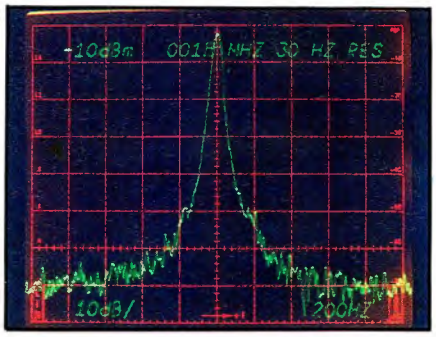
787A Programmable Mic Processor: Combines a compressor having adjustable release time with 3-band parametric EQ, de-esser, and noise and compressor gates in a fully programmable package. Designed for voice talent processing, the unit can be used to store 99 commonly-used instrumental and vocal settings for instantaneous recall. MIDI, RS-232, and remote control interface options.

Optional Security Covers: Attractive, acrylic security covers are available to fit standard 19" rack-mount products—from one to four rack spaces, in opaque white, clear, and transparent blue.

orban

LISTEN TO THE DIFFERENCE.

Orban a division of AKG Acoustics, Inc.
645 Bryant St., San Francisco, CA 94107 (415) 957-1067 Telex: 17-1480 FAX: (415) 957-1070



Battling power amp ac line voltage sag

By Gary R. Jones

A curious phenomenon occurs when the ac line voltage of an audio power amplifier is monitored at idle and at rated output; the line voltage sometimes will noticeably sag. Because of this, many manufacturers include a disclaimer in the product literature that states the product must be supplied by a 120Vac line to meet printed specifications. There's no shame or specmanship here; any power amplifier is a slave to the ac line feeding it.

To provide some protection, designers often build in enough headroom to compensate for a loss (drop/sag) of up to 10% in ac line voltage. This headroom guarantees the power amplifier's ability to deliver rated output, but probably not its THD specs, under the worst line-voltage conditions.

To examine this phenomenon, let's develop a rack of equipment and place it in different situations to see how ac line sag might affect the power amplifiers.

Example problem

Showing the particular unit and its power consumption in watts, our system consists of the following:

- One routing switcher power supply 205W
- Two stereo audio power amplifiers (500W each) 1,000W
- Two electronic crossovers 32W
- One recorder power supply . . . 800W
- Total 2,037W

This system's electrical load, when converted to resistance, is approximately 7.07Ω (using Ohm's law).

Assume a 30A service has been pulled for the audio rack, and that the wire run is 40 feet from the service panel. Forty feet of 2-wire No. 10 will generate a measured resistance of about 0.081Ω. (See Table 1.) If the No. 10 wire is considered a series resistance (R1), and the load resistance (R2) is 7.07Ω, a voltage divider network has been created:

$$(V_{in})(R2) / (R1) + (R2) = V_{out}$$

$$(120 \times 7.07) / (0.081 + 7.07) = 118.64V$$

This 1.4V loss represents a 1.2% sag and is normally not a problem. But what happens if only a 20A service is supplied? Based on Table 1, 40 feet of No. 12 wire (the higher gauge probably would be used for this lower-amperage service) will have a measured resistance of about 0.12952Ω.

$$(120 \times 7.07) / (0.12952 + 7.07) = 117.8V$$

(1.8% sag)

What happens if a 20A service is supplied, but the wire run is 100 feet long? That length of No. 12 wire would contribute a resistance of about 0.3238Ω:

$$(120 \times 7.07) / (0.3238 + 7.07) = 114.7V$$

(4.4% sag)

This sag percentage certainly could become a problem under some conditions.

Extension cords

What about the innocuous extension cord? Just about everyone would have to plead guilty to misuse of this item. Typical wire gauge for extension cords usually is 14-, 16- or even 18-gauge. The rack equipment assembled in the previous example is simple, and it easily could be portable. Connection to a 50-foot extension cord might lead to incredible ac line loss.

14-gauge = 0.00515Ω/foot:

$$(120 \times 7.07) / (0.2575 + 7.07) = 115.8V$$

16-gauge = 0.00819Ω/foot:

$$(120 \times 7.07) / (0.4094 + 7.07) = 113.4V$$

In addition to losses caused by a low supply or poor service-panel configuration, 4.2V will be lost to the 14-gauge, 50-foot extension cord. The 16-gauge cord could lose up to 6.6V.

All this indicates that it is well worth the few minutes spent to actually measure the voltage delivered to your racks, at the service drop point and in the racks themselves. Those convenient power strips also can contribute to some drop.

SERVICE	WIRE GAUGE	OHMS PER FOOT
20A	No. 12	0.003238
30A	No. 10	0.002036
40A	No. 6	0.000806

Table 1. *Higher amperage service panels use larger wire, which results in a lower cable resistance.*

Shop testing power amps

Many shops have underpowered test benches and massive ac line sag. A repair or test technician who is experiencing this problem may not know why the power amplifier under test will not meet printed specifications. Joe's power amplifier model 2000 could have been rejected by ABC Audio Design because it didn't have any "headroom" and did not meet printed specifications for THD. Did the test technician for ABC maintain 120Vac on the power amplifier's line cord? Will ABC say bad things about Joe's power amps from this day forward? Could this situation have been avoided? Absolutely!

A variac (variable power transformer) is one method to help alleviate sag on a test bench. The variac offers the technician a method for recovering ac line loss because it is a variable step-up transformer. A variac usually is fuse-protected and includes a voltmeter, an ammeter and a voltage-control knob. Variacs generally are required test devices for manufacturers of power amplifiers, yet they rarely are seen in the field.

Available ac line voltage during peak hours may be well below 120V. The city of Dallas, for example, regularly experiences line voltage in residential areas as low as 109V during peak hours. If line voltages already are low and the service panel is not nearby or is too small, the performance of any sound system may be affected. The minimum acceptable ac line voltage is 108V, and professional audio power amplifiers are expected to be able to deliver rated output power even when the ac supply has sagged this low. If your installation is having problems, and troubleshooting indicates ac line voltage sag is occurring, check for the following:

- low unloaded line voltage.
- an overloaded service panel.
- adequate service routed to the audio rack.
- a service panel that is nearby, not hundreds of feet away.

Before you curse the equipment and condemn the manufacturer, check your electrical power. It still takes power to make power.

Jones is technical services manager for Altec Lansing Corporation, Oklahoma City.

Editor's note: This article originally appeared in *Sound & Video Contractor*, an Intertec publication, Jan. 20, 1989.

JVC's 11 Series

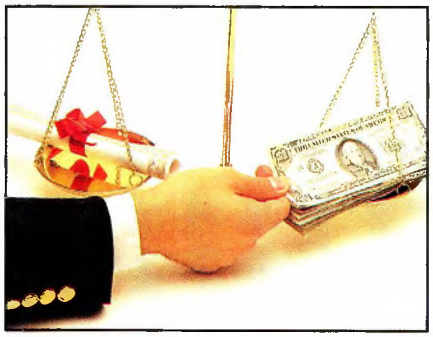
The Standard By Which All S-VHS Should Be Measured

PROFESSIONAL S is more than a trade name — it's a tough JVC standard that only the most sophisticated S-VHS products can meet. PROFESSIONAL S products must have VITC time code capability, balanced audio and superior picture quality through multiple generations. All JVC 11 Series products meet the PROFESSIONAL S standard. For further information call 1-800-JVC-5825 or write JVC PROFESSIONAL PRODUCTS COMPANY, 41 Slater Drive, Elmwood Park, NJ 07407.

JVC
PROFESSIONAL

Circle (11) on Reply Card

Management for engineers



Dodging the corporate ax

By Brad Dick, editor

I was talking with a friend about his recent "out-placing" from a major company. Marketplace conditions (no, not broadcasting) had forced the company to lay off more than 10% of its work force. This person was taking the loss of his job quite hard, because he had worked for the company for almost 20 years.

Whose company is it?

My friend expressed a loss of confidence in the system. He not only wondered how such a thing could happen, but also thought he deserved much better treatment. "How could they do this to me?" he asked.

One response to the question has been around for a long time. Lord Edward Thurlow, an English jurist and statesman in the 18th century, put it this way: "Did you ever expect a corporation to have a conscience, when it has no soul to be damned and no body to be kicked?"

Although it's true that the most successful companies are the ones that appreciate the value of their employees, those employees represent a cost variable of the utmost importance. And, without the ability to control costs, no corporation can survive.

Many in the broadcasting business have been victims of the corporate ax over the past 10 years. Deregulation merely started the ball rolling. Once the regulations that limited station trafficking were lifted, new marketplace forces came into play. Stations were traded like pork bellies and stocks. A frequent question was, "Who owns us today?"

The constant ownership changes meant that employees no longer had the security of a long-term commitment by the station to the community and staff. Now the owner might be a bank or a country-western singer. As the new-style owners took over, so did new management methods. Some of these methods resulted in "out-placement" or "disemployment" — euphemisms for firing.

Here today, gone tomorrow

The first station sales I witnessed affected only the managers and program directors. Most of us in engineering seemed immune to the effects of new ownership. Later, I discovered that as corporations gained experience in broadcasting, they often brought in their own experts to take over many areas of the stations, including engineering.

The same scenario originally applied to the lower-level staff in broadcast stations. A camera operator was needed no matter whether the owner was a holding company or newspaper magnate, right? What many of us did not anticipate was that these new owners brought with them management techniques based on regulation-free marketplaces. When they took over, they immediately applied their tried-and-true methods of automation and job consolidation.

Because so many stations had based the size of their staffs on 20-year-old technology, it wasn't difficult to see where staff reductions could be applied. The engineering department often was one of the first to be scaled down.

Examine your company's health

Take an unsentimental look at what's happening at your station. Is it being squeezed by the competition? Is its share of the media pie shrinking? How have these factors affected the station's profitability? Have recent staff reductions taken place or are some planned?

If your station is owned by a group, you need to ask the same questions about the parent corporation. The corporation may be making money, but perhaps your station is not; that's reason for concern.

Even if your group-owned station is profitable, you still may have reason to be concerned. Ailing stations in the company could increase pressure to cut your station's operating costs to shore up the unprofitable operations. Upper management may view a successful station as a safe place to pare the budget so that scarce financial resources can be shifted.

Take stock of your job

Look at your own job. Are you getting paid a relatively large salary? Ask yourself, honestly, how much the station would suffer if you were replaced by someone who could be paid significantly less. How much would station operations suffer if you weren't replaced at all? What if your boss were transferred or fired? Would it make your termination a possibility?

Many conscientious engineers adopt an unrealistic view of their importance to the station. They think that the hard work and long hours they put into getting the job done will be recognized and rewarded. The reward is supposed to be a raise and job security, but financial managers often take a much different view.

Weigh your options

Visualize where you'd be if you lost your job today. Could you transfer to another position within the corporation? Do you have powerful friends who could help open important doors for you? Would you have to relocate? If so, how would that affect your family and your standard of living?

Could you get a job in another area, such as a production house, recording studio or electronics company? If you look closely at the alternatives, you may find that they pay more. Some may pay less. The point is to examine your options.

Develop survival skills

Many people have trouble coming to grips with these questions. These tactics may help.

Assume you've lost your job and have no income. It's amazing how creative you become once you accept the notion that if you fail to act, you're done for. Suddenly, luxuries become insignificant, and survival becomes the critical factor. Once you begin a drive for survival, a whole range of new possibilities opens up.

Don't wait for the ax to fall. While you still have a job, look around for alternatives. Become political, develop alliances and call in favors. Now's the time to increase your value to the company. Don't wait until trouble looms on the horizon. Enroll in courses, develop new skills and increase your visibility within the company.

Broadcast engineers are talented people. Put those talents to work to ensure your survival in case everything changes tomorrow. Remember, if change does affect you or your station, what you become may be even better than what you are now. |:-)))|

NEW FROM ARRAKIS SYSTEMS

10,000 SERIES

For features, performance, price and reliability,

NOBODY BUILDS CONSOLES LIKE ARRAKIS.

Call (303) 224-2248

Circle (13) on Reply Card

ARRAKIS SYSTEMS INC. 2619 MIDPOINT DRIVE FORT COLLINS, CO 80525

arrakis SYSTEMS, INC.

What goes around, comes around.

Making automation work

The old saying, "The more things change, the more they stay the same," is especially true when applied to automation. Automation has always been about capability. It was next to impossible to make a diverse group of tape machines work together to pull off a perfect commercial break unless some kind of sequencing system took over the button-pushing and told each machine when to roll, allowing for individual preroll times, and controlled the switch between machines.

Then came the cart machine. Automation gradually shifted its emphasis to simplification. One person could easily keep up with a rack of early Spotmasters or a 2-inch cart machine, but it might take two or more to handle a mix of reel-to-reel machines and turntables or a room full of screaming quadraplex machines.

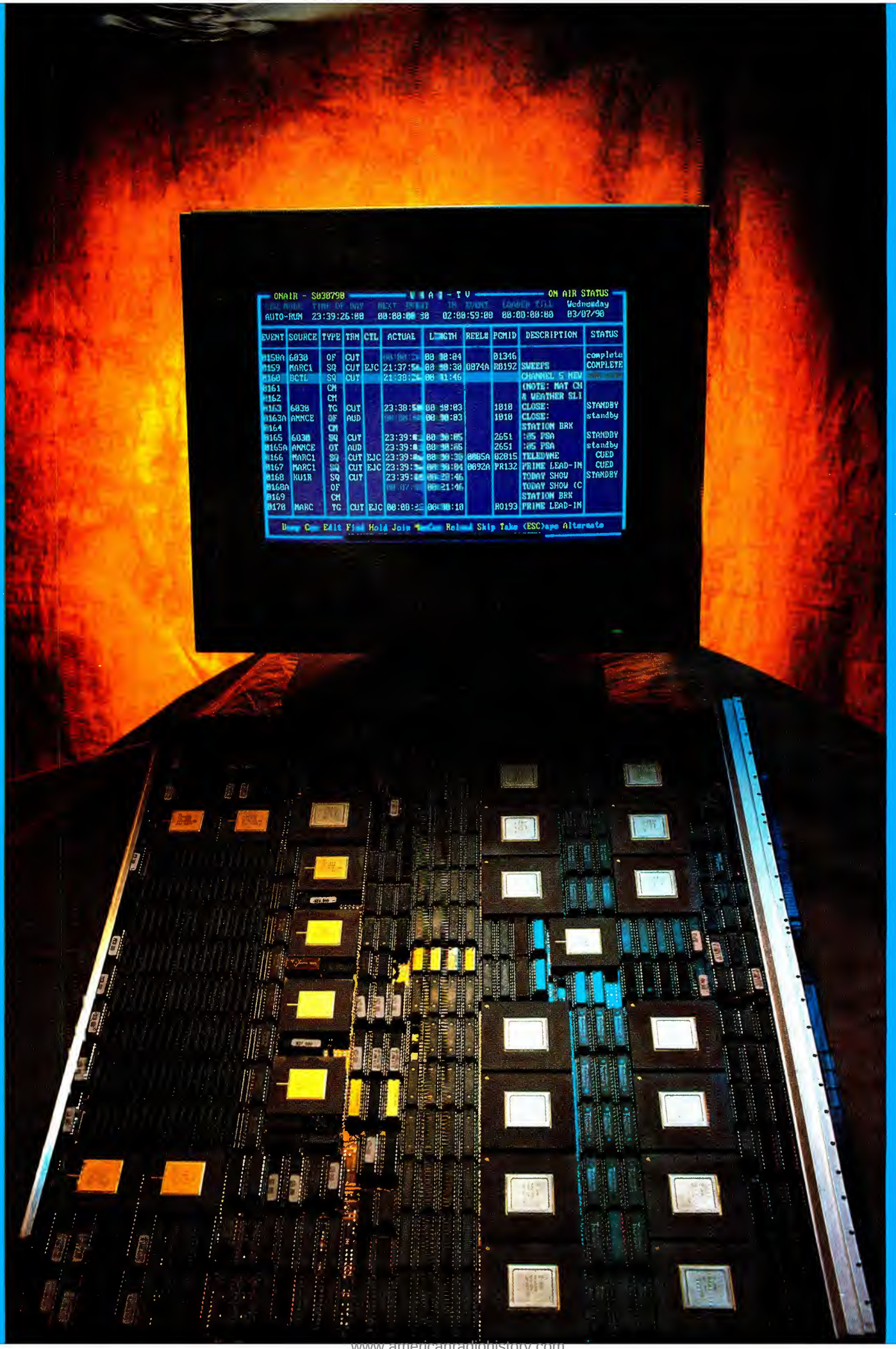
The circle is shrinking further as stations begin to trade their old automation equipment for today's cart library systems, sequenced tape machines and programmable random-access digital audio program sources. Some stations are even converting to remote commercial-insertion facilities, which rely on satellites for the bulk of their programming, including "live" talent.

This Automation Special Report will touch on the future shape of radio automation; the advances in automatic program delay units, in which microcomputers keep a multitude of decks organized; and new ideas in large library cart machines, which are becoming so powerful that they may redefine the master-control process. Also covered will be how to plot a course of action for getting back on the air quickly if disaster strikes, and the digital connections between machinery.

Strangely, this trend toward rampant automation is reaching its zenith just when the economics of broadcasting are the bleakest they've been in quite a while, and when the future has storm clouds of increased competition from alternate methods of program delivery. Once again, we just might see that automation is about capability, but not about commanding hardware and rolling tape machines — the next round of automation may deal with a station's capability to stay economically viable in a changing world.

Rick Lehtinen

Rick Lehtinen,
issue editor

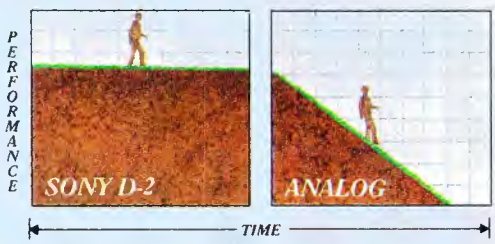


To everyone with their video it's time to

Not long ago, these facts would have been fiction. Then Sony introduced D-2 composite video.

D-2 takes the amazing possibilities of digital technology and makes them a practical reality.

In fact, revolutionary is the only way to describe it. D-2's digital world is a place where performance is consistently extraordinary. Where every tape copy is as good as the original. Where audio is as important as video. And where machines operate without the need for constant adjustments.

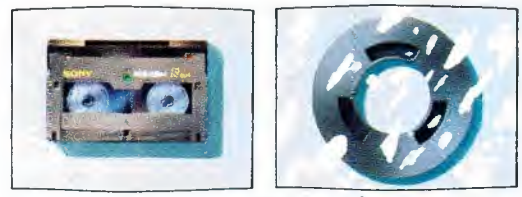


D-2 maintains consistently high performance.

In the digital world, a D-2 VTR does its job just about perfectly. So you can too.

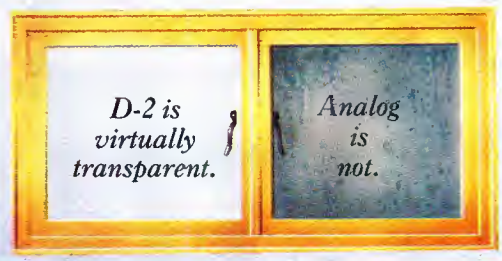
And it's all a matter of fact.

D-2's picture quality is exceptional from the start, and it stays that way consistently. Here's why:


D-2 effectively eliminates dropouts.

D-2's unique error correction and concealment system means you'll never have to worry about dropouts.

D-2's digital transparency is another clear advantage.



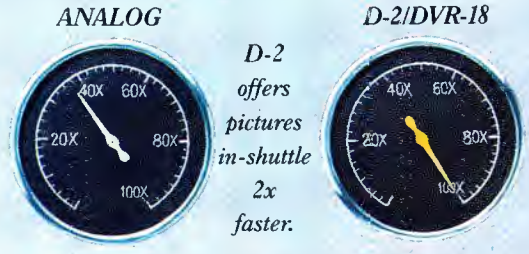
And copies of D-2 tapes aren't dubs.

They're "clones." Digital replications indistinguishable from the original.

As for audio, D-2 VTR's have broadcast sound quality previously unheard of.

formance machine would be hard to work with. But in fact, D-2 is quite easy to use.

For example, D-2 shows you pictures-



in-shuttle faster and in color. So you can work more quickly and efficiently. And one person can comfortably operate up to eight D-2 VTRs. Which makes it a lot easier to do a lot more.

who's satisfied tape recorders, face the facts.

Given all this intelligence, you'll have to agree. Sony D-2 sets a new standard in recording technology. After all, you can't argue with the facts.

D-2 combines digital audio with digital video.

Four independently editable channels of CD quality digital sound. In stereo that never needs a phase adjustment.

Fact is, no other composite VTR performs as well as D-2. In both video and audio. You might think such a high per-

D-2 lets one person easily operate up to eight VTRs.

For more information call (800) 635-SONY.

SONY

BROADCAST PRODUCTS

The right automation system can vanquish a lot of little headaches around the station. The wrong one can be a pain in the neck.

Radio automation for the '90s

By Steve Walker

The general manager of a radio station in rural Texas might define automation as "absolutely the best decision I ever made." Ask an engineer in Idaho to define automation, and the answer might include the words, "that stupid machine." Consult the McGraw-Hill Encyclopedia of Science and Technology (1987), and you'll see automation defined as systems that "save or eliminate labor, or imitate actions typically associated with human beings."

However defined, radio automation is here to stay. More stations each year are discovering that either full automation or live-assist (partial automation) can be helpful in maintaining a consistent on-air sound, keeping program quality high and managing the cost of attracting and holding quality on-air talent.

This article will examine the state-of-the-art in radio station automation. It will discuss the types of source equipment and automation controllers available, important considerations in the selection of a system, and the pros and cons of "do-it-yourself" automation.

Audio sources

When considering automation, first determine the basics: Where will the primary source material (music, news, talk shows) originate, and on what type of medium (reel-to-reel, cart, compact disc, DAT, cassette, videotape, satellite) is it available?

Walker is operations manager for Broadcast Automation, Dallas.

Reel-to-reel tape decks and broadcast cartridge machines have made the radio business what it is today. With technology changing constantly, it's difficult to know what the future holds for these tape formats. Perhaps one day the typical radio station will operate free of analog tape machines. For the time being, however, the ease of interface and the random-access capabilities of multicart sources make them hard to beat for commercial playback, and the reel-to-reel is still the standard answer for music storage.

Digital audio is another consideration. It is now possible to build an automation system with CD players (including "CD jukeboxes," which hold 60 discs each), DAT (digital audiotape) machines, videocassette recorders or even Winchester-type hard disk storage.

Then there are the satellite services. Once the mystical domain of rocket scientists and TV gurus, satellite transmissions now serve thousands of radio stations. No matter what format you want, it's probably available for delivery by satellite from one of many program syndicators.

Although satellite-delivered programming promises to allow stations to automate with a smaller initial equipment investment, it offers less control over content than other formats do. It also is more difficult to impart a distinctly local flavor to this type of programming. However, the convenience of having nearly everything done for you has caught the attention of hundreds of radio stations over the past few years.

Two kinds of controllers

Two basic types of automation controllers are available: stand-alone controllers and personal computer-based systems. Each has distinct advantages over the other.

In the strictest sense of the word, all automation systems are really computers. The stand-alone controller is a dedicated computer designed to execute the singular function of providing automatic control of radio station equipment. Stand-alone controllers often are organized in modules: power supply, memory unit, random-access controller and audio switcher. In addition, some kind of keyboard or terminal is provided for programming.

Most stand-alone systems also will accept second terminals or keyboards for remote programming capability, as well as remote-control panels for live-assist operation. Also, system programs may be stored on cassette or, through interconnection with a computer, on floppy disk.

Stand-alone systems tend to be full-featured and, therefore, offer more flexibility than PC-based systems. Because of the modular design, a bad card or module does not necessarily cause the entire system to fail. Often, the bad module can be replaced with a spare and repaired later with little system downtime.

The typical PC-based system uses the power of personal computers to control

How the newest AM transmitters earned one of the oldest names in radio.

GATES

Introducing the Gates Line of 1, 2.5 & 5 kW Solid State AM Transmitters.

Gates. It's more than a name — it's a tradition of quality and value. To earn that name, these affordable new transmitters had to meet the highest industry standards in five key areas:

Value

- Overall efficiency of up to 72% cuts power costs.
- Multimeter plus PA voltage, PA current, and forward/reflected power meters standard.
- Output tuning included as standard.
- Remote inputs compatible with both TTL and relay-type remote systems.

Durability

- No tube failures, time-consuming adjustments or replacement costs.
- Modular construction with easily accessible socketed MOSFETs.
- "Chimney design" air handling keeps transmitter clean and dust-free.
- 100% solid state "soft-failure" power amplifiers.

Simplicity

- Six independently adjustable power levels accommodate virtually all PSA/PSSA requirements.

- Color Stat™ front panel with signal flow block diagram and red Fault LEDs shows transmitter status at a glance.
- Rugged, dependable discrete logic controller.

Reliability

- Automatic overload power cutback keeps the transmitter on the air at the highest safe power level.
- Bandpass output network has proven its lightning survival capabilities in the field.
- Automatic instant AC restart.
- Battery backed-up controller memory.

Performance

- Patented Polyphase Pulse Duration Modulation technology.
- Unsurpassed reach with 130% positive peak capability.
- Minimal distortion, overshoot and ringing for crisp, "ear grabbing" sound.

Original circa-1946 Gates transmitters are still on the air to remind us that value, durability, simplicity, reliability, and performance are as important right now as they ever were. So if you want an affordable solid state transmitter with all the "old-fashioned" advantages, call Harris today for more information on the newest AM transmitters — and how they earned the proudest name in radio.

HARRIS

Harris Broadcast Division
Marketing Department
P.O. Box 4290. Quincy. IL USA 62305-4290
Tel (217) 222-8200 ExL 3408
Fax (217) 222-7041

Circle (12) on Reply Card

an audio switcher unit. The switcher provides start commands to each of the audio sources, accepts EOM (end of message) signals from each source, and controls the flow of audio into the system.

Most of the "brains" in this type of system reside in the computer. The PC-based system uses software custom-written for broadcast automation. The software may be changed as needed to provide enhancements or to cure certain types of problems.

Programming for PC-based systems may be done on any computer that can run the programming software. This means that the traffic department can perform this task in the office and send a floppy disk to the automation computer. Some systems can be programmed automatically by the traffic computer.

Choosing a system

Purchase of an automation system requires a major investment, but if it is chosen wisely, the system may be of great benefit to your station. Look for these features:

1. Ease of use/programming.

For PC-based systems, does the software flow in a logical manner? Ask for a demo copy of the software, and determine whether you can figure out the basics before you read the manual. If not, ask yourself how easy it will be for the rest of your station's staff to learn.

In the case of stand-alone systems, basic operations such as *start, stop* and *step* (start next event) should be easy and straightforward. Programming shouldn't be any harder than with PC-based systems, but it may seem more difficult without the on-screen prompts.

2. Expandability/flexibility.

How easy is it to expand the system beyond your immediate needs? For example, suppose your station begins automation with format A and later decides to switch to format B. Will the system accommodate additional equipment needed for the new format?

Can you access the system remotely by modem? This would be helpful if you were called in the middle of the night and told that the system "blew up." Is the system capable of live-assist operation? Many stations prefer partial automation in certain day parts. Will the system join networks? If it is not able to join networks by time, the network program will have to be recorded and played back on a delay basis.

3. Failsafe features.

The following features may greatly increase the reliability of a system.

- Closed loop: This failsafe mechanism checks whether the source just called for actually started. If it did not, the system immediately starts the next programmed source, with no noticeable dead air.
- Silence sense: This feature should be present in all automation systems. It starts the next programmed source if more than a preset number of seconds of silence pass.
- Battery backup: When power glitches are a problem, a battery backup or uninterruptible power supply can keep your system's memory alive so that you won't lose the whole day's worth of programming.

Not all of these features are equally important in every case, but make sure you know your requirements, and find a system that meets or exceeds them. Also consider the reputations and policies of the manufacturer and dealer. Will they be willing and able to help if you need assistance?

Do-it-yourself?

Because of the ready availability of off-the-shelf automation controllers, some engineers elect to put together their own automation systems. Lots of potential "gotchas" lurk behind this approach. For instance, some controllers are poorly documented, making them almost impossible to install without help. You may be billed for that help, so know what your vendor has available in the way of technical support before you begin.

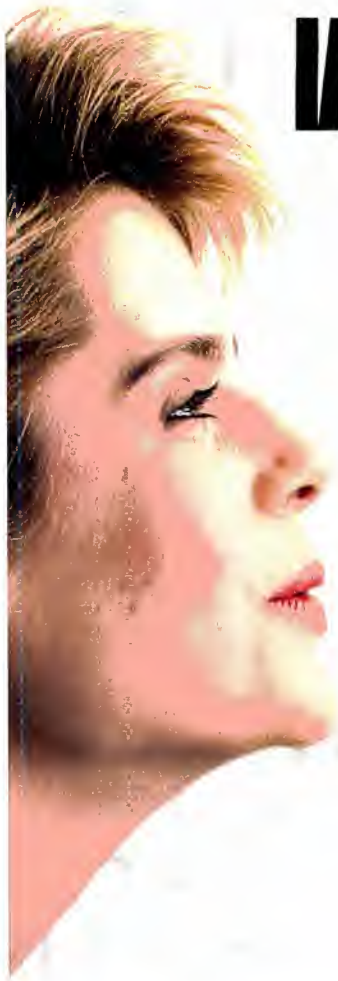
Another possible pitfall concerns the source equipment you plan to interface to the system. Some controllers are not very flexible regarding source levels and impedances. Before purchasing a controller, be sure that all the source equipment you intend to use will interface properly.

Warranties are another area of concern. Most warranties contain exclusions that may be costly if you make an honest mistake that causes major damage to part of your system. The exclusion, covering "improper installation," "unsafe engineering practices" and/or "abuse," is a legitimate practice that allows the manufacturer some protection against tampering by unqualified personnel.

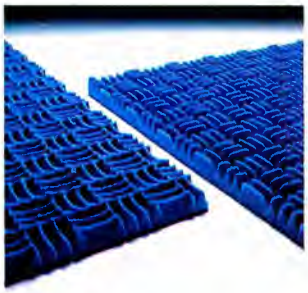
Buying a complete system from the factory or an authorized after-market system vendor has distinct advantages. These companies will make sure that all parts of your system work together in harmony before you ever see it. Many of them offer installation and training at reasonable cost.

In this case, responsibility for proper operation of the equipment rests on the company's shoulders. There can be no question about "proper installation" on your part, and the training makes learning the system quicker and easier for you and the staff. The installer may give you programming and operating tips that don't appear

THE MOST IMPORTANT AUDIO CONTROL EQUIPMENT WORKS FROM HERE TO HERE



Keeping sound clean and accurate can make or break your audio projects. SONEX from illbruck ensures that you're getting the sound you want. Our complete line of acoustical materials gives you total control—in the studio, the control room, or wherever sound quality is critical. There's a reason SONEX continues to lead—nothing works better. Put the leader to work for you.



SONEX

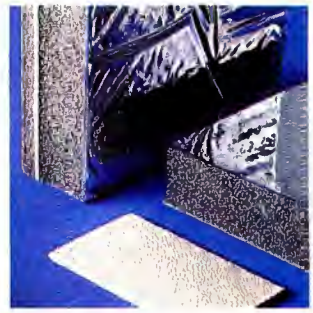
The only acoustical foam with the illbruck anechoic-wedge—over 400% more surface area than flat materials. Controls reverb, reflections, and resonances—beautifully. The proven performer.

SONEX 1

The same unbeatable performance of SONEX but in materials that meet all Class 1 regulations. For demanding applications where heat or fire are factors. Safe for you but deadly for sound.

SONEX CEILINGS

Suspended ceiling treatments that deliver new levels of acoustical performance. Unique, contemporary designs. Available in a variety of styles and colors.



BARRIERS & COMPOSITES

When the problem requires more than absorption, illbruck barriers deliver. Single layer vinyls to multi-level laminates. Lead performance without lead price or problems.

illbruck

Sonex Acoustical Division
Minneapolis, Minnesota

Circle (15) on Reply Card

in the manual.

Automation is an ever-changing area in the field of broadcasting. It behooves the radio broadcast engineer to keep up with the changes. You never know what tomorrow will bring. |:-)))|

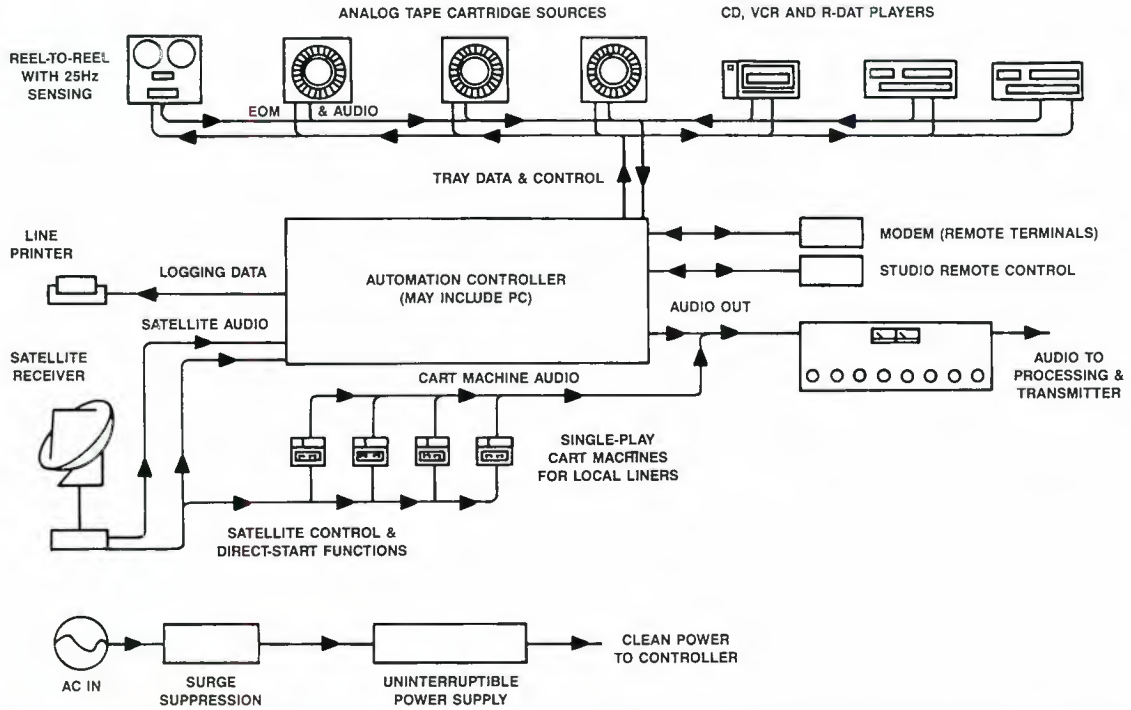
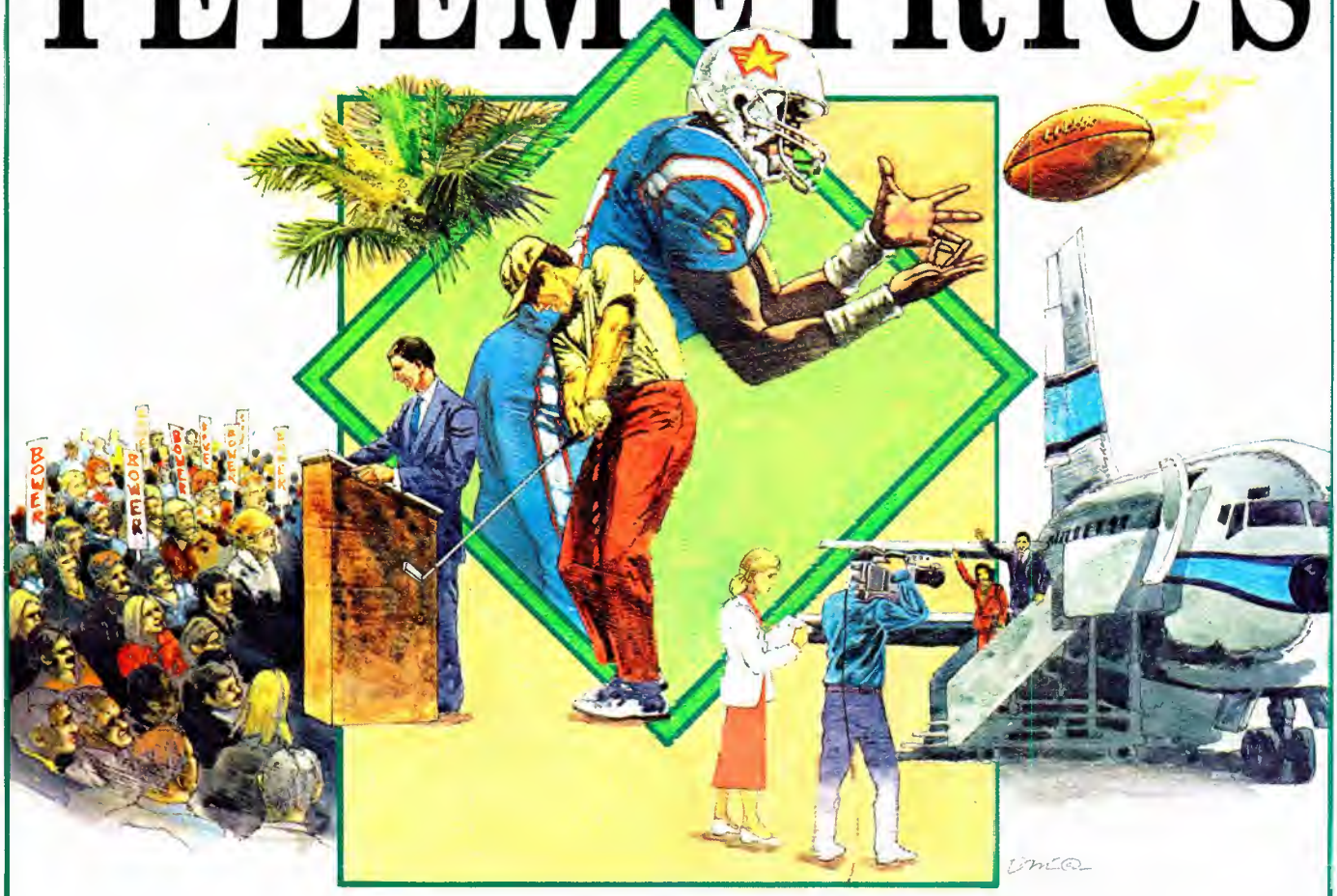


Figure 1. A good automation system can accept a broad variety of input sources and accommodate remote-control or live-assist operations.

TELEMETRICS



Takes You Where The Action Is.

On the football field. In the streets. At the convention. When it's happening live, Telemetrics is there...and we have been for more than 20 years.

The innovative and economical Telemetrics Camera Control System consists of a portable Triax Adaptor linked via Triax or Coax cable to a compact, one-rack unit Base Station. All signals are transmitted on one cable–Video, Audio, Control, Interphone, Genlock, Tally and Power–with a range of up to 5,000 feet.

No matter what camera you use, we have a Triax Unit that's customized to complement its unique features.

For ENG and EFP-type cameras-Sony, Panasonic, Hitachi, Ikegami and BTS.

All of them. Lightweight, portable and easy-to-operate, our Triax Adaptors are completely compatible with serial data for Pan/Tilt-Zoom/Focus and Remote Control.

Telemetrics. We take you where the action is. Reducing your operating costs. Increasing your programming flexibility. With complete, unparalleled reliability.

Telemetrics Inc.

7 Valley Street, Hawthorne, N.J. 07506
Tel. (201) 423-0347 Fax (201) 423-5635
Ask for info on Pan/Tilt Systems.

Circle (16) on Reply Card

Automatic program delay units offer more than a repeat performance.

Automatic program delay units

By James W. Lindelien

Financial realities of the new decade are putting the pinch on engineering and operating budgets. The halcyon days of TV broadcasting, when station acquisition costs were lower and more could be spent on facility design and operations, are fading fast. Consequently, the trend toward adopting flexible, reliable, cost-effective automation shows no sign of slowing. Like most chief engineers, you're probably either dreaming about, or losing sleep over, station automation, library management and cart and traffic systems.

Previously, broadcast delay was routinely needed only for converting the incoming network feed to local time. Modern program delay systems are not only tailored to automating conventional time zone conversion, but also lend themselves to a variety of new tasks, such as time-compressing the delayed network playback or shifting it incrementally by a few seconds or a minute each prime-time hour to add extra regional commercial breaks. The network also can be delayed until the conclusion of a local sporting event, to avoid joining the program in progress. (Such creative rescheduling may run afoul of contractual commitments with the network or other program suppliers, however, so be aware of your non-technical constraints.)

With these new features, delay systems not only reduce operating costs and improve on-air reliability, but also may pay their own way by generating extra revenue.

Lindelien is president of Time Logic, Simi Valley, CA.

Automated delay systems

Satellite distribution of syndicated programming and commercials, as well as the local broadcaster's desire to shuffle the original network schedule to target local viewing habits, has increased the cost and complexity of network delay. This means there is a higher probability of human error causing on-air disruption. An automatic program delay system can perform advanced program record and delay tasks while significantly reducing the incidence of on-air mistakes.

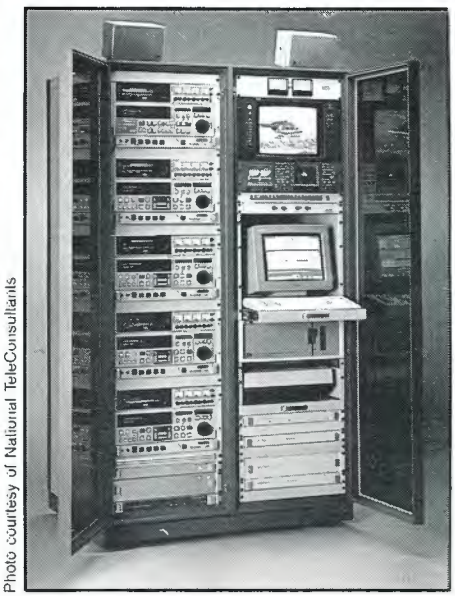


Photo courtesy of National TeleConsultants

The delay-system screen display should convey clearly the detailed event list, system and VTR real-time activity so that error conditions can be quickly assessed and equipment maintenance procedures planned.

The essentials of a basic single-input, single-output program delay system are a control computer, a bank of VTRs and an output switcher. (See Figure 1.) The signal to be recorded is distributed to each VTR, along with a time-code reference. The computer then cycles each VTR through a sequence of record, hold and playback operations, and hands off the delayed signal frame-accurately from each VTR to the next. The system may be self-contained in one or two equipment racks, or the delay controller may integrate with the facility's routing switcher and VTRs.

Dedicated delay vs. cart systems

The minimum number of VTRs required for the simplest continuous-delay process is three. At any time, one VTR is recording, a second one is playing and the third is recuing. Typical delay requirements easily can tie up more VTRs. The variable is the length of tape load with respect to the length of the delay. (See Figure 2.) If the delay is too long, the number of cart VTRs available for playing commercial spots may not be adequate to cover complex breaks. This is especially true in light of the dynamic limitations imposed by robotic loading, particularly when several short (5- to 10-second) spots must be played back to back.

Few cart systems offer automatic generation of delay event schedules, which

Continued on page 36

3:45 Thursday, way ahead.

He's a tough client but you were ready. And right now you can hear him saying,

"Fast...this is going fast."

Capture the speed

You could tell him about the speed of your new Abekas A72 CG—How it sizes characters instantly, does italics, drop shadows, outlines—instantly. All with no waiting to render.

A72 Digital Character Generator

But you don't.

Abekas

A Carlton Company

Leading in Digital Innovation

For details: (415) 369-5111 Atlanta (404) 451-0637 Chicago (708) 699-9400
Dallas (214) 385-4544 Los Angeles (818) 955-6446 New York (516) 829-0820 San Francisco (415) 369-6791

Circle (17) on Reply Card

AT LAST, A STUDIO

INTRODUCING IKEGAMI'S HK-355 CCD

From the moment you experience the cutting edge quality of the HK-355, you'll realize that this is no ordinary chip camera. From its lightweight aluminum design to its outstanding specs, Ikegami's premier Studio/Field chip camera is simply the best ever built.

The HK-355 features three FIT 2/3" Chips each delivering 450,000 individual pixels, a resolution of 800 TVL and a S/N ratio of 62dB. A newly developed optical LPF (low-pass filter) insures exceptional response characteristics, while our CCD driving system and 3-DTL enhancer results in dramatic improvements in vertical resolution, and substantial reductions in moire noise patterns. The HK--355 also features Ikegami's exclusive Automatic Colorimetry Correction Circuitry.

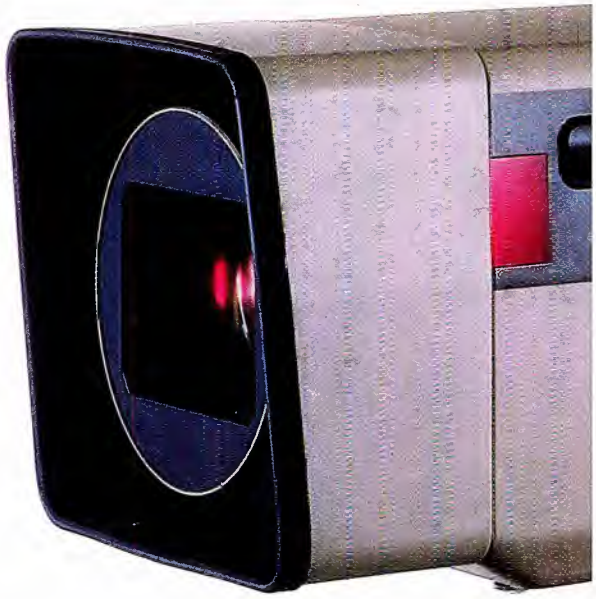
Breakthrough engineering that incorporates auto level setup functions with chip technology, eliminates various setup functions associated with tube cameras, while triax, multicore, and fiber optics are connected via simple plug-in modules.

Additional features include plug-in board design for easy maintenance, a computer controlled CCU, a 7" viewfinder and optional 7" color viewfinder.

A hand-held version, the HK-355P, is available and can operate from the same base station or with any popular recorder.

Owners of Ikegami's outstanding HK-323 tube camera can enjoy total compatibility with all HK-355 accessories, allowing them to own the finest studio chip camera at a substantial costs savings when compared to the competition.

For information on the studio chip that's best, contact your Regional Sales Office or the Ikegami dealer nearest you.



IKEGAMI'S HK-355P PORTABLE COMPANION CCD

Ikegami

Ikegami Electronics (USA), Inc.
37 Brook Avenue, Maywood, NJ 07607
East Coast: (201)368-9171 West Coast: (213)534-0050
Southeast: (305)735-2203 Southwest: (214)869-2363
Midwest: (708)834-9774 Hawaii: (808)946-5955

Circle (18) on Reply Card

CHIP CAMERA THAT'S ~~BETTER~~ *Best*

Continued from page 32

means that the operator must create and load such schedules manually. The latest delay-system software packages automatically will generate an event list and determine the minimum number of VTRs needed for a given delay schedule, tapeload size and VTR cuing ballistics. Automatic schedule creation is a key distinguishing feature of delay-system software in contrast to station automation and cart machine programming.

Flexibility pays

With minor changes, the delay-system design can be tailored to other real-time control tasks commonly needed by broadcasters, such as feeding multiple outputs, dubbing and editing. Increasing the number of applications of the system may offer a more rapid payback on the original equipment investment. With the cost of a dedicated delay controller and VTRs at one-tenth to one-fifth that of a robotic cart system, the added operational capabilities are acquired at a marginal cost.

For national network centers distributing to multiple time zones, a multibus output switcher replaces the single output switcher. (See Figure 3.) A change in the VTR scheduling software permits the same bank of VTRs to handle unique delays to multiple outputs simultaneously, with each output responsible for feeding an entire time zone. The controller also may drive an input switcher or router bus to automatically select the appropriate feed to record.

One delay controller optionally doubles as a daytime news editing system, which may be advantageous to the budget-conscious small broadcaster needing delay only during prime-time or late-night hours. (See Figure 4.) The edit bay may share the delay VTRs and cuts-only switcher, or it may have its own equipment complement. The capability to edit during no-delay day parts offers an additional way to reduce costs or, perhaps, to generate revenue.

Reliability is critical

Things break. Equipment runs too hot or too cold. Fan filters clog up, cutting off cooling air. Heads clog and the power fails. Tape wrinkles and transports stop. CPUs glitch and memory bits change state. Disk drives get dusty or, worse yet, erase a sector of the program boot track as the power fails. Distribution amplifiers fail, microwaves fade. A robust delay product addresses these problems.

Disaster recovery

When evaluating a system, ask what happens in worst-case scenarios. Remember, by definition an automation system is supposed to be capable of operating unattended for long periods of time. If it does this, your people may not be familiar or comfortable with potentially intricate software menu commands and recovery procedures. You may be tempted to demand that all foreseeable error situations be covered by user commands in the delay-system software, but this would be impractical. No delay-system design addresses all potential problems, and if the situation arises less than once a month, your operators will not remember how the commands work anyway. On the other hand, many common situations can be handled automatically, and they are in some systems.

Find out how fault-tolerant the product is. Is it based on an office PC clone? Many are not designed with industrial applications in mind, and have low temperature extremes and uncertain meantime-between-failure (MTBF) ratings.

On average, VTRs and tape fail more frequently than the controller. Does the software allow spare on-line VTRs, and will it use them automatically if necessary? Make sure it allows you to declare certain VTRs off-line for preventive maintenance.

Ask whether the controller recovers on its own in the event of a brief power failure (the time it takes for your diesels to

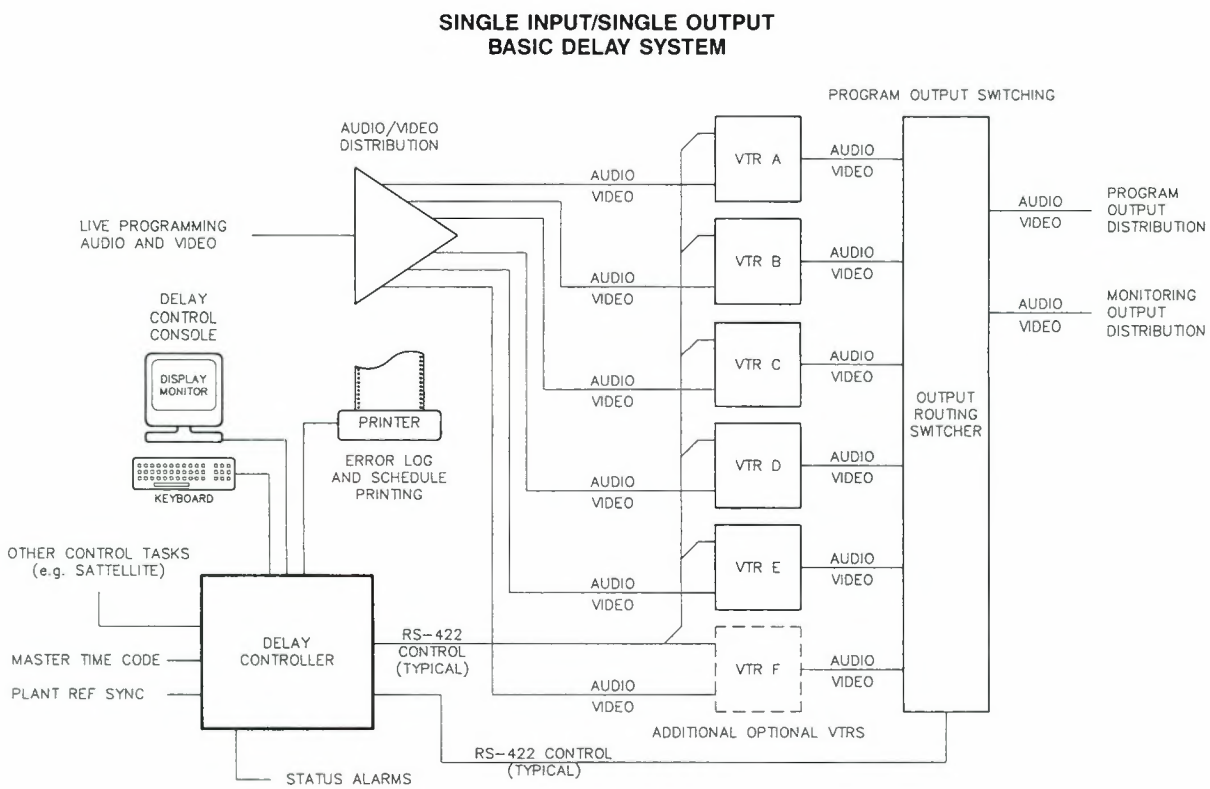


Figure 1. *A basic delay system records the incoming network feed to a bank of VTRs and replays it after the programmed delay interval, automatically switching each successive playback VTR to air.*

TRANSPARENCY... VIDEO

YOU CAN SEE RIGHT THROUGH US.

With the Microtime FS-10 ten-bit Frame Synchronizer

Precision ten-bit sampling at 4xfsc results in negligible quantizing errors, impeccable performance specifications, and superior video transparency...

...with the Microtime FS-10 Frame Synchronizer. Offering the industry's most advanced capabilities for synchronizing remote video signals.

Dual video inputs allow AB source selection from the front panel, and the synchronizer can automatically switch to an auxiliary input with loss of the video feed. A line-by-line video advance corrects for timing delays introduced by other equipment. A D2 composite digital output is also standard.

The FS-10 is available in NTSC, 525 PAL and 625 PAL, and a heterodyne TBC option is available. NTSC models can be ordered with a 2-field or 4-field memory. The FS-8 eight-bit version is also available.

For the ultimate in video transparency, call Microtime to learn more about the FS-10 and the FS-8 today.

MICROTIME

A Subsidiary of ANDERSEN GROUP 1280 Blue Hills Avenue, Bloomfield, CT 06002 USA
Tel: (203) 242-4242 • 1-800-243-1570 • Telex: 4938290 MCRO UI • Telefax: (203) 242-3321

Circle (19) on Reply Card

Continued on page 42

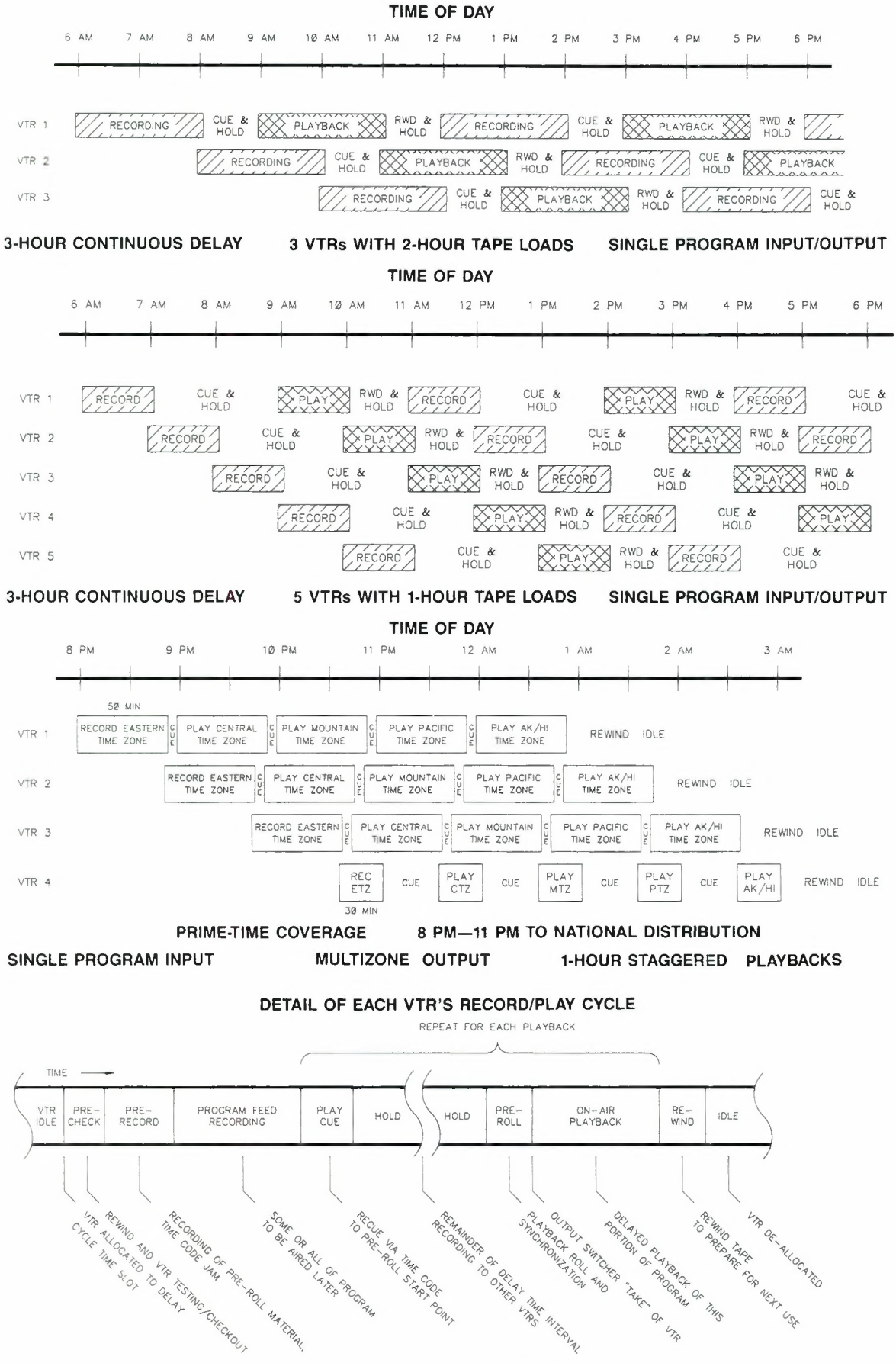
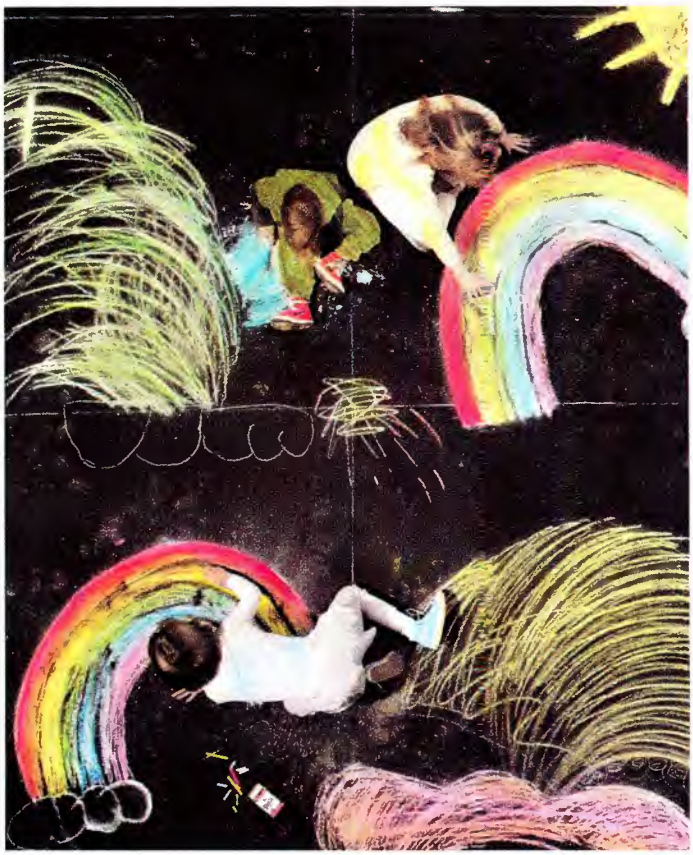


Figure 2. *When the delay is long, with respect to the tape load length, more VTRs are required in order to delay on a continuous basis. This can tie up all the VTRs in a cart machine or leave too few to handle complex breaks that have several short spots.*

SPECTRUM
SYSTEMS



Your station, like most, is racing into the digital domain. Just think about your growing CD library. Wouldn't it be marvelous if your audio processing chain could be fully digital, too?

With the new Spectrum System, that option is yours, today.

Spectrum System includes the Digital Prizm, a four-band pre-processor that allows you to shape your signal with digital accuracy, for maximum apparent loudness right to the fringe.

Then there's our all new FM limiter/stereo generator, the Digital Lazer. The Lazer gives you incredible stereo separation and keeps your signal at optimum modulation. Plus, with 8 separate pre-sets, you can infinitely fine tune your sound, A/B the results and return precisely to where you started. All at the touch of a button with absolute repeatability.

Get your personal demonstration today. Just give your authorized Spectrum System dealer a call.

GENTNER

Gentner Electronics Corporation 1825 Research Way Salt Lake City, UT 84119 (801) 975-7200 Fax: (801) 977-0087

Call me, I'm interested. Circle (21) on reply card.
Send literature. Circle (20) on reply card.

THIS ENGINEERING HAS VERY LITTLE COMPETITION.

BVU stands alone. No other 3/4-inch system offers the beauty and power, the sheer thrill of controlling this Sony U-Matic SP™ video equipment.

We could tell you about features that are state-of-to-morrow's art. But that wouldn't really give you a feel for the amazing responsiveness and precision of BVU recorders.

Or we could tell you about the Dynamic Tracking® capability in the new BVU-920, giving you fingertip editing control of pictures from −1 to +3 times normal speed. And about the plug-in time-base corrector that lets you record the Dynamic Tracking® effect, and also brings you digital

THIS ENGINEERING HAS NONE.

noise reduction in both luminance and chrominance picture components.

We could go on about shuttle speeds up to 40 times normal, with visible picture. And BVU U-Matic SP™ (Superior Performance) picture quality, with 340 TV line resolution and Dolby® C noise reduction.

But these hot new BVUs must be experienced to be appreciated. Take the first step. Call 1-800-523-SONY ext. 232.

SONY®

PROFESSIONAL VIDEO

Continued from page 38

come up). Does it keep its event list and real-time status intact? Many controllers do not, requiring the event list to be rebuilt or reloaded manually, which could keep you off the air for a considerable amount of time.

At the network level, two fully redundant systems usually are specified. This permits long-term system-level preventive maintenance and assists in operator training because an off-air test bed is available. New controller software releases can be tested first on the backup system, then brought on-line on the primary unit.

One effective compromise to full redundancy is to drive two redundant banks of VTRs and output switchers with a single controller and add a manual or automatic changeover switch into the playback signal path. Some of the vendors supporting this configuration charge for the extra VTR and switcher control ports, and others do not. Some also offer a price break on the second controller in fully dual redundant configurations.

Any delay controller you choose should be capable of controlling one or more VTRs in addition to the minimum number required by your delay schedule. The software should be smart enough to automatically substitute one of these spare transports if it finds the intended one is not ready. A still better allocation method is to use all available VTRs, including the on-line spares, on a first-in, first-out basis. This would more evenly distribute the wear on heads and tape and still guarantee that at least one VTR is spare at any time.

Know your needs

Delay-system software capabilities vary, ranging from a fixed delay interval running continuously throughout the day to single daily start and stop times to schedule-driven variable delay. Some systems allow for record-only or play-only operation, allowing late-night satellite program distribution to be automated at both the origination center and downlink sites. Try to anticipate your future needs and assess current ones in order to be able to streamline your upgrade path when the need arises.

What level of control do you want your software to provide? Some delay-system software may display the detailed VTR and switcher events on the computer screen. Others suppress them and show only the "high-level" parameters of the delay task: the intervals to be recorded and the amount of delay to be applied to each. Each method has its advantages, and it is best if the software package can display both.

Besides the generation of delay event lists, additional list "compilers" can be added to the delay controller software to create specialized event lists for dubbing, general-purpose station automation (on-air switcher events, station ID keying, spot playback), satellite dish and routing-system control. The events required by these secondary activities are time-sorted and displayed along with those associated with delay. Some delay-system vendors offer such software customization services; others do not. In either case, determine the vendor's policy and pricing for future software updates.

Bottom-line advantages

An automatic program delay unit can lend extra flexibility to your operation and contribute to your facility's bottom line,

Continued on page 106

MULTIPLE INPUT/MULTIPLE OUTPUT NETWORK CENTER DELAY SYSTEM

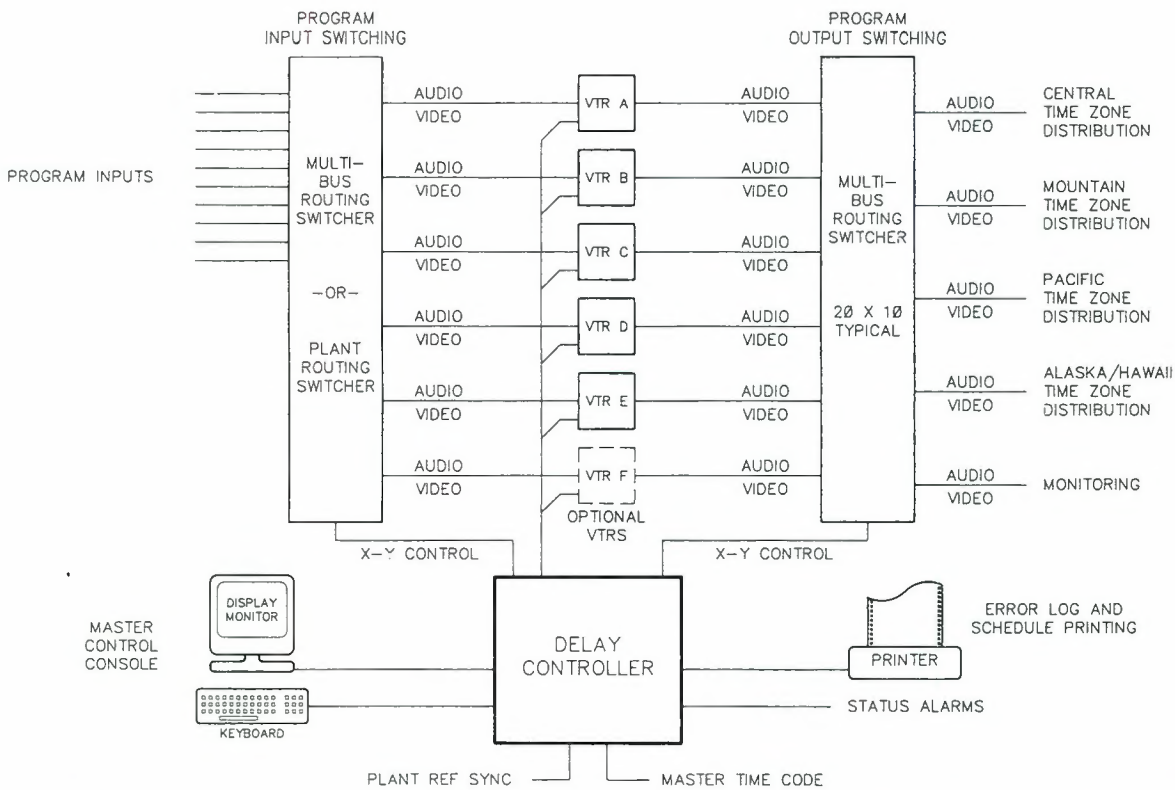


Figure 3. *The typical network center delay system supports multiple simultaneous inputs and outputs, each having a different delay requirement, as required for distribution from many sources to all time zones.*

It takes teamwork to produce the industry's best-performing router. It takes confidence to guarantee it for ten years.

At Utah Scientific, people know how to work together to bring you the best in product design, product performance, and product support. Products like the AVS-2, the new generation of Utah Scientific routers.

With the best operating specs in the business, the AVS-2 offers these exclusive features:

☐ surface mount component technology—increased packaging density for maximum size reduction with no sacrifice in signal integrity

☐ up to 525 crosspoints per rack unit including power supplies

☐ 1280 x 1280 matrix sizes with 8 separately addressable levels

☐ HDTV compatible—video frequency response flat to 30 MHz

☐ matrix cards automatically assigned to location—change card positions without reprogramming

☐ full matrix salvo capability—reconfiguration in one vertical interval

☐ only multi-sourced components are used—no hybrid circuitry.

And even though the AVS-2 is a revolutionary new design, we have the confidence to guarantee it for ten full years—parts and labor.

That means you can have confidence every time you buy a Utah Scientific product. Confidence that you are buying the best. Confidence that our team of experts is available to help you whenever you need it. Confidence that your Utah Scientific switcher will keep working for you year-after-year with the best reliability record in the industry.

Call us today for more information about the AVS-2 or any other Utah Scientific product.

UTAH SCIENTIFIC

Confidence in Quality.

Utah Scientific, Inc.
4750 Wiley Post Way
Salt Lake City, Utah 84116-2878
(801) 575-8801 Toll Free: (800) 453-8782

Dynatech Broadcast Group

Move over master control.
The cart machine wants your job.

The cart machine takes charge

By Tim Crabtree

Large-capacity cart-machine systems around the world offer a look at how well automation is living up to its predicted virtues. Stations with these systems have enjoyed a healthy return on investment.

Engineers and technicians, freed from mundane cart-machine operations, have been able to assume more demanding responsibilities. Also, routine procedures, such as the manual transfer of traffic schedules to playlists, need no longer lull workers into making costly errors. Today's cart systems not only convert traffic schedules into playlists without human intervention, but also keep track of all carts in a station and prepare "as run" logs to report back to the traffic department exactly what was played.

Furthermore, the systems handle these tasks with such precision that make-goods are becoming a rarity. In fact, the modern cart machine's inherent sequential programming capability, combined with the high level of computer control and software, makes it the logical hub of master control and, perhaps, news operations.

Taking charge?

The cart-machine playlist contains one event line for each spot or program segment. The event line also defines the cue point and duration of play. The sequence controller directs the robotic manipulator to load the scheduled cart into a recorder or player, rolls the VTRs, commands the switcher, times the cart's play and carries on the next event. Meanwhile, it recues and subsequently stores the last cart played.

The sequence controller also can control external VTRs. Because of this capability, program material that comes in on 1-inch reels can be played directly to air from the 1-inch deck, yet be controlled and switched by the cart machine. The only human intervention required is the entry of cart data into the cart machine's playlist.

Within just a few years, cart systems routinely will be controlling and switching a myriad of broadcast devices. This will be accomplished through the use of external device interface units for each peripheral. The internal event lines in the cart machine's playlist will be joined by external event command lines that will allow control of external VTRs. In addition, they can prompt routing switchers to select specific crosspoints at specific times, preset still-stores and direct production switchers to execute special effects between two sources at specified times and predesignated rates.

One of the first devices to accept such automation commands probably will be the master-control switcher. Station traffic computers may include switcher commands that will become part of the play schedule downloaded into the cart machine. This will result in automatic insertion of commands such as "switch to network," or "preselect still-store by frame number," between events in a playlist, according to presettable parameters. The commands also could be inserted manually by the operator at the desired switchpoints within the playlist.

The automated tape room

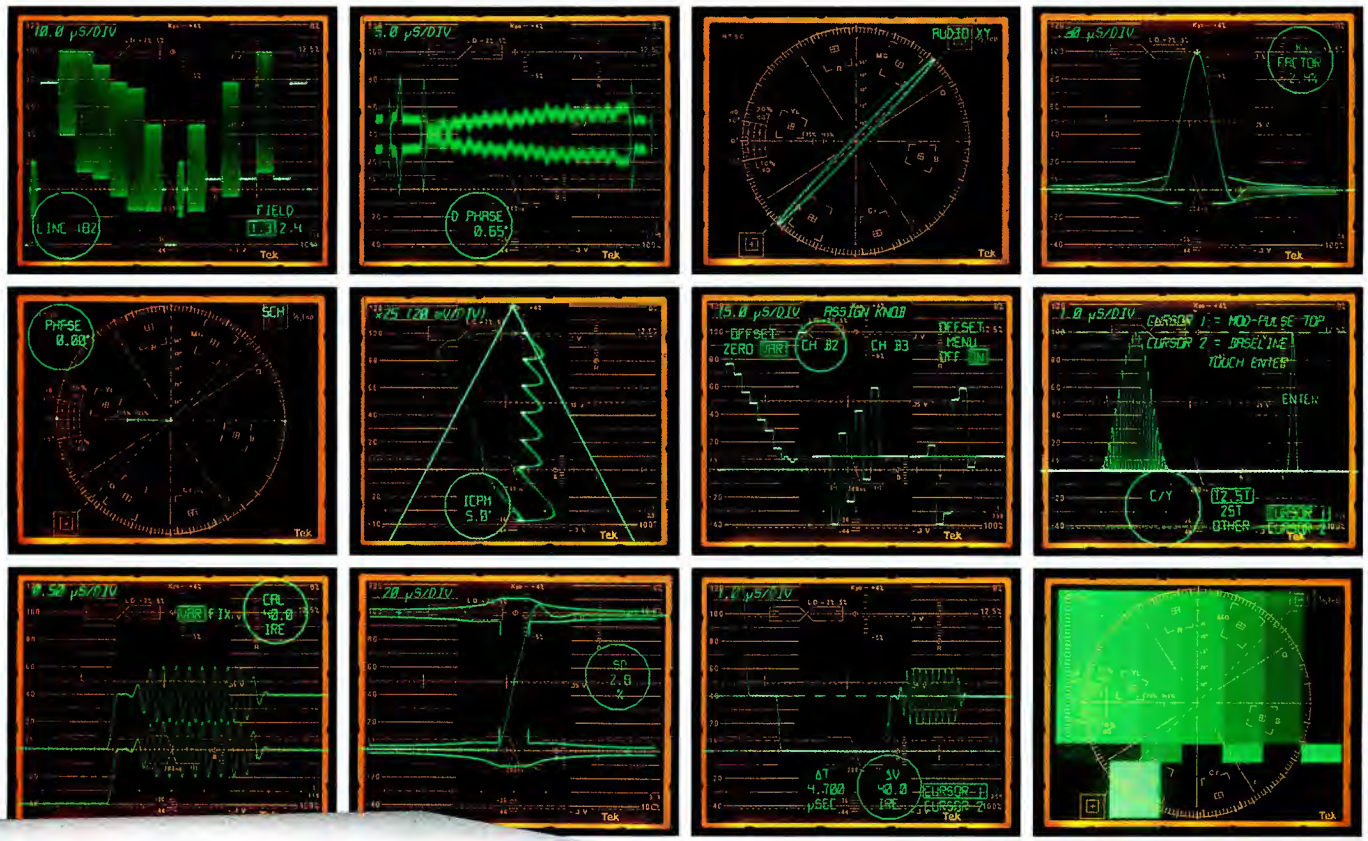
Already, commercial spots are being fed via satellite to TV stations that subscribe to satellite downlink services. More and more broadcasters are taking advantage of satellites for receiving commercial spot material, news segments, sports and syndicated material.

Currently, this downlinked material is received by equipment that is external to the station's cart machine. It is the responsibility of the control room staff to make sure that the recorders are ready to receive. However, the next generation of cart machines automatically will record the spots that are downlinked from a satellite or other communications system. They also will incorporate automated test equipment to verify electronically that the signal came through intact.

This type of program distribution places an extra burden on the station, which must provide the raw tape stock, make dubs to carts, and make and store backup copies. The "multiple-event-per-cart" capabilities of today's cart machines, however, are helping to control the expense and effort. First, because each cassette is fully utilized, the physical size of the tape library can be reduced. Second, cart-machine advances are doing away with

Crabtree is director of broadcast engineering at Odetics, Anaheim, CA.

The Tek 1780R: We don't mind if you judge by appearances.



Nobody's watching closer.

Even at first glance, you can see that the Tek 1780R is in a class by itself. Only the 1780R offers full-bandwidth analog measurement capabilities with separate, complementary waveform and vector displays. Component and composite capabilities are provided through four video inputs and a front-panel probe input. You get polar SCH presentation, precision differential gain and phase displays required to test modern television systems, and more. All made easy enough for even first-time operators.

But enough said. Ask your nearest Tektronix representative for a demonstration of the 1780R: by all appearances, the most advanced analog video measurement set you can buy!

Tektronix
COMMITTED TO EXCELLENCE

Circle (23) on Reply Card

the longtime problem of multiple events per cart — what to do if two spots are scheduled back-to-back on the same cart, allowing no time to recue prior to playback. Increasingly sophisticated collision-detection software now automatically directs the creation of a dub copy for use in the break.

Another promise for the future is that data pertaining to the spot will be transmitted along with the spot. This information, such as start-of-event and duration times, automatically will be entered into the cart machine's database. The cart machine, in turn, automatically will update the traffic department computer system so that all concerned parties, both human and electronic, will know that the commercial cart is in the station's inventory.

Into the newsroom

In some pioneering stations, news operations are automated by large library cart machines that control the playing of news carts. With a News Control Terminal linked to a cart system, technical directors no longer rely on verbal communication with the tape room to keep the newscast flowing. They now have real-time control, via a touchscreen panel, of the VTRs within the cart machine. This puts news carts at their fingertips; they can even revise the rundown list during a newscast. (See Figure 1.)

Although news operations currently are better served by the use of news control terminals with a dedicated cart machine, the next decade will see larger library cart systems that fulfill the needs of spot, news and program playback.

Networked stations

With the computing power of today's computer workstations, local area networks (LANs) can be set up so that station departments that now communicate by floppy disk, telephone or paper will be able to pass information between each other's computer files.

Within the control room itself, the computer link will be put to work so that a network feed can be accompanied by the latest timing information. Special graphics or audio pieces can be stored digitally and called up on a computer workstation.

If there is a roadblock to stationwide automation, it is the lack of interface standards. As with other now-commonplace technologies, usage will set the standards that evolve as the broadcast industry meets its automation needs. (See "The Great Video Computer Merger" pg. 26 in **BE** February 1990, for more information about LANs in broadcasting.)

Human vs. machine?

An often overlooked — or purposefully ignored — stumbling block to successful implementation of automated systems is human resistance. It is human nature to fear change. But, as in earlier "revolutions," in which VTRs replaced film and color replaced black and white, people eventually will wonder how they ever survived without the changes they once dreaded. However, during the transition period, we must take our colleagues' concerns seriously.

Fear of change is only part of the trepidation that strikes the heart of the technician who sees a large library cart machine on the loading dock. The fear of being replaced by the machine is a legitimate one.

There are two ways to handle both concerns. One is for management to communicate as often as possible to the staff about the station's goals for automating. The second is to involve the control room staff in the purchase decision-making process early on. Once the decision is made, the staff should be kept informed of plans for the new equipment.

Although one of the reasons for purchase of such equipment is to use the staff

It's 5:53! Where's Charlie, Jim and Jane?

There's nothing to worry about. AutoCam's™ ACP-8000 has control.

Repetitive and boring manual camera control is eliminated. AutoCam's ACP-8000 menu driven touch screen control easily learns and reproduces precisely and consistently all camera shots and floor positions. Now, experienced personnel can accept more challenging and rewarding assignments.

An example of AutoCam's power: After the opening Anchor stories on the 5 o'clock news, cameras 1 and 2 are easily relocated to the Weather desk during a 2 minute video. After Weather, cameras 1 and 3 are quickly repositioned to Sports during a 30 second break... then all 3 cameras return to the Anchor desk to close the show. Preset camera shots, floor positioning and cable management are performed easily and automatically with the HS-110P Pan/Tilt head and the SP-200 servo pedestal with X-Y base.

Circle (25) on Reply Card

The proprietary X-Y base guidance system repositions the cameras within an 18 arc second rotational error. As the cameras are moved from position to position, there is zero cumulative error. Its sophisticated locating and collision avoidance system eliminate the need for rails or studio floor grids. If desired, AutoCam's manual control mode can be initiated at any time.

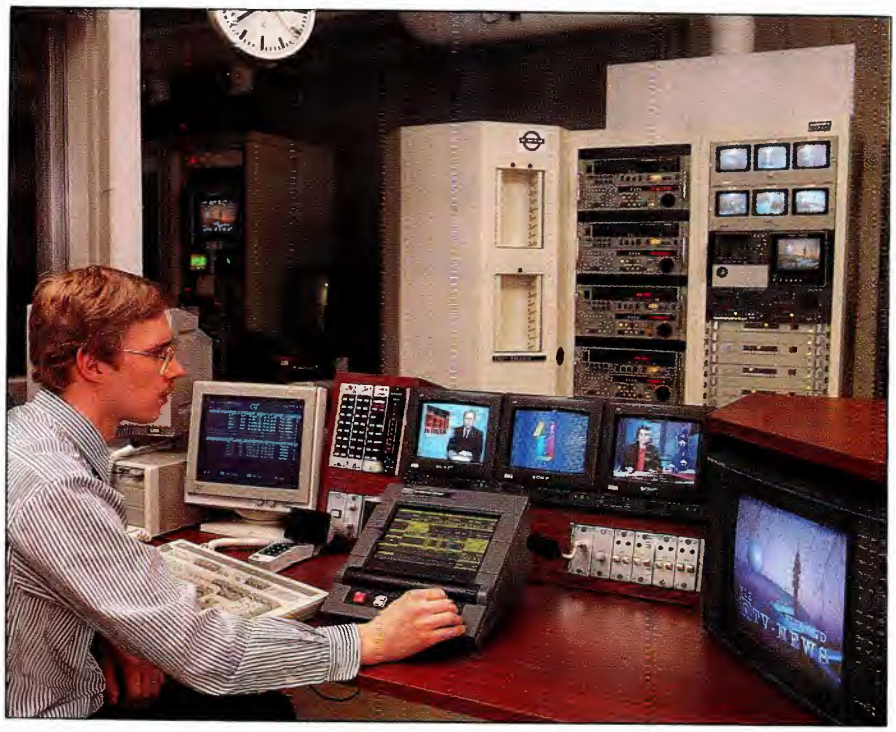
The AutoTrak™ talent tracking option maintains accurate framing of the Anchor even on tight head and shoulder shots. (An essential operating requirement with key shots.)

AutoCam's newsroom computer option gives the news director quick access to all camera resources. Scripted stories with all camera moves are automatically played via the ACP-8000 newsroom computer story list. Last minute changes are executed quickly and smoothly.

AutoCam can provide you with the most efficient communication link between your director and your on-air product. And, its reliability and sophisticated moves improve your on-air image. Call for a proposal and demonstration... now.

TSM

TOTAL SPECTRUM MANUFACTURING INC.
709 Executive Blvd. Valley Cottage, NY 10989
914-268-0100 FAX 914-268-0113



A cart machine remote-control system can simplify news operations by providing instant access to hundreds of tapes and simultaneous control of multiple tape decks.

more efficiently, it is by no means a forgone conclusion that every technician will be laid off. Two important points should be addressed:

- The equipment will improve master-control efficiency and accuracy, making life less stressful for everyone.
- Even the most self-contained equipment allows for human interface; someone has to be on hand to edit a playlist or manually override the automatic functions when needed. (Because this is rarely done, user-friendly override controls are extremely important.)

Bridge to the future

The automated control room will become the standard in the 1990s. Forward-thinking broadcasters are installing state-of-the-art equipment today, reaping its benefits and preparing for future advances. A conservative, practical approach is to select equipment with proven technology. It should be capable of streamlining station operations today as well as expanding into a strong, reliable bridge to the control room of the next century.

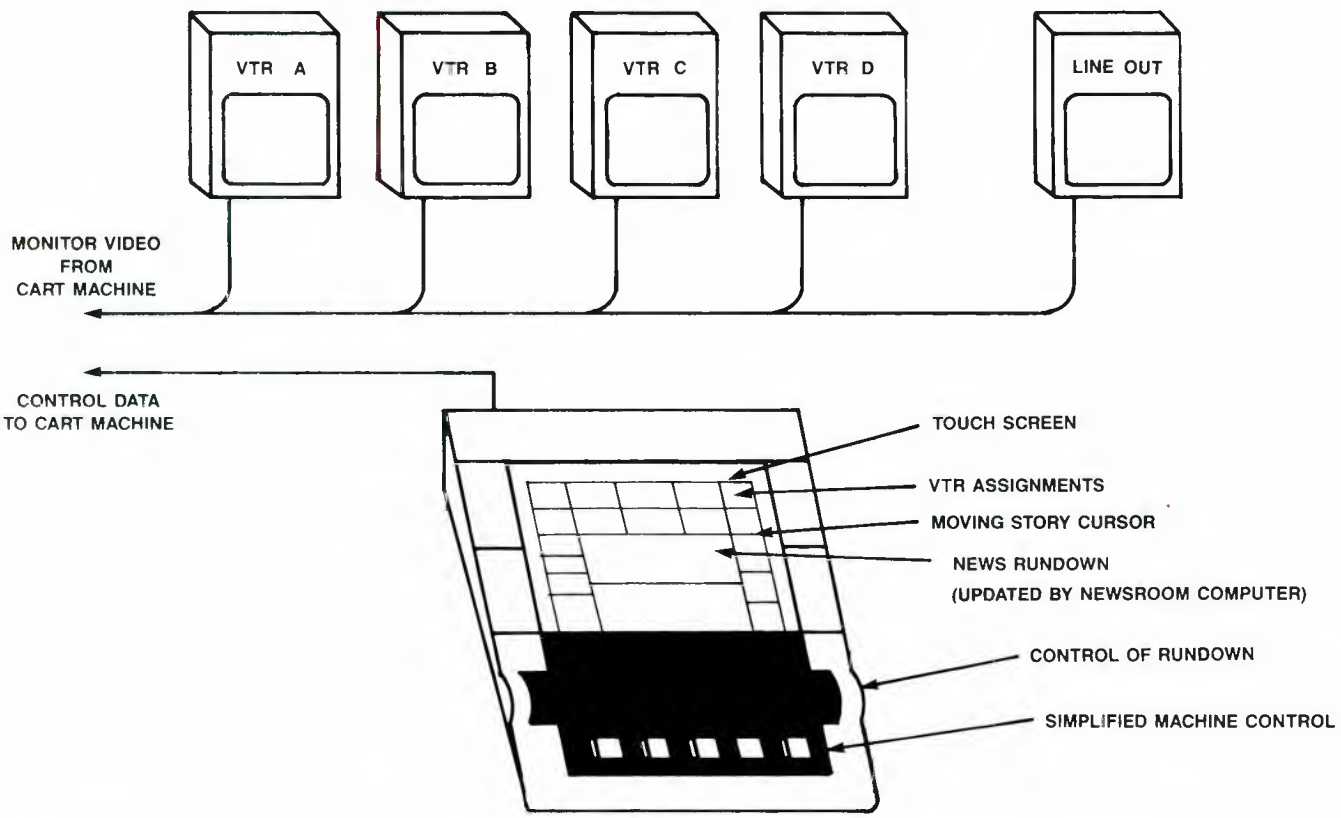


Figure 1. *This control terminal allows a video cart machine to fulfill the functions of a manned ENG tape playback area.*

Shure Introduces A Microphone That Proves There Are Two Sides To Every Story.

Your crews do whatever it takes to guarantee that your viewers see the whole story. But until now, making sure that they could hear all the drama and realism of being there has meant risking a fragile, expensive stereo microphone.

Shure's VP88 lets you bring back audio that's as exciting as the video. The VP88 is an advanced stereo microphone that meets Shure's legendary standards for reliability and advanced design. Best of all, it provides broadcast quality stereo from remote locations at a surprisingly affordable price.

TRUE MS STEREO.

The Shure VP88 is a single point stereo condenser microphone that recreates the sonic environment as few other mics can. The forward facing Mid capsule, and the perpendicular Side capsule, plus the built-in stereo matrix provide wide, natural, uncolored response for optimized stereo imaging. Yet the VP88 is perfectly mono compatible.

The VP88's three switch-selectable levels of stereo effect allow you to control the degree of stereo "spread" and ambience pickup to achieve the exact image that you desire.

Of course the VP88 also provides the low noise, low distortion and wide dynamic range that has made Shure microphones famous.

POWER AND MOUNTING VERSATILITY.

When you're reporting from a remote location you never know where the action is going to take you. So you need a microphone that can go just about anywhere.

That's why the Shure VP88 can be powered by a self-contained battery (with LED indicator) or phantom power just by turning a switch. And its advanced surface mount design means extended battery life through the improved efficiency of the mic's circuitry components.

The VP88 mounting is versatile, too. Besides easi

Affordable And Reliable: The N

mounting on a camera, you can use the VP88 on a floor stand, fishpole, boom, or as a handheld microphone.

LOW-FREQUENCY ROLLOFF.

Shure knows that you do remotes to capture the action – not the rumble of passing traffic. So we included a switch-selectable low-frequency rolloff (12 dB/octave below 80 Hz) to reduce ambient noise and vibration pickup when you need it.

And to further reduce extraneous sound the VP88 is equipped with an advanced shock-mounted cartridge and built-in "pop" screen to reduce wind noise.

ACCESSORY PACKAGE INCLUDED.

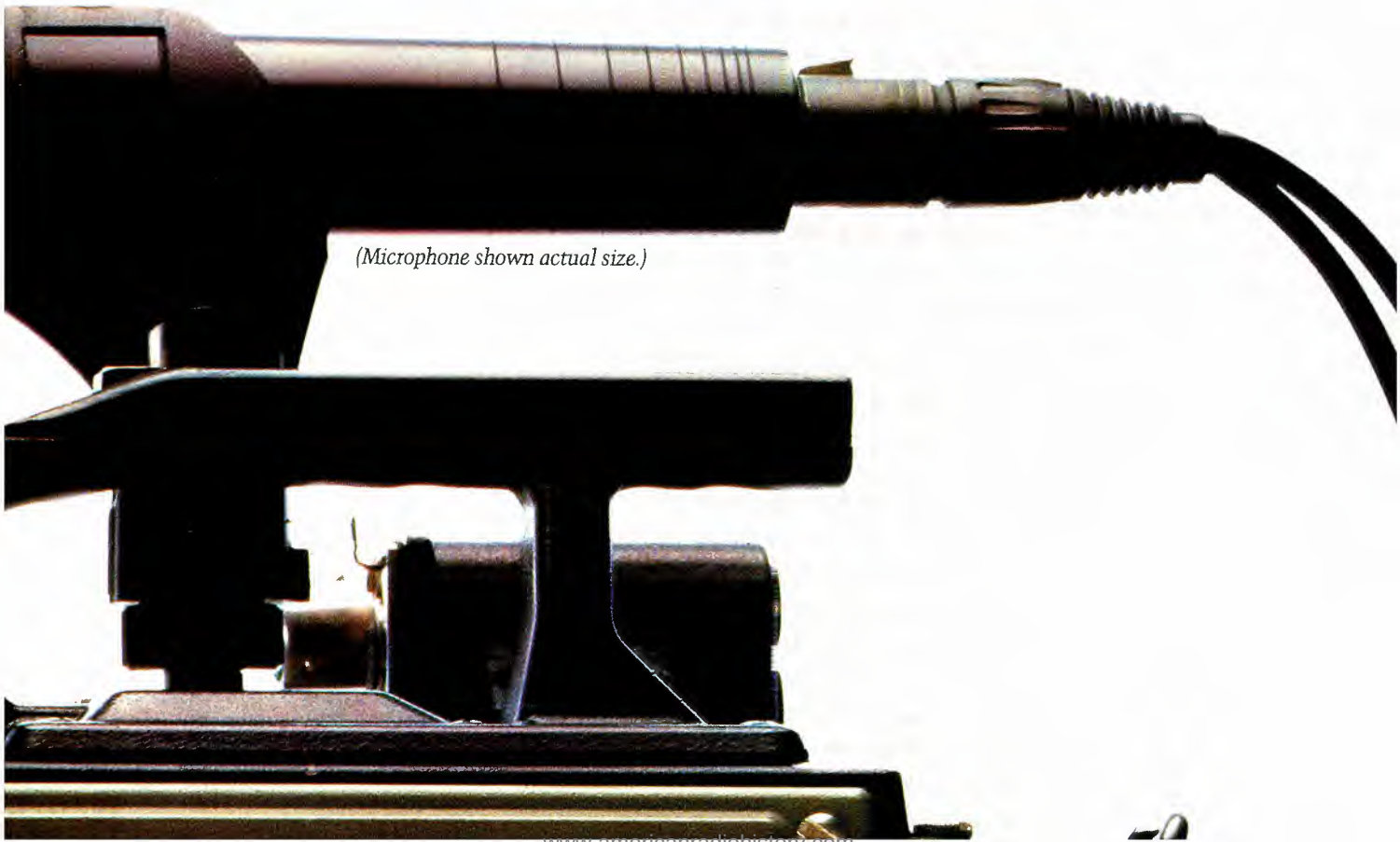
The Shure VP88 comes with a 30" multi-connector "Y" cable, foam windscreen, swivel stand adapter, battery, and zippered carrying/storage bag.

You can also get optional accessories like a locking isolation mount, a 25' microphone extension cable, phantom power supply, and microphone stand.

Whatever options you choose, you can be sure of years of reliable performance from the only stereo microphone that covers both sides of the story – the Shure VP88.

Standard and optional accessories.

Shure VP88 Stereo Microphone.



(Microphone shown actual size.)

SPECIFICATIONS

Type
Single-Point Stereo (MS configuration)
Condenser

Frequency Response
40 to 20,000 Hz

Output Impedance
Rated at 150 ohms (100 ohms actual).
Recommended minimum load impedance: 800 ohms (may be used with loads as low as 150 ohms with reduced clipping level)

Output Level (1 kHz, MS mode)
Open Circuit Voltage: -66 dB (0.5 mV) Mid.
(Side level 1.6 dB higher than Mid level)
(0 dB = 1 volt per microbar)

Side Level (Stereo mode; relative to Mid level)
Low: -6.0 dB; Medium: -1.9 dB; High: +1.6 dB

Clipping Level (1 kHz)
800-ohm Load (less than 1% THD)
-12 dBV (0.25 V) (Mid output, 1% THD)
-10 dBV (0.30 V) (Side output, 1% THD)
150-ohm Load (less than 3% THD)
-25 dBV (0.06 V) (Mid output)
-19 dBV (0.11 V) (Side output)

Maximum SPL
800-ohm Load.....129 dB
150-ohm Load.....119 dB

Hum Pickup
-4 dB equivalent SPL in 1 millioersted field (60 Hz)

Output Noise (Mid, Side, Left and Right outputs; equivalent sound pressure levels)
24 dB typical, A-weighted
28 dB typical, weighted per DIN 45405

Dynamic Range
105 dB (maximum SPL to A-weighted noise level)

Signal-to-Noise Ratio*
70 dB (IEC 651) at 94 dB SPL

**S/N ratio: difference between microphone output at 94 dB SPL and microphone self-noise A-weighted.*

Overvoltage Protection
Maximum External Voltage applied to Pins 2 through 5 with respect to Pin 1.....±75 Vdc

Polarity
Positive pressure applied from any direction to the Mid cartridge or from the left to the Side cartridge in the MS mode, or applied from the front in the Stereo mode produces positive voltage on pin 2 relative to pin 3 (Mid/Left) and pin 4 relative to pin 5 (Side/Right).

Power
Phantom
Supply Voltage.....9 to 52 Vdc
Current Drain .....1.3 mA/output; 2.6 mA total
Battery
Type.....6 V cylindrical*
Life.....Average 70 hours**
Current Drain.....2.4 mA total

**Silver oxide (NEDA 1406SOP), lithium (NEDA 5005L), alkaline (NEDA 1414A)*
***Fresh silver oxide or lithium battery; 40 hours with alkaline*

Environmental Conditions
Operating..... -18° to 57° C (0° to 135° F) (Relative Humidity <90%)
Storage..... -29° to 74° C (-20° to 165° F) (Relative Humidity <80%)

Net Weight (without battery)
416.7 grams (14.697 oz.)

Cables
Y-Splitter Cable (supplied): 0.76 m (30 in.) vinyl-jacketed, dual-shielded, 2-conductor with 5-pin female XLR connector on microphone end and two 3-pin male XLR connectors on equipment ends.
Microphone Extension Cable (Model C110; optional): 7.6 m (25 ft) vinyl-jacketed, shielded, 4-conductor with 5-pin male XLR connector on one end and 5-pin female XLR connector on other end.

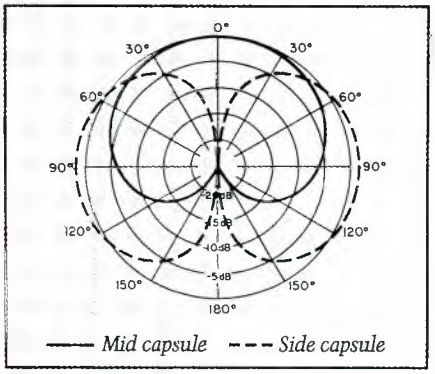
Case
Brass and nickel-plated aluminum construction with stainless steel grille. Finished in satin black vinyl enamel.

FURNISHED ACCESSORIES

Battery.....90TC1371
Carrying/Storage Bag.....26A14
Foam Windscreen.....90A4163
Swivel Adapter.....90B4046
Y-Splitter Cable (0.76 m—30 in.).....90A4148

OPTIONAL ACCESSORIES

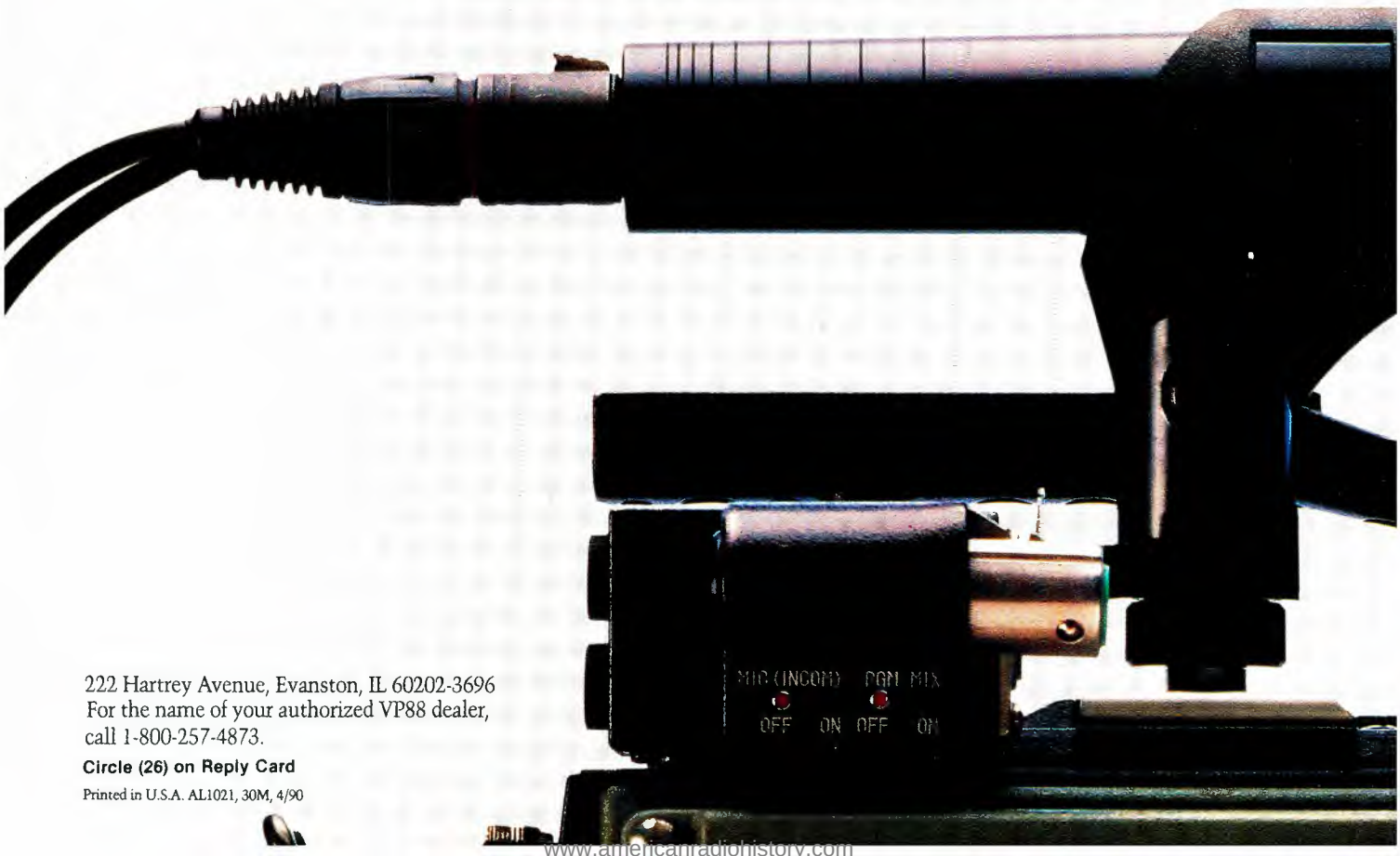
Extension Cable (4-cond. shielded, 7.6 m—25 ft).....C110
Isolation Mount.....A88SM
Phantom Power Supply.....PS1A
Microphone Stand (4.3 m—14 ft).....S15



MS Stereo Polar Pattern

SHURE®

The Sound of The Professionals®...Worldwide.



222 Hartrey Avenue, Evanston, IL 60202-3696
For the name of your authorized VP88 dealer, call 1-800-257-4873.

Circle (26) on Reply Card

Printed in U.S.A. AL1021, 30M, 4/90

The best time to cope with a disaster is before it happens.

Picking up the pieces

By Rick Lehtinen, TV technical editor

Broadcasters get paid by the hour. Not the station staffs, necessarily, but the stations themselves. If programming stops, whatever the cause, so does the revenue.

This article will discuss planning for disaster recovery. One aspect in preparing your station for a disaster is "*hardening*." This means anticipating what calamities might befall your station and preparing for them. Another important aspect is planning. In the event of various anticipated contingencies, there should be a course of action for what must be done when and where and by whom. The disaster that may happen may not be the one anticipated, but even the best laid plans may fall victim to poor execution. Careful planning will help broadcasters form a list of their options in numerous situations. Important decisions also can be made before disaster strikes. The best time to pick up the pieces is before they drop.

Establish priorities

The first step in any disaster recovery plan is to establish priorities. Staying on the air and supporting the news are just two. Part of disaster recovery planning should include provisions for station business operations. For instance, the traffic department must be able to generate the log. It does no good to have the engineers work to keep a station on the air if no one knows what tapes to play. Also, because commercials mean revenue, an as-run log must be created for billing purposes. Station sales departments may require similar support. Spots are often sold with considerable lead time, and a competitive advantage may be lost if the station is crippled too long.

What to talk about

Do these departments have adequate emergency power and lighting available so employees can continue their work? If smoke damage renders their areas uninhabitable, can their operations be transferred to a different area? One plan might be to move these operations off the station premises to a safe location that is blocks or even miles away, where data processing can be continued while cleanup operations are under way.

Involving the business teams of the station in developing the disaster recovery plan serves three purposes. First, everyone knows the priorities, and no one gets upset if one department receives help before another. Second, it pools resources. If one division of a station must be moved temporarily outside of the facility because of fire damage, certain assets may be available for loan to help surviving departments get back to speed. Finally, and perhaps most important, it asserts an engineering department presence into management decisions of the station. Engineers can be viewed as providers of station technical support instead of merely as fixers of broken tape machines. This may become a key to keeping broadcast engineering a viable career.

The planning team should consider what steps can be taken to reduce station vulnerability. Determine what type of disaster could affect each site (fires, vandalism and acts of nature). What kind of recovery operations would be required at each site? What resources or vendor support would be required to affect the recovery? Estimate the monetary losses in downtime and equipment if a given site was lost. What steps could be taken to overcome such loss?

Interdepartmental debate about allocation of emergency resources will probably run loud and long as each division asserts its own needs. The important thing is to have the debates now, before disaster strikes.

Who stays?

A fast way to shut down a broadcast plant is to threaten the people inside it. Gas leaks, sewer backups, toxic spills on nearby railways or interstate highways can lead authorities to order evacuations. Even a bomb threat will push prudent managers to release all non-essential personnel.

There are a few facilities in which automation has advanced to such a degree that equipment can get along fine for a few hours or even days without human intervention. But, in most cases, someone will have to stay behind and "hold the fort."

Determining who stays is not a task to be taken lightly. During a bomb scare, one station evacuated its entire staff, except for the master-control operator. The building

Continued on page 52

History doesn't happen twice.

You can't plan it. But you've got to be ready. Because when it happens, it happens.

That's why virtually every major television facility on earth relies on products from Tektronix to help bring home the news.

Whether you're broadcasting live feeds from a hometown sports event or sending signals via satellite from Berlin or Beijing to thousands of stations around the world, you can count on Tek to help deliver the clearest picture of current events. Globally or locally.

Whatever format you work in, no one offers better tools than Tek for measuring and maintaining your video signal quality. More confidence, at the moment of truth.

For over 40 years, Tektronix technology has kept a step ahead —to keep you on the air. Our high-performance waveform monitors and vectorscopes, sync and test signal generators and fully integrated video measurement sets cover the entire gamut of test and measurement capabilities. They're accurate, easy to operate and give you results quickly and consistently.

Even in the evolving world of high-definition television, Tek is out in front with wide-bandwidth instruments to test and evaluate HDTV equipment.

It's just another measure of proof that Tektronix television products continue to meet the broadcast industry's needs better than anyone, day after day, year after year. Whether it's the first big break in the Iron Curtain or the last lap at the Indy 500, we'll see to it that your picture looks its best; because nobody's watching closer than Tek.

Nobody's watching closer.

Tektronix
COMMITTED TO EXCELLENCE

Circle (28) on Reply Card

Continued from page 49

was inspected by authorities, pronounced safe, and the staff was re-admitted. (Fortunately, the incident occurred near lunchtime, which minimized the inconvenience.) The master-control operator was awarded a bonus for sticking to her post — two free movie tickets. She took this as a measure of how much her services meant to station management, and she quit shortly thereafter.

Disaster recovery may eventually become one of the most compelling arguments for station automation. In an automated environment, station control can be transferred to one of several points that are out of harm's way. Multiple-event-per-cartridge programming can allow immense libraries of programming and commercials to be stored in a reasonable area, decreasing the frequency with which such equipment must be tended.

Station business operations must also be administered. Disaster recovery may form a cost-justification factor for a voice-mail system. If everyone has to leave, the voice-mail system can indicate that all circuits are busy and invite callers to try again later. Callers who dial direct extensions can leave detailed messages, which can be fielded by the respective employees from off-site until the facility problem can be resolved.

Happy, joyous redundancy

Plot the various microwave and satellite signal paths into a station, and then plot the various paths on which signals flow out of the station into the viewer's home. Put your hand over each block on the diagram. If eliminating any location can shut down the entire operation, you have discovered a *single point of failure*, which is the electronic equivalent of putting all your eggs in one basket. The best disaster plans center on distributing the signal path, always providing redundancy.

For instance, the transmitter site could be equipped with a secondary antenna and a standby transmitter. More than one microwave or phone link should serve the transmitter site. TV stations may consider providing direct microwave feeds to cable companies so that the their signals will still reach a large number of homes even if the transmitter site fails.

Arrangements may be worked out with news bureaus, sister stations or stations in different markets to provide backup feed points in case of emergency. (Although many cities are geographically isolated from competing markets, transmitter sites may be within microwave range of each other). In this day of satellites, it should be no problem to arrange alternate sources of signals. However, it might be easier to set up a mutual assistance pact when you are up and running and have resources to pledge than when your back is to the wall and you seem to have little to offer.

Best laid plans

Backup power systems and duplicate signal paths between studios and transmitters can help to assure that a single point of failure never hampers your operations. Planning, however, will provide your greatest protection. This is not to say that specific plans will not be washed aside in the face of calamity. Rather, planning is profitable because it forces a careful and realistic assessment of what resources are available, and requires you to consider new and sometimes unorthodox usage of those resources to achieve the goal of getting back on your feet and staying in business after a disaster strikes.

Continued on page 107

Selecting a UPS

By Stewart W. Nowak

Everyone knows about backup power. That's why stations have generators. They are noisy, rumbling diesels hidden in the bowels of a station or in an outbuilding. Traditional generator sets keep stations going when commercial power quits, but there are some tasks for which they are simply not subtle enough. Anything related to or using computers falls into this category, and that includes most of today's broadcast equipment.

The shortcoming of generator sets is not that they can't carry the load. After all, they are in many instances just smaller versions of what the utility used to create the power in the first place. The problem is that by the time a generator gets cranked up, even a sophisticated one equipped with compressed-air starters, block heaters and automatic transfer switchers, most station computers have already died a horrible death.

Some way is needed to keep computer and microprocessor-based equipment ticking through the few deadly seconds it takes a generator to come alive. Preferably, such a device could then help clean up the generator's sometimes erratic voltage waveforms. Such a device is an uninterruptible power supply (UPS).

Editor's note: Nowak is sales manager, power products at Clary, San Gabriel, CA. This article is adapted from *Electronic Service & Technology*, November, 1989.

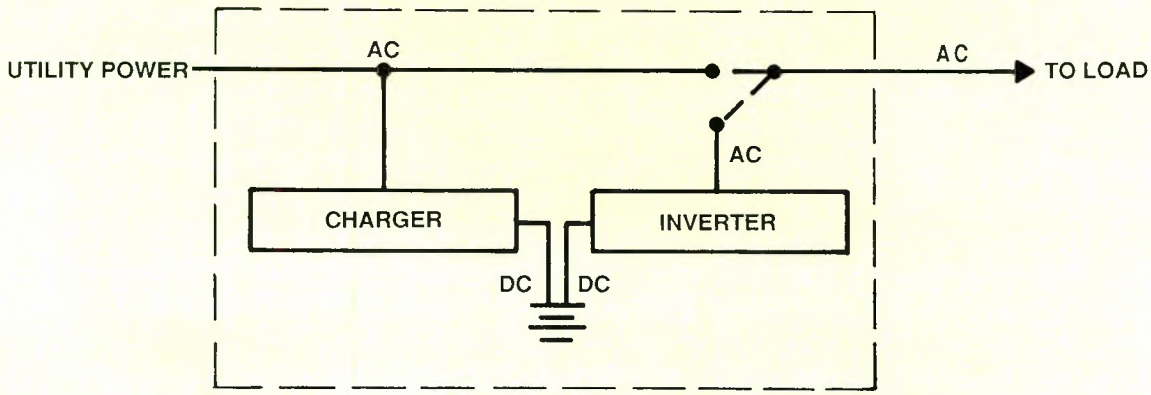


Figure 1. *The off-line UPS is usually inexpensive and lightweight, but it has some disadvantages. It causes a switching glitch of 5ms to 20ms; it usually offers no line conditioning or regulation; it can be "fooled" by brownouts and frequency shifts; it usually doesn't have sine wave output; and its switching time can triple during brownouts.*

The people who set our standards are very tough to satisfy.

Our standards are set by our most demanding customers. And by our sales and technical service representatives. And since all of them are seeking perfection, not one of them is ready to settle for less than the best. That's why 3M Broadcast Betacam® and Master Broadcast Betacam SP® videocassettes meet and exceed the critical demands of Betacam and Betacam SP users. If the last thing you want to worry about is the tape, choose ours.

We won't be satisfied until you are.

3M

Circle (29) on Reply Card

Understanding and solving equipment interface problems.

Making digital connections

By Bruce Lilly

It has been 15 years since digital techniques were introduced to the TV industry. Digital time base correctors were the first to benefit from digital signal processing and storage, followed by effects generators, synchronizers, VTRs and routing and production switchers. In order to realize the full potential benefits of digital audio and video equipment, digital connections should be used throughout a system.

Analog agony

In order to better understand the benefits of digital signal transmission, a brief review of analog signal transmission is in order. As shown in Figure 1, analog transmission begins with a signal source that represents sound or picture by a time-varying voltage. This voltage is coupled to a cable through a source impedance, which is nominally matched to the cable impedance and the load impedance. The cable carries the analog signal with some inherent losses, which include low-frequency amplitude loss due to the finite resistance of the cable's conductors, additional high-frequency losses due to cable inductance and capacitance and losses due to mismatched source and load impedances. In addition, ground potential differences can couple hum and noise into the signal by generating a voltage across one of the cable's conductors. Stray electric and magnetic fields also can introduce interference, which degrades the signal quality.

In an audio or video system, further complications are introduced by the differences in source or load impedance of different pieces of equipment, which result in level differences. Moreover, the impedance might not be purely resistive, contributing to frequency response errors. Variations in cable length or characteristics also can cause signal-quality differences in various parts of a system. Finally, variations in cable and equipment characteristics over time and in response to environmental changes (temperature and humidity) cause signal quality to fluctuate.

Every time signals are converted to or from the analog domain, various errors, such as increased noise, frequency response errors and non-linearities, are introduced by the conversion process. Analog signal transmission also introduces noise and frequency response errors. It's possible to avoid these problems by using all-digital connections, which can mean the difference between a well-functioning plant and one in constant need of attention.

Digital transmission: The ultimate in signal quality

Signal transparency is the main distinguishing characteristic and advantage of digital signal transmission. Unlike analog signal transmission, the digital signal at the receiving end of a signal path is identical to the signal at the sending end, as long as the limits of the transmission system are not exceeded. Audio and video signals do not deteriorate because of cable losses, hum pickup or other problems that plague analog systems.

Digital signal transmission is fundamentally different from analog transmission. Because the sound or picture information is coded as a numerical digital signal, rather than as an analog voltage, cable char-

Continued on page 58

Lilly is manager, digital television tape recording product management, Sony Broadcast Products Division, Teaneck, NJ.

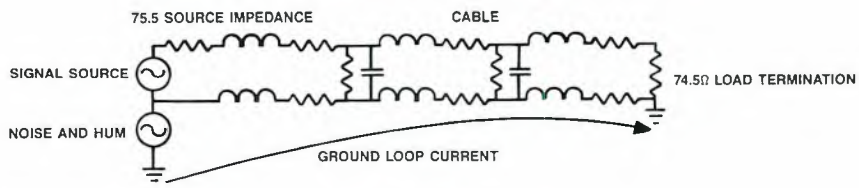


Figure 1. *Equivalent circuit of a cable carrying an analog signal.*

PEOPLE WHO KNOW ROUTING SWITCHERS, CALL US FIRST.

FIRST - 20 MHz solid state video switching system (NASA), 1963

FIRST - 360 x 800 20 MHz switching system —worlds largest (JPL), 1964

FIRST - 30 MHz bandwidth switching system (USAF), 1965

FIRST - 30 MHz equalizers for up to 200 feet of coaxial cable, 1967

FIRST - 90 MHz video matrix (Satellite Tracking Center), 1969

FIRST - 42 MHz bandwidth switching system (USAF), 1969

FIRST - Use of laser-trimmed hybrid video circuits, 1978

FIRST - Switching of high res computer generated graphics, 1980

FIRST - 120 MHz switching system, 1987

FIRST - 135 MHz switching system, 1987

FIRST - 150 MHz video DA's, 1988

FIRST - 40 MHz 2 RU V/A router, 1989

It only makes sense. When you want the most advanced routing and distribution systems, you come to the people who've set the standards. The people of DYNAIR.

Just consider what the list above means for you. Because while it details our technical milestones, there's another message coming through. One of experience. And reliability. Proven reliability. Like the DYNAIR switcher at NASA's Jet Propulsion Laboratory. It's been in continuous use since its installation—26 years ago.

26 years. Isn't that the kind of dependability you need when your job counts on it?

For reliable system routing and coax/fiber connectivity. For needs ranging from CCTV to high resolution graphics. For performance that's designed in, not tweaked in, dial 800-854-2831. We'll send you information on our full line of routing switchers and distribution systems. And you'll see why for 32 years, people have called DYNAIR. First.

DYNAIR

Call us first. 800-854-2831

Circle (30) on Reply Card

Take a closer look . . .

Betacam built by Ampex!

You already know that Betacam SP is the world's most popular acquisition video format. But did you know that Ampex has been in the Betacam business for over three years? What's more, we build and test Betacam SP portable and studio video recorders, cameras, camcorders and accessories in our own factory.

Ampex Betacam SP products meet the demands of broadcast professionals everywhere. The CVR-300 integrated camcorder shown here performs under the most demanding conditions, with 670 line resolution and an electronic shutter.

Better yet, Ampex offers not only Betacam SP products, but also a full line of production and post-production equipment for both component and composite systems. And if you ever need help, highly qualified Ampex service people will respond, fast!

Call us at **1-800-25AMPEX** for information about Betacam SP products from Ampex.

AMPEX

BE-040-BCAM

Continued from page 54
acteristics, minor variations in source and load impedances and moderate levels of interference do not degrade the quality of the audio or video.

The perils of parallel

Early digital video products use a parallel signal transmission scheme, as shown in Figure 2. Each bit of a given sample is sent on a dedicated pair of wires, and a separate clock signal, transmitted on another pair of wires, is used to recover the data samples. This method of transmission achieves all of the benefits of digital transmission, but there are some technical and practical limitations.

First, the individual pairs of wires that are used to transmit the data and clock signals must be closely matched in effective length (to within nanoseconds) in order to recover the data reliably. This imposes an upper limit of about 30 meters (approximately 98 feet) on the practical cable length that can be used. Because the databits are transmitted separately, timing errors and jitter can make recovery of the signal less reliable.

As shown in Figure 3, these errors reduce the margin for data recovery. In order to reliably recover data, the data must be stable (no transitions) inside the area marked "recovery window," which is only a few tens of nanoseconds wide. Timing offsets and jitter bring transitions close to the edges of this window, as compared to the theoretically ideal signal shown. Each of the eight (or 10) data signals can have a timing offset or jitter different from the others. Figure 3 shows the allowable timing errors at the parallel signal source. Additional errors, due to the variation in effective length of the individual pairs within the parallel digital cable, cause the signal transitions to approach even closer to the edges of the recovery window. The cable contains many individual wires and it is rather bulky and costly. The 25-pin connectors used for parallel digital video also are bulky, limiting the practical number of connections on a given piece of equipment.

Because many individual signals are simultaneously transmitted, distribution and routing equipment tends to be cumbersome, power-hungry and expensive. Many individual line-driver and receiver circuits must be used, one for each databit and an additional set for the clock signal. Such circuitry must be repeated for each input or output connection. Also, because of the size and construction of the parallel digital video connectors, there is no convenient way to patch parallel signals. (Of course, an electronic routing switcher can be used, subject to the size, power and expense considerations previously mentioned.)

The audio end of it

In digital audio, a serial digital transmission method was standardized by the AES and EBU. In serial digital signal transmission, the individual databits that comprise a sample are sent one after the other, serially, on a single path. (See Figure 4.) Circuitry at the sending and receiving ends of the path takes care of multiplexing and reconstructing the individual databits of each sample. The chosen transmission method allows the timing information to be recovered from the serial signal, obviating the separate clock signal used in parallel transmission. Because a single transmission path is used, rather than many paths operating in parallel, the cable and connectors can be much less bulky than those used for parallel digital transmission.

Serial video

Serial transmission also now is being used for digital video signals. Although serial digital video transmission has all of the advantages of digital transmission as noted earlier, it also eliminates the draw-

"Auditronics' 400 is the best production board for the money,"

Bumper Morgan, Producer WYHY-FM

Cameron Adkins Chief Engineer WYHY-FM A Jacor Communications station

says Cameron Adkins, Chief Engineer of Nashville's outrageous Y107 FM. "In fact, Auditronics' sound has helped make us number one in our market for the last five books, and we expect to capture our sixth one as well."

"After looking at all the production consoles that were out there, we found the Auditronics 400 was the best buy for the money. It had more useful features than any other console in its class, and was less expensive overall. So we decided to buy it not only for WYHY here in Nashville, but for two of our other stations as well."

"We bought the light-bar metering version because the ballistics and characteristics are more meaningful for what the production engineer needs to know. Our producer, Bumper Morgan, likes the light bars better than conventional VU meters because he can see from across the room if he's got one channel a little hot without having to stare at the board all the time. The light bars also give the console a high-tech look that helps our sales people when they bring ad agency and client types in, because the 400 gives us the best looking production room in town."

Bumper Morgan, Producer at WYHY says, "Auditronics has really set a new standard in radio production consoles. Going from our old board to this 400 was like going from night to day. The light-bar display gave me instant gratification. I use the foldback modules a lot. I like the range of the eq and the very clean overall sound of the board. Besides our own work, I do a lot of promos, sweepers and liners for other broadcasters from Honolulu to New York, and I continually get compliments that the sound of our packages helps stations sound better than their competitors."

Adkins says, "The Auditronics 400 was easy to wire in. And nobody's board surpasses this 400 for reliability or stability. We're a heavily produced station with seldom a break that we don't air something that was produced here on this board. Even with this heavy workload, we've had zero failures. Literally nothing has gone wrong since day one," he says.

Call 1-800-638-0977 toll-free today for more information on the 400 production console Cameron Adkins buys.

auditronics, inc.

Auditronics, Inc., 3750 Old Getwell Road, Memphis, Tennessee 38118 • 901 362 1350

Circle (33) on Reply Card

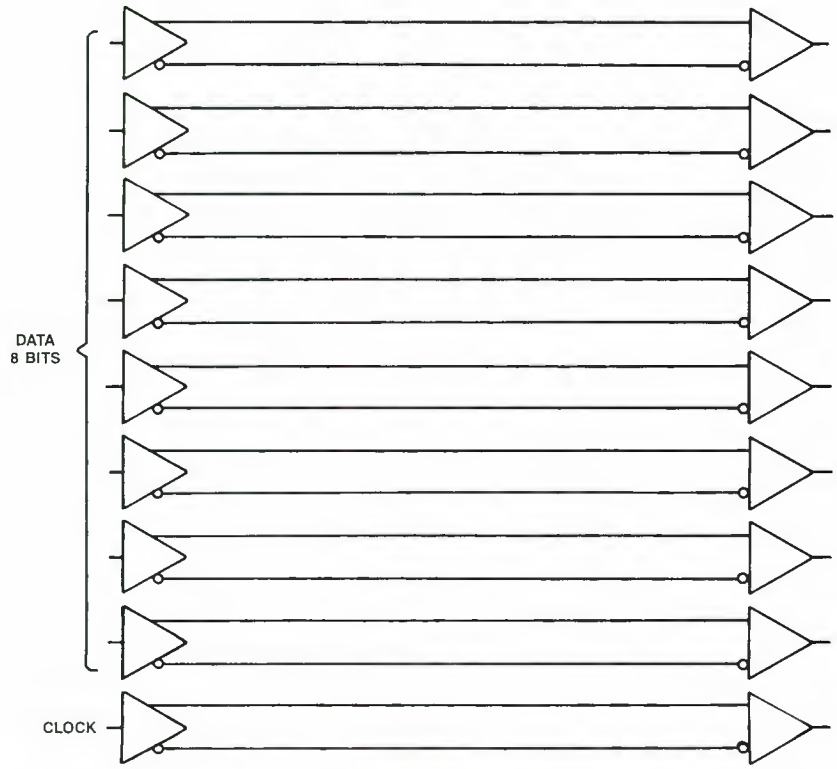


Figure 2. In a parallel digital signal transmission system, a separate pair of wires is required for each bit of a sample, plus the clock signal. This makes parallel cables bulky.

backs of parallel transmission. Serial digital video transmission uses ordinary, video coaxial cable and can reliably transmit signals up to 500 meters — more than 10 times the parallel limit. Repeaters can be used to extend this distance.

Because a single transmission path is used in serial digital video transmission, the circuitry in such devices as routing switchers and distribution equipment is much smaller and consumes less power than parallel digital video equipment. As coaxial cables are used, patching is possible by using a standard, high-quality video jackfield. The ability to patch signals quickly while maintaining the transparency of digital signal transmission allows rapid configuration of a system to meet changes in requirements.

Serial digital video transmission offers other benefits. Video signals, including digital video signals, have unused areas in the TV horizontal and vertical intervals, so it is possible to transmit additional information on the same transmission path as the video. For example, several channels of digital audio could be sent down the same cable as the associated video signal. Other information, perhaps relating to the origin of the signal or the types of processing that have been performed on

Trade up to Sachtler and save up to $4455.

Introducing a "Trade Up To Sachtler" Deal That's Unbeatable!

Announcing spectacular savings on Sachtler camera support systems. Trade in your old head/tripod combination — no matter how old... in whatever condition... **any brand** — and get big cash savings. There are Special Sale Prices in effect with no trade-in equipment.

Simply send your old equipment to Sachtler (New York only), and purchase a new Sachtler camera support system at your participating dealer before May 15, 1990.

Trade In Any Camera Support...Any Brand...Any Model:

On A New Sachtler Camera Support System	List	Special Sale Price	Trade Up Savings	Your Total Savings	Your Total Cost	Sachtler System Features:
System 10	$1,245	$1,125	$226	**$346**	$899	V-10, tripod, elevation column, dolly, Free bag.
System 14 II	$1,955	$1,780	$365	**$540**	$1,415	V-14II, S-14 long, SP-14, Free case.
System 18 II ENG	$5,130	$4,695	$996	**$1,431**	$3,699	V-18II, ENG 2CF, SP-100, Free ENG2 case.
System 20 II ENG	$6,235	$5,705	$1,206	**$1,736**	$4,499	V-20II, ENG 2CF, SP100/150, Free ENG2 case.
System 25 II	$7,400	$6,734	$1,380	**$2,046**	$5,354	V-25II, DA 150 med/long, dolly S, Free case.
System 30 II Combi	$15,325	$13,870	$2,771	**$4,226**	$11,099	V-30II, Combi-Pedestal, rubber feet, Free case.
System 80	$16,185	$14,525	$2,795	**$4,455**	$11,730	V-80, OB-2 tripod, OB-2 dolly, (no case avail.).

Special Savings Up To 10% Even Without Trade-In Equipment!

Sachtler Performance. Now's the Time To Get It.

You've always wanted Sachtler performance. Features like dynamic counterbalance; dial-in drag control; and precise camera movements with our patented fluid system.

To make it easier for you to own a Sachtler, we've assembled the most popular packages for ENG, EFP, and STUDIO, at truly remarkable savings.

Take a look at the Sachtler Savings Chart and see how much you can save!

The Sachtler Warranty. The Best In the Business.

We're so confident of the quality and performance of every Sachtler that we have a **3 year warranty** on the entire system...and **5 years** on the leak-proof fluid modules. It's the best camera support warranty available.

A "Free Loaner" Program If You Buy Now.

Every Sachtler purchased during this "Trade Up" is covered by a special "Free Loaner" program. If your Sachtler is out-of-action for warranty service for more than 48-hours (2 business days), we'll loan you a replacement...FREE!

Chances are you'll never need this, but owning a Sachtler gives you extra peace-of-mind.

Special Bonus: Buy Now And Get A Free Case Too!

Act Now — This Offer Ends Soon.

You must act now because the "Trade Up To Sachtler" Savings Program will end May 15, 1990.

Every system is on sale. If you don't see the exact combination you want, call us. We'll put it together.

So grab your old, used, worn-out camera support and see your participating Sachtler dealer. It's the best move you and your camera can make.

See your participating Sachtler dealer today.

sachtler®
corporation of america

55 North Main Street
Freeport, NY 11520
Phone: (516) 867-4900
Telex: 140 107 sac frpt
Fax: (516) 623-6844

West coast office:
Burbank, California
Phone: (818) 845-4446

Circle (36) on Reply Card

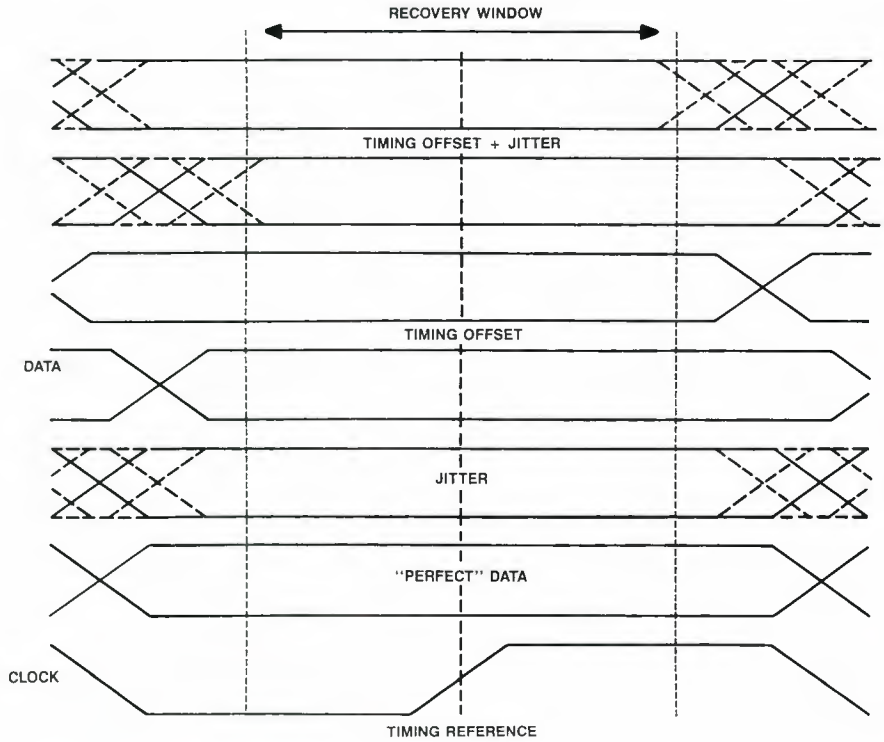


Figure 3. In a parallel digital signal, the phase of each signal with respect to the clock affects the data's readability. All variations due to signal jitter or cable length variations must not exceed the recovery window or else the data will be invalid.

it, also can be encoded as part of the digital signal sent down the cable.

Solving problems with converters

Sony and Alpha Image are offering serial digital equipment that can convert between the serial and parallel transmission methods. A number of facilities have incorporated these units to interface older equipment, having only parallel connections, to systems using the more modern serial connections.

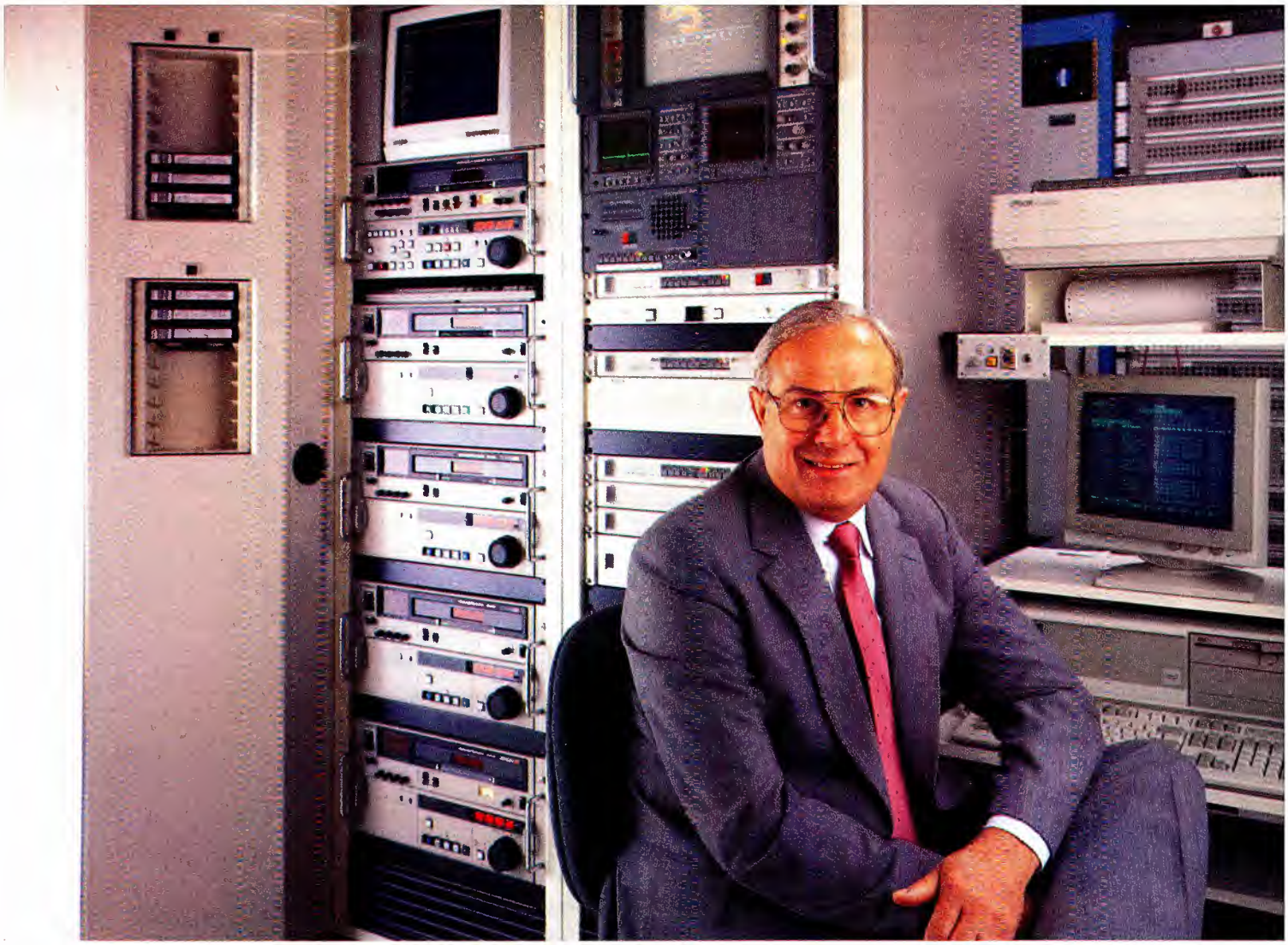
Initially, facilities coped with communication problems in the digital interface by running parallel digital cables to and from the products. Frequently, the parallel runs were long and the resulting signal was degraded. Installation of digital interfaces can help facilities cope with these problems.

Installation is usually a matter of inserting two short parallel cables that go to and from the parallel/serial converters, which may be switch-selectable for operation with either 4:2:2 component or 4fsc composite digital video signals.

Routing and distribution

Parallel routers tend to be bulky and expensive. Serial routers have made it prac-

Continued on page 115



"For Dependability and Quality, You Can't Beat the Odetics Cart Machine..."

"Since we switched over to the Odetics TCS2000 Cart Machine, on-air discrepancies have dropped from about six per day to virtually none. And the quality has improved dramatically .

Our old machines were labor intensive. Too much time was spent daily pulling carts from storage and programming. We needed a machine that would do away with human effort...and human error.

I shopped and compared for over two years before I settled on the TCS2000. The other machines I researched didn't have the Odetics level of automation, and they were not nearly as dependable.

I've been especially impressed with the Odetics machines ability to download from our traffic computer and generate a play list. Not only does that feature save time and effort, it eliminates the error factor. And, of course, if we don't have on-air failures, we don't worry about makegoods.

The on-air appearance of the station is 100% better now. That's a big morale booster for everyone here. And the machine has certainly made my job easier. I don't miss those phone calls about our old machines problems at all hours of the night.

I didn't know a lot about Odetics before I bought their equipment, so I asked for a factory tour and demonstration. After I saw the large-scale robotics work the company was doing for the space industry as well as the broadcast business, I knew Odetics had the automation expertise I needed. In fact, I would strongly recommend that any chief engineer looking at cart machines take that factory tour. Also, I knew Odetics had already installed about 80 machines at other stations, so I called some of those chief engineers. I didn't talk to anyone who wasn't happy with the Odetics machine.

Most of the engineers I talked to emphasized the exceptional after-sale service and support Odetics provided. We found that out for ourselves when our new machine was installed. The training and support our operations people got was efficient, thorough and highly professional.

If you'd like to know about what the Odetics cart machine has done for KPHO, why not get some firsthand information? Feel free to give me a call at (602)264-1000."

Bill Strube, ***Director of Engineering***
KPHO, Phoenix

Odetics Broadcast

1515 South Manchester Avenue, Anaheim, California 92802-2907 Phone (800) 243-2001 or (714)774-2200

Circle (38) on Reply Card

Surviving changes in station ownership

By Brad Dick, editor

Develop a survival plan, before it's too late.

Tom was one of the most important engineers in the station, and he knew it. The station relied on an old TCR to playback most of its commercials, which made it crucial to the company's financial success. Tom originally installed the machine, knew all of its idiosyncracies, and was the only one in the station who could keep it operating.

Although many of the younger engineers tried to learn how to repair the machine, Tom felt that such work was best left to him. Eventually, even the most persistent engineers gave up and let Tom take care of the machine. He was an expert with the "old technology," but didn't understand much of the newer hardware.

Tom's many years of experience, and the station's continued dependency upon the old-technology cart machine, forced management to encourage Tom's loyalty and continued employment with a higher salary. After all, it was cheaper to pay Tom more money than to replace the machine. Unfortunately, as Tom soon learned, he had traded his security of knowing only the old ways for the insecurity of not having a job.

Forced changes

Mergers and buyouts occur daily. If your station hasn't been sold already, it may happen soon. In major markets, hardly a month goes by when at least one property doesn't change hands.

The catalyst to implementing new technology often is based on new station ownership, especially if the owners are looking for a quick return on their investment. This can translate into rapid and drastic changes within a station, which often includes the search for labor-saving and staff-reducing technology.

As staffs shrink, engineers who do not have the skills to compete for the remaining jobs will be released. Even if the owner feels some degree of responsibility for the employees (which is not always the case), the reality of monthly debt payments usually takes priority.

First technology wave

Engineering job security used to be based on federal regulations and the need for good, component-level troubleshooting skills. Today, both of these reasons to hold on to your job have vanished. Sophisticated technology requires different troubleshooting skills. Systems, as opposed to components, become the repair targets. Two major changes have affected broadcast engineering.

Modern remote-control systems are a good example of how the system approach affected significantly the broadcast environment.

Broadcasting originated with tube technology. The transistor represented the first wave of new technology. Engineers kept busy replacing tubes. With the advent of the transistor, reliability increased and the need for constant attention (maintenance) decreased.

There were some engineers who had a difficult time making the transition from tubes to solid-state equipment. They never quite grasped the importance of the technology to their futures. The industry moved forward and they faded away.

The discrete transistor migrated into the IC, which begot the computer. Now, computers drive much of our station operations.

IC technology brought superior reliability to broadcast stations. Much of the equipment no longer needed constant adjustment; in many cases, the equipment adjusted itself. This stage of technology probably didn't affect greatly the number of engineers needed by a station. That is not the case with the second technology wave.

Second technology wave

Broadcasting's second technology wave was represented by how components could be integrated into systems. Systems became the blocks of construction and even repair.

Modern remote-control systems are a good example of how the system approach affected significantly the broadcast environment. As the transmitters (especially TV transmitters) were replaced, modern, sophisticated, remote-control systems were installed. The engineers working at the transmitter sites were usually transferred back to the studio, often with disastrous results.

Those engineers usually were highly ualified, but only with transmitters. Their kills were seriously lacking when it came ɔ repairing modern tape or video equip- ıent. Because the engineers usually ʌorked alone, they often found it extreme- ɾ difficult to be around others, usually in ɨnsion-packed studio environments. any of these engineers sought, and were ıanted, early retirement.

You have to ask yourself, "Do I want to remain in broadcasting?"

his new systems technology first swept ough radio and is now making its way ough TV stations. It often requires ad- ıced or, at least, different maintenance lls. Engineers who have not upgraded ir skills may find themselves seriously ıdicapped when it comes to maintain- ɡ modern equipment. Another conse- ence of the second technology wave is ɨt fewer people are required to operate maintain stations.

Fewer jobs

s no secret that there are fewer broad- engineering jobs. The latest state-of- industry report **BE** (December 1989) ʍs a marked drop in radio and TV staff

1986, the median-size TV staff was 3 people. This fell to 14.7 in 1987 and ' in 1988. In 1989, the median TV sta- engineering staff was 11 people. This esents a 20% reduction in only one . The non-commercial TV station me- staff size fell a whopping 21% in just year.

dio stations saw a similar reduction the same period. The median radio ɔn engineering staff size was 2.7 in . It fell to 2.4 in 1987 and to 2.3 in . In 1989, the median radio station en- ering staff was only 2.0 people. This ɨsents a 26% reduction over a 4-year ɔd.

any radio stations (67.9%) have two or ɨr technical people on staff. Approxi- ɨly 20% of the radio stations have be- ɨn three and four. Very few stations ɔloy five or more technical people. pproximately 23% of the TV stations loy between 10 and 24 technical peo- Most of the respondents to the Decem- 1989 survey fell into this category. ıl percentages (16.5%) of the stations ploy between five and nine or between 25 and 50 people.

Survival skills

This means that the market may get even tougher. Labor-saving devices will continue to eat away at the operator-type positions. Despite the statement "Automation can't take away my job," automation will affect how broadcast engineers do their jobs.

In addition to major changes in automation, equipment is more reliable, yet more complex. The seeming dichotomy of automation (labor-saving) and complex (labor-using) can benefit the savvy engineer.

To be a successful broadcast engineer will require different skills. For instance, component-level repair will become obsolete for complex equipment. Swapping boards and troubleshooting systems will become important. Instead of complaining about board swapping as a maintenance practice, become the fastest and best board swapper in your station.

The most important survival skill isn't technical at all, but requires some introspection. Ask yourself, "Do I want to remain in broadcasting?" If you do, then it's time for self-examination and improvement. If not, then admit it and put your skills to work elsewhere. Plenty of opportunities exist in the electronics field, and most of them don't require you to wear a pager or work holidays.

Engineers are the key

For those who choose to stay, the future looks bright. Engineers are still (and always will be) the gatekeepers of technology and crucial to the success of every station. Broadcast stations cannot function without proper technical expertise. Just as managers can run stations only with good engineers, engineers will be successful only using proper management techniques.

Station managers are no fools either. They recognize the value of staying on the air. Recall the last time the transmitter went off the air — how valuable was the engineer? What about the time the network satellite link failed? Who panicked first? It probably wasn't the engineering staff. Why? Because they new what went wrong *and how to fix it*. Engineers hold a crucial key to stations' financial success.

If you want to remain in this exciting business, you have to do three things. First, accept the responsibility for your own future. Whether you stay in broadcasting should be your decision — not someone else's. If you're not happy where you are, don't wait for the ax to fall. Make your

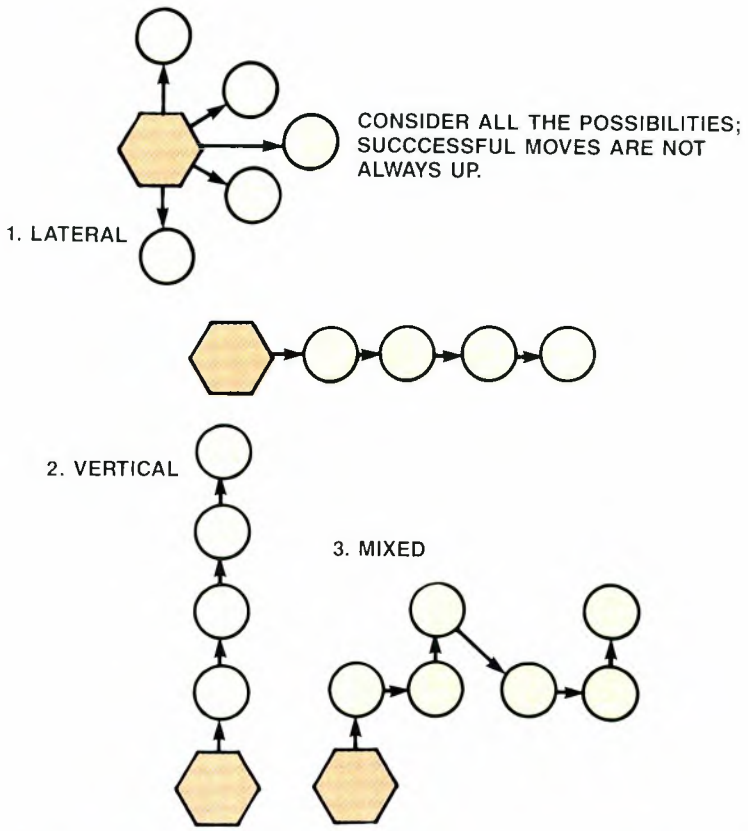


Figure 1. *When faced with significant changes in your work environment, consider all of the possibilities. Not every move on the career ladder has to be up. Lateral and mixed-direction moves can also prove successful.*

move early while you still have a place from which to jump. Figure 1 illustrates that your move may not be up, but that both lateral and mixed-direction moves also can bring success to your career.

Second, learn the new technology and how to apply it toward making money for the station. Stop complaining about how bad things are and look for ways to make things better.

Third, adopt a new language. Stop using *engineereze* when talking with your manager. Use English so you'll be understood. Could that old tape machine be reconditioned for less than a new one? Use charts and graphs to show the manager what the difference between reconditioning and replacement will mean in terms of dollars, not frequency response or chroma level. Compare the costs in per-hour of operation. Leave the engineering terminology in your office.

Purchases for every department must show a return on investment (ROI). Learn how to justify your requests based on the manager's perspective. You're still telling the manager what's best for the station, but you're using language that you both understand.

No manager would throw you out of his office for showing him how the station could make more money. He might, however, throw you out if you ask for equipment that doesn't contribute to making a profit. Table 1 explains a process to follow when trying to sell your recommendations to your station manager.

You can become a part of the manager's team or part of the manager's problem. That decision rests primarily with you.

Surviving new ownership

One sure way to lose points with the new owner is to introduce yourself by pointing out everything that's wrong with the station. If you come into the manager's office with a chip on your shoulder about how bad things are, watch out. A manager wants solutions, not problems. If you don't have a solution, don't bring up the problem.

So you don't place yourself in Tom's situation, there are some other steps you can take to prepare yourself before the new owner shows up.

Demonstrate your versatility. Learn how to operate and repair as many pieces of equipment as possible. Ask to be trained on unfamiliar equipment. If this requires factory schooling, ask to attend. If you're told no, look for alternatives. Conventions, such as those conducted by the SBE, often provide inexpensive, factory-type instruction on broadcast equipment. If the company won't send you to school, try to learn on your own. After all, it's your fu ture you're investing in.

Learn as much as possible about ho the station operates. The more you kn about how each department works ar teracts with the others, the better pos you'll be in to recommend profit changes.

Increase your visibility. If you work c at night, show up occasionally at the tion during the day. The adage "Ou sight, out of mind" also applies to ployees. Be sure the manager knows exist and that you're valuable to station.

Engineers can either contribute to o tract from a station's bottom line. You become a part of the manager's tean part of the manager's problem. That d cision rests primarily with you.

Kick in the pants

Technology will continue to change nature of broadcast engineering, a that's good. Companies exist to mak profit, and employees who don't cor ute to making that profit must accep consequences.

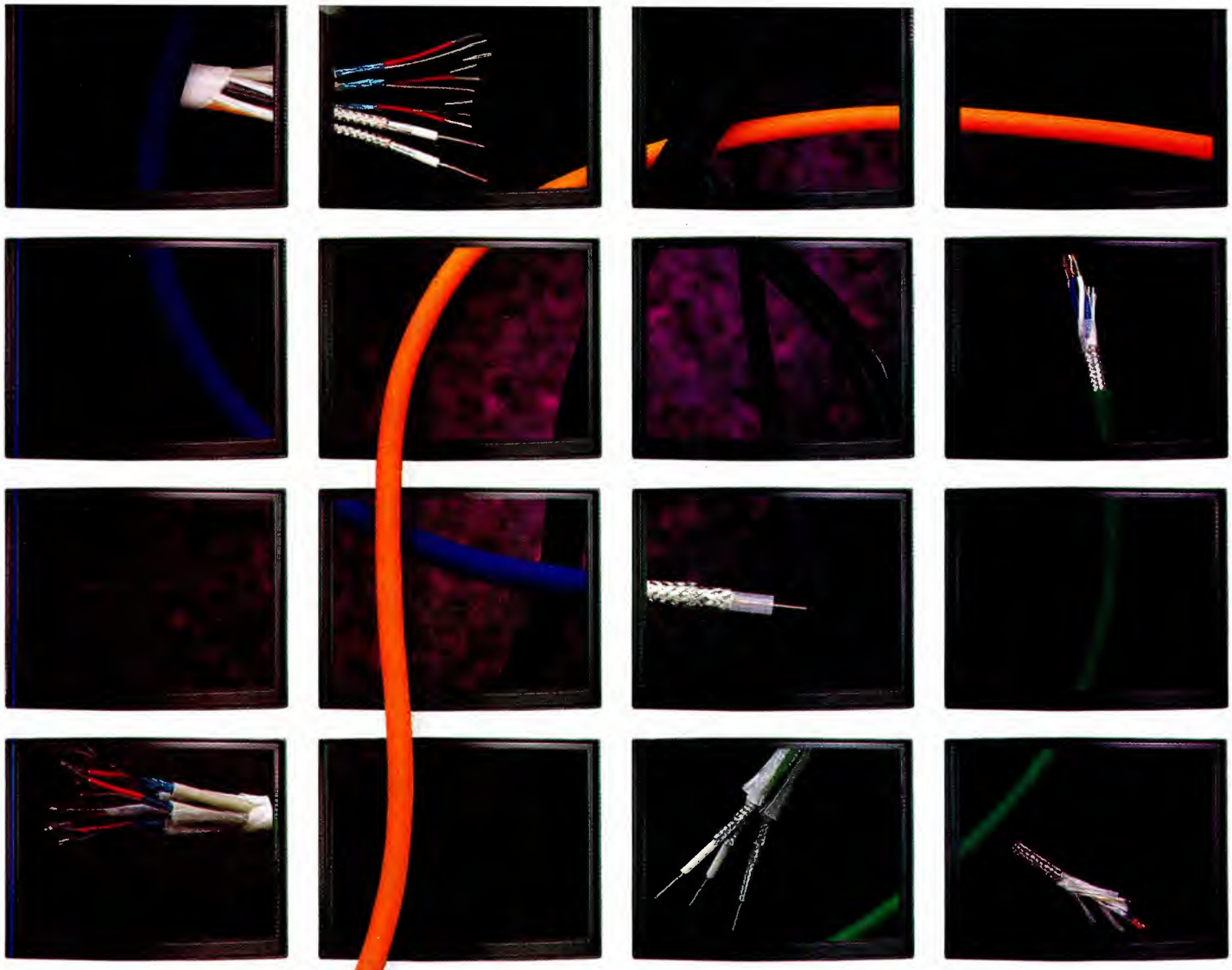
David Sarnoff, reminiscing abo early days in radio, mentioned the s competition he had to face. "But I'm g ful to my enemies," he said. "In the lon range movement toward progress, a k in the pants sends you further along th a friendly handshake."

Although that may be true, you d have to wait for that to happen to you. citing opportunities are appearing on horizon. Digital audio broadcasting (I and satellite-delivered radio and televi are now being proposed. These bro systems will need broadcast enginee ter all, someone will have to desig stall and maintain the systems, and is better qualified than the modern br cast engineer?

Don't wait for a new owner to give y a kick in the pants. Make plans now to su vive the turmoil of new station ownersh

STEP:	EXAMPLE:
1. Research	• Review previous budgets. • Use proper forms. • Incorporate station goals into your proposal.
2. Planning	• Think through the process. • Relate your department's objectives in terms of overall station goals. • Highlight benefits the station will receive. • Develop, but do not present, several lower-cost budgets, cutting what you want, but not what management wants.
3. Preparation	• Read and re-read everything. • Use charts and graphs where possible. • Schedule your presentation carefully.
4. Presentation	• Start with an overview and the benefits. • Be calm and enthusiastic. • Don't fake answers. If you don't know, say so and offer to get the answer.
5. Follow-up	• Once approved, show your results against the project's budget. • Thank the manager for supporting your plan.

Table 1. *Selling your plans to the management requires careful planning and execution. Follow these steps to success.*



BELDEN BRINGS THE LIGHT OF INNOVATION TO BROADCAST CABLE

Just as no performer can stay on top without innovation, no company can retain its reputation for performance without product innovation. The standards we've set with our broadcast cables are a reflection of our commitment to product innovation - something that continues today with Brilliance™.

Named for the sound and picture brilliance obtainable through product innovation and improved signal integrity, Brilliance products range from exciting audio/video cable assemblies to the four new cable products below:

Soft, flexible Microphone Cables.

The debut of Belden's four-conductor microphone cable sets an industry standard. Featuring matte finish jackets in a wide range of colors, these new cables are designed to increase cable flexibility while enhancing performance.

High-Flex and CL 2 Rated Precision Video Cables.

To solve the problems of rack installations and CCTV systems, Belden has developed a new 75 ohm precision video cable. High-Flex combines Belden® 8281 electrical performance with improved flexibility and longer flex life.

Audio Snake Cables.

Belden now offers a line of multi-pair snake cables. Featuring individually jacketed and shielded pairs, Belden snake cable provides maximum protection against signal loss. Features include loose tube construction and a non-reflecting black matte finish.

Audio and Video Composite Cables.

For systems combining audio and video, Belden has specifically designed cables for ENG and camera applications. They combine off-the-shelf availability with specialty design center technology and fiber/copper composition.

Call your local Belden distributor for our Broadcast Catalog, or contact us directly:
BELDEN Wire and Cable
P.O. Box 1980
Richmond, IN 47375

1-800-BELDEN-4
(in Indiana, call 317-983-5200)

There is no equal.™

COOPER INDUSTRIES

BELDEN

Circle (44) on Reply Card

Baumgartner resigns board position

By Bob Van Buhler

The resignation of newly elected board member Frederick Baumgartner has created a vacancy on the board. Baumgartner, who recently accepted a position as technical editor of "Communications" magazine, said that he could no longer act as a representative of the SBE membership in light of his departure from the broadcast industry and transition to land mobile.

In his letter of resignation, Baumgartner included his personal insights and observations on the changes that have occurred in broadcast engineering in the past 10 years. He said the business was "choking in debt" and that other problems were "overpopulated airwaves and...management (that) can no longer afford to be concerned with the public interest, necessity or good."

Baumgartner urged the board to choose the professional rather than fraternal course for the society. He stressed the importance of fostering and protecting the credentials of engineering professionals.

In search of chapter zero

SBE president Brad Dick is focusing his attention on "chapter zero" members — those who are not chapter-affiliated. Many members are unable to attend regular chapter meetings in their area because of the remoteness of the location or other accidents of geography.

A special effort is under way to make extra copies of all press releases as well as the frequency coordination, certification and SBE convention newsletters so that they can be distributed to "chapter zero" members. Although this incurs additional printing and mailing costs, it is considered necessary to keep all members informed of the organization's activities.

Directory and board reports

The membership directory should be in the hands of members by the end of this month. The design of the publication and printouts of member information were completed in early March. Because of the directory's high production cost, another one is not expected to be published until 1992. The society has published only three complete membership directories in its 25-year history.

The officers and directors now are receiving monthly reports on SBE national activities, issues and interests. More than 90 pages of data have been disseminated to the directors since Dick assumed office.

This flood of information will enable board members to comment promptly on issues concerning the membership and to arrive at semiannual board meetings better informed and prepared to vote on matters presented on the agenda.

Portrait of an executive director

In a recent letter to chapter chairmen, Dick outlined his opinions on hiring an executive director. In his discussion of the potential duties of an executive director, he drew a distinction between industry visibility and member services.

The primary goal of the executive director, he said, should be to increase membership. New incentives would be likely to bring many more engineers into the society. Dick thinks the traditional benefits of membership — certification, representation before the FCC and the operation of a convention — are not enough when it comes to serving the membership.

He also sees a need for improved life and health insurance plans for members. By drawing on the strength of a membership numbering nearly 6,000, the SBE can exercise substantial buying power for group insurance. This level of buying power is unattainable for many engineers; those who work in small markets or for small companies often are unable to receive first-class insurance benefits. Dick suggested that a professional association director or manager could provide the expertise necessary to revise the current insurance plans to cost-effectively increase the level of protection for these members.

Another potential responsibility of the executive director would be the publication of a monthly newsletter, Dick said. Obtaining advertiser support, necessary to offset added production costs, also would be a function of the executive director. The production costs for a quality monthly newsletter would exceed $60,000 per year, according to Dick.

Other potential benefits of hiring an executive director fall within the realm of education, in the form of regional training seminars sponsored by SBE and held in various locations throughout the United States. The director could, in cooperation with the Ennes Foundation, develop and administer a curriculum of valuable seminars on broadcast engineering and management topics to be offered to members.

With an executive director in place, Dick predicted, the SBE convention would enjoy a noticeable increase in size and scope. Full-time management would allow more extensive convention planning, better communication with the membership and a higher level of cooperation with local chapters and other groups.

Many other projects, such as an annual membership directory, sample contracts for contract engineers and consultants and preferential access to business insurance, would become feasible if a professional association manager were there to see them through. The key, according to Dick, is generating the revenue to accomplish these goals. "A professional association manager will be able to raise money from a variety of sources," he said. "We should look to those areas first, before members are asked to pay more (in dues)."

VISA and video

Members soon will be receiving applications for an SBE-sponsored VISA card. The credit card will carry the SBE logo, and the relationship will offer financial benefits to individual members as well as to the entire organization. Members are urged to support the society by taking advantage of this offer.

Sandy Fryou, operations supervisor at WENH-TV in Durham, NH, has offered to duplicate copies of the SBE convention tape for distribution to chapters across the country. For members who were unable to attend last year's show, the tape will provide an overview of the programs and exhibits. David Sloane of East Texas University has offered to produce the tapes. The details are being worked out, and the video may be ready for distribution soon.

Van Buhler is manager of engineering at KNIX-AM/FM, Phoenix.

CHUCK LIKES LARCAN.

"We've had our LARCAN transmitter on air since October and I'd say its performance has been great.

"The two most important features are the quality of the signal and reliability.

"Redundancy, and lots of it. That's the key word. LARCAN has enough circuitry built into it so a single transistor or an entire module can fail, and you still stay on the air.

"Another thing we like are the low voltages running through the transmitter. LARCAN is far safer to work with than older-style tube transmitters with voltages of 5,000 or more.

"We're also impressed by the entire interchangeability of the modules and that the modules require absolutely no tuning.

"As for people, all our relationships with LARCAN and LDL have been first class.

"Apparently we made the right decision with LARCAN."

Chuck Morris
Corporate Director of Engineering and TV Chief Engineer
KIRO-TV, Seattle, Washington

Testimonials like this keep proving the point. LARCAN continues to move forward as the solid state leader in station acceptance from proven third generation performance.

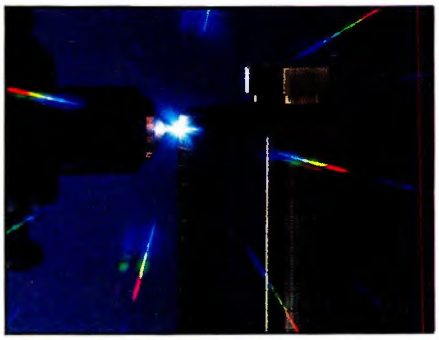
Find out why. Call our RF experts at LDL. We'll send you all the reasons why LARCAN M Series 100% solid state VHF transmitters from 3 to 60 kW are your "best buy in the long run."

LDL COMMUNICATIONS, INC.
14440 Cherry Lane Court, Laurel, MD 20707
Tel: (301) 498-2200. Fax: (301) 498-7952.

LARCAN
COMMUNICATIONS EQUIPMENT, INC.
6520 Northam Drive, Mississauga, Ontario, Canada L4V 1H9
Tel: (416) 678-9970. Fax: (416) 678-9977. Telex: 06 968055.

MEMBERS OF THE LeBLANC COMMUNICATIONS GROUP

Circle (45) on Reply Card



System compresses digital audio data

By Francis Rumsey

In modern communications, channel bandwidth is purchased by the hertz, and the many eager customers have made space a valuable commodity. Digital audio and video both need considerable bandwidth in their raw forms. It is expensive to transmit or store this digital data without some form of intermediate processing to reduce the amount of bandwidth required.

Several techniques exist for digital audio bit-rate reduction. In turn, the bandwidth requirement is lowered. This article describes a new system, known as APT-X 100. The technique is designed to reduce the bit rate required for digital audio by one-fourth, without adversely affecting audio quality.

Rumsey is an engineer with Audio Processing Technology, Oxford, England.

Background

Digital audio data-compression systems are not new to the industry. Various companding and adaptive coding systems already are in wide use in communications and broadcasting. This discussion will be restricted to the area of high-quality music-coding systems, which are capable of handling full-bandwidth audio.

Two common data-compression techniques are ADM (adaptive delta modulation) and NICAM (near instantaneously companded audio multiplex). These systems can reduce the bit-rate requirements of digital audio to 256kb/s-400kb/s per channel. Such techniques are used in broadcasting, particularly for stereo TV sound transmission in some parts of the world.

The rapid rise of inexpensive digital signal processing (DSP) ICs has opened the door for more complicated techniques. There are several new ways to achieve the increased number of calculations per second. It's important to be able to properly analyze and code an audio signal economically and quickly. With DSP, the APT-X 100 system can transmit one channel of digital audio, sampled at 32kHz with 16-bit original quantization, at a data rate of 128kb/s. Further efforts may reduce this by a factor of 2kb/s to 64kb/s.

Data-compression methods

The aim of a music-coding system is to ensure no apparent loss of audio quality from the data-compression process. A study of psychoacoustic effects plays an important role in determining what side effects the human ear can perceive. To re-

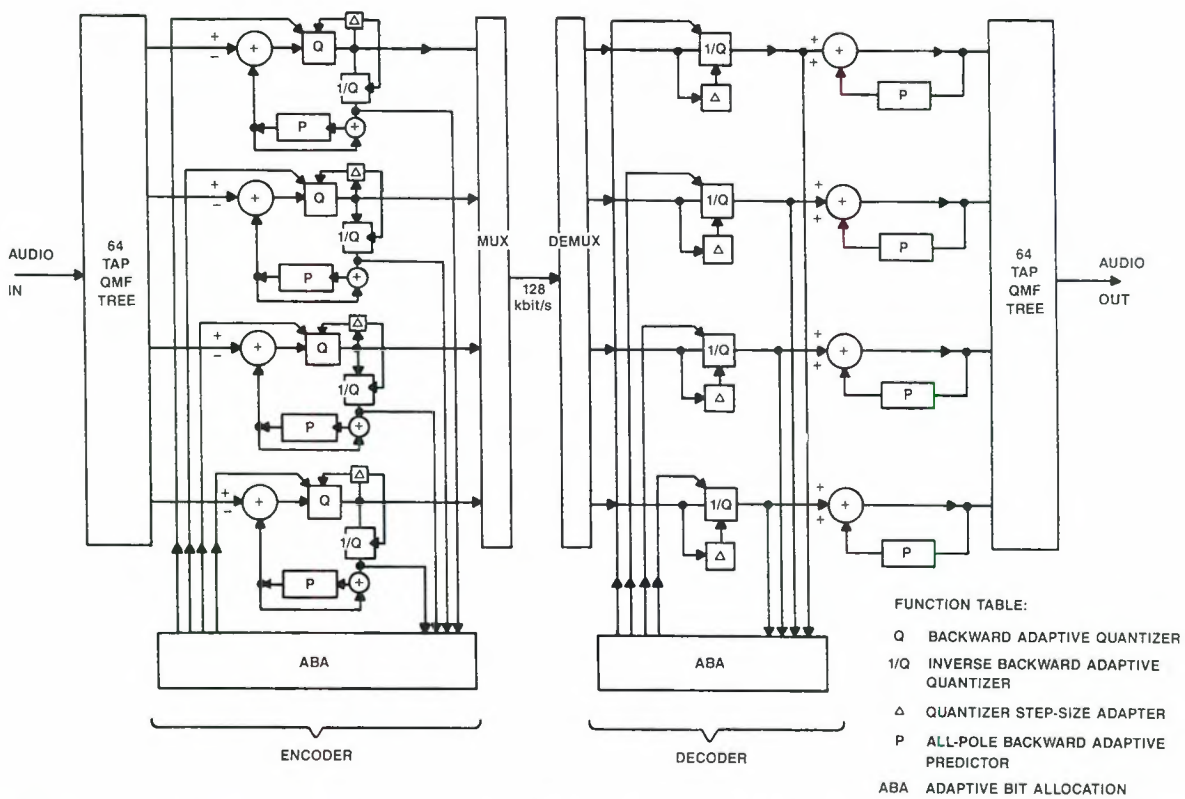
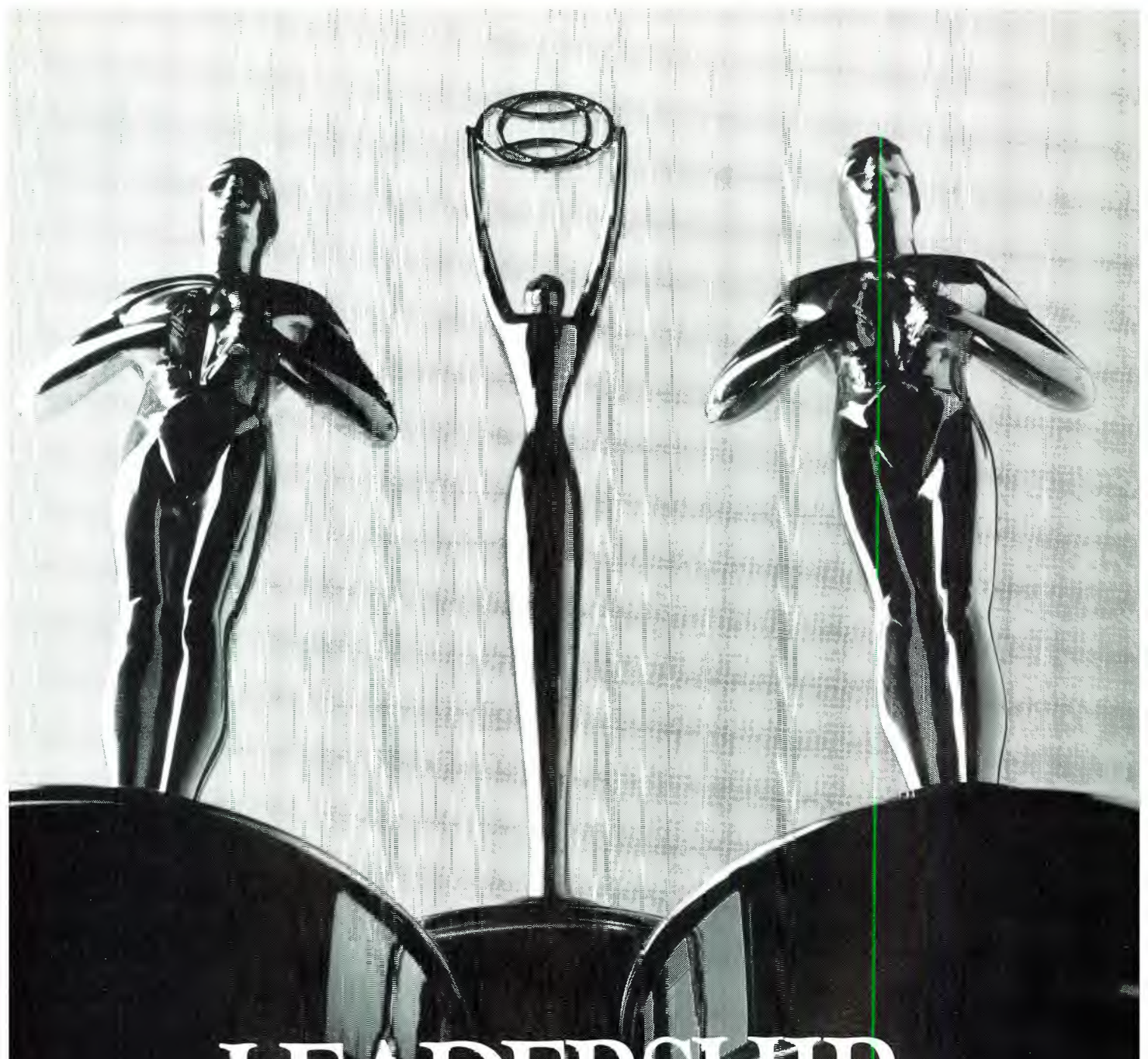


Figure 1. Block diagram of the APT-X 100. The encoding/decoding process does not require a separate control channel, nor are significant delays produced.



LEADERSHIP HAS ITS REWARDS.

Video leaders see the Sony difference not only in the quality of their pictures, but in their trophy cases.

Award-winning producers, editors, news teams and duplicators rely on Sony professional videotape to capture their best creations. They see a virtually perfect balance of durability, reliability, audio-video performance and responsiveness in sales and service.

That's why Sony, the leader in professional videotape, is the choice of video leaders. Worldwide.

SONY®
PROFESSIONAL VIDEOTAPE

Circle (50) on Reply Card

duce the bit rate by the amounts mentioned above, there must be some exploitation of redundancies within the audio signal to be encoded. This means the designer must be able to anticipate the masking effects of certain signals on others in both the time and frequency domains. It's also important to look for repetitive or predictable components.

Once the signal has been analyzed, it's possible to concentrate on coding accurately the components that are dominant or that have a significant effect on perceived sound quality. Essentially, the accuracy of coding is adjusted according to the nature of the audio signal and optimized for the best audible result.

It is possible to allow a data-compression system to vary its output data rate, to adjust its coding accuracy according to the nature of input audio signals. A second method fixes the output data rate, which requires that the system always aim for the same output rate no matter what the prevailing signal situation. This second method is mandatory in applications of one channel using a fixed data rate (such as a transmission channel). The former method may be used in storage applications (such as disk recording), in which the actual data rate may not be that important.

The audio signal may be analyzed in either the frequency domain or the time domain in order to exploit spectral redundancies. One system uses *adaptive transform coding* and works by perform-

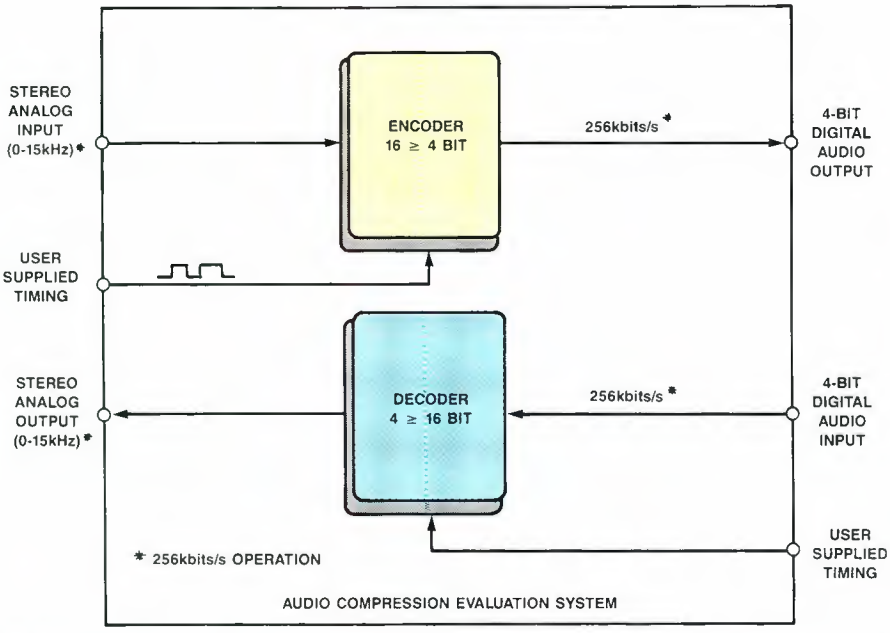


Figure 2. *User-supplied timing signals can be used to control the sample rate in the evaluation configuration.*

This switcher handles standard bandwidth like it's going out of style.

TVS/TAS-3000 Distribution Switcher

The new TVS/TAS-3000 video/audio distribution switcher from BTS handles standard bandwidth switching in stride. But the fact is, standard bandwidth may not be the standard much longer. And that's why the TVS/TAS-3000 is not your standard switcher.

With the advent of wide bandwidth video, you'll need a switcher that can handle the new higher bandwidth signals. The 3000 will. It provides a video bandwidth of more than 50 MHz, measured with a full-amplitude sine wave or video signal. Which makes it upwardly compatible with HDTV or computer graphics—no matter what the standard.

The TVS/TAS-3000 also delivers the cleanest signal and expands to accommodate any matrix size to meet your specific needs.

And if high bandwidth capacity isn't a requirement, BTS still has you covered with our best-selling switcher, the TVS/TAS-2000. The 2000 represents the same advanced technology and quality as the 3000 in a standard bandwidth switcher. BTS also offers a full-range of control panels and distribution amplifiers for a complete system designed, tested and guaranteed by one supplier.

All BTS switchers undergo 100% computerized factory testing and are protected with a 5-year warranty. In the unlikely event you do have a problem, simply return the board for a free replacement.

Dependable, performing switchers from BTS. Anything else is substandard. Call for information and technical specifications today: **1-800-562-1136, ext. 21.**

BTS
The name behind what's ahead.™

BTS is Broadcast Television Systems, a joint company of Bosch and Philips. P.O. Box 30816, Salt Lake City, UT 84130-0816.

Circle (47) on Reply Card

ing a discrete fast Fourier transform on a group of samples. The resulting set of values represents the spectral components contained in the sample window.

The signal then is processed selectively, while known properties of the human ear are taken into account. This allows dominant spectral components to be quantized more accurately than less important components of the audio signal. Furthermore, because any increased quantizing noise is constrained to narrow bands, it will be masked by spectral components of the signal itself.

In such a system, a control pattern is generated by the encoder, which tells the decoder what coding scheme is involved at any particular time. This control pattern is heavily error-protected, because its corruption could result in severe audible degradation of the main signal.

Analyze the signal

The APT-X 100 system relies on a combination of *backward adaptive quantization, linear prediction* and *sub-band adaptive differential pulse code modulation (ADPCM)*. The system does not result in significant delays (3.8ms coding delay at 32kHz) and reacts gently to conditions of high error rate.

To determine what dominant spectral components exist within the audio, the system examines the signal in the time domain, eliminating the need for a time-consuming fast Fourier transform. Periodic emphasis in the signal shows up dominant frequency components.

Linear prediction is a technique commonly used for speech coding. It is advantageous for music signals because it is particularly efficient with signals of high spectral purity (such as pure tones of high-amplitude resonant sounds).

The technique makes it possible to attenuate these predictable signals, which normally show up as unwanted modulation noise effects, before quantizing. Because of this, resonant components can be coded referentially without resolving the frequency spectrum. More random signals, which are inherently unpredictable, do not benefit from linear prediction. However, these signals themselves have a masking effect on noise.

Band-splitting

The sub-band ADPCM part of the data-compression process involves splitting the signal into four frequency bands and adjusting the accuracy of quantization according to the amount of signal energy in each band.

By using backward adaptive quantization, it is possible to look at what has gone before in order to predict what coding accuracy is required in each band. This technique also eliminates the need for a control signal to indicate the coding rules for a decoder. The decoder is really a mirror image of the coder, also investigating past samples but performing the inverse action to the coder, which restores the audio signal to its original form. (See Figure 1.)

One particularly important design factor for good sound quality is the correct selection of the number of previous samples to be analyzed. This is crucial in determining the adaption of quantizing interval at the current moment (the backward adaptive quantizing principle). Because this technique relies, to some extent, on the predictability of an audio signal, it is important to pick a window of the right length. If the window is too short, there may not be enough information on which to base the prediction. If the window is too long, the prediction is likely to be inaccurate.

Sound quality and error tolerance

In subjective trials, the APT-X 100 system has performed extremely well with a wide range of program material. Side effects of the companding/expansion process, when compared with original digital recordings, have been judged by experienced listeners to be inaudible in most cases.

The performance of such a system under error conditions is important to anybody who wishes to use it in a transmission environment. Although the current design has not been tested in such a situation, it has worked well in simulated burst and random error tests. Random error

Continued on page 78

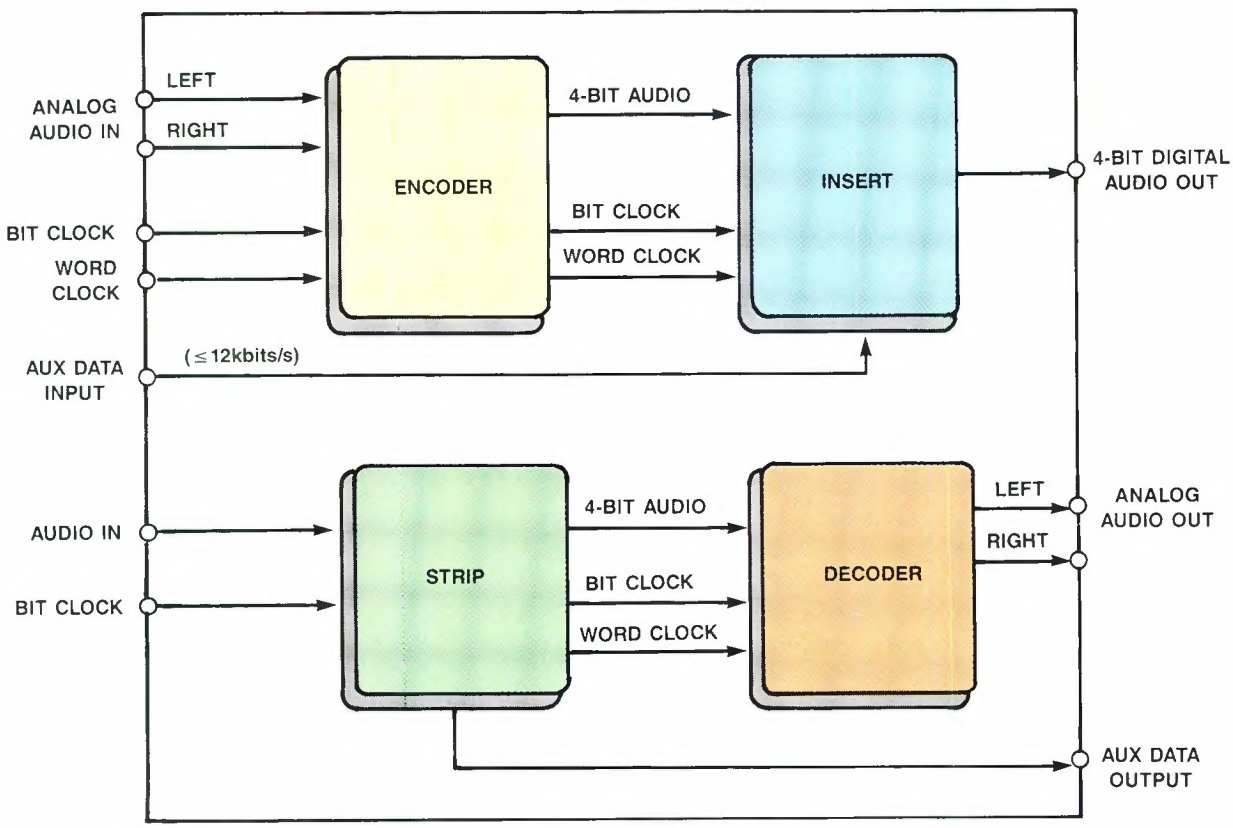
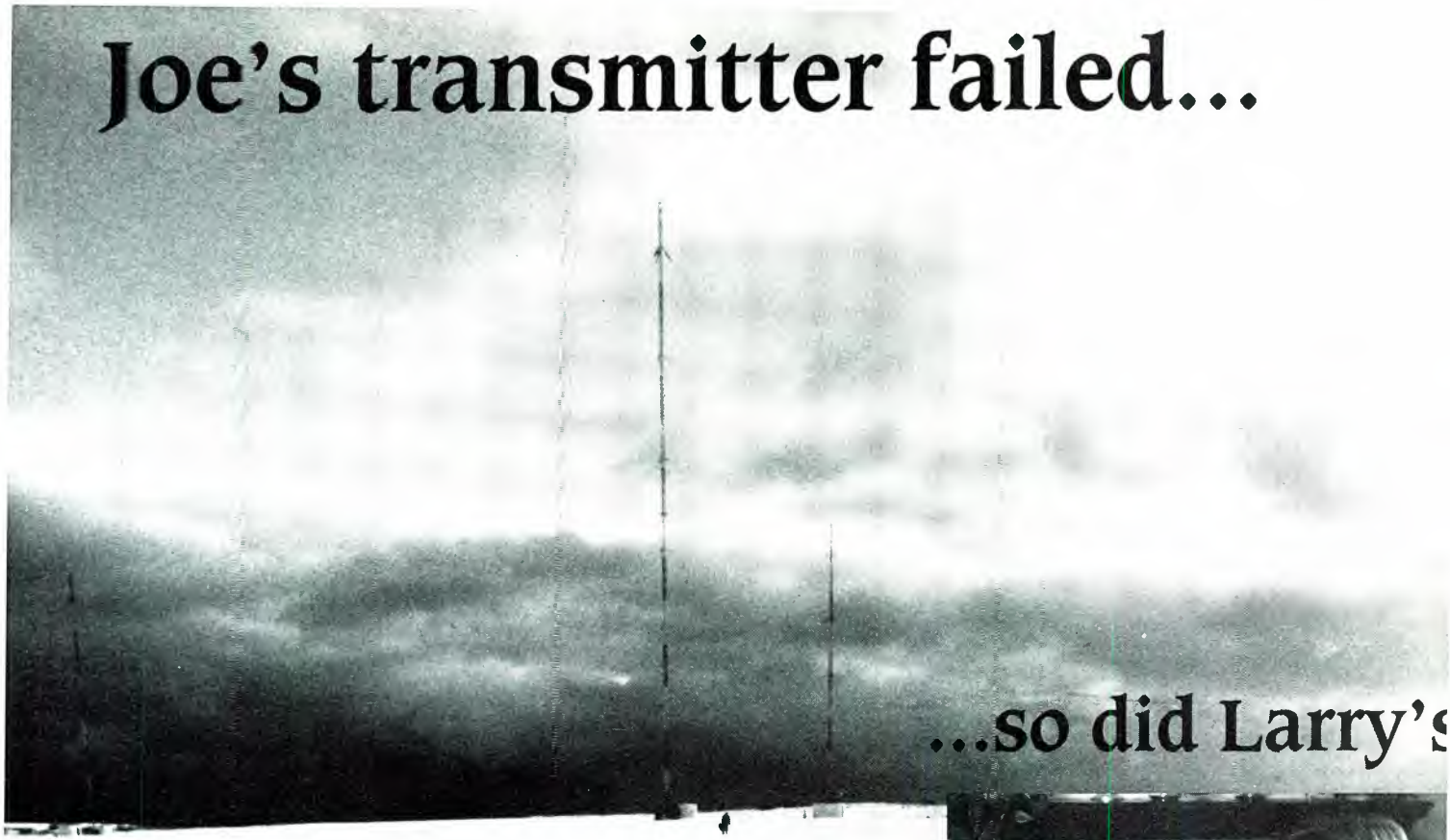
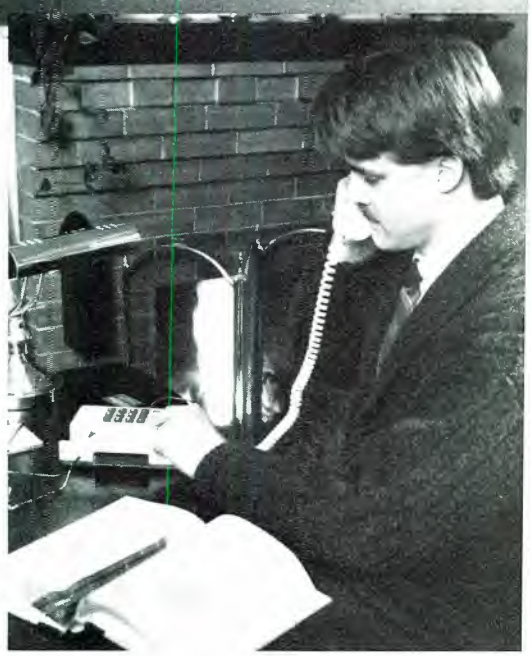


Figure 3. *An auxiliary data channel exists within the system. The data is supplied to the auxiliary input and must not exceed 8kb/s per channel.*

Joe's transmitter failed...



...so did Larry's



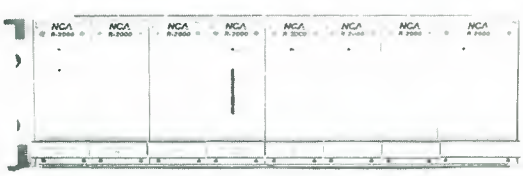
ne days you just can't win...monitoring and control systems
t just can't handle those exceptional conditions. Maybe you
uld just camp out at the transmitter site!

maybe you should look at acquiring an R-2000. Fully
nfigurable through an elegantly simple user interface.
tery backup comes with every unit. Expandable?
to 256 inputs and 256 outputs. Exceptions? Never
exception! Our macro and timed event
abilities take care of that. Everything from
tching day to night time patterns throughout
year at your AM site, exercising the diesel
nerator at your FM site, to daily testing of
backup transmitter at your TV site.

ce? You'll be pleasantly surprised.
NCA we believe in giving you a
nplete package. You won't
l hidden costs down the
d

2000...Some days you
t can't lose!

Monitoring and control...a call away!



R-2000

To talk to an actual R-2000 dial our demo
number 506-634-5018

Circle (51) on Reply Card

NCA MICROELECTRONICS INC.
(506) 634-5014

DISTRIBUTED BY:
MARUNO ELECTRONICS LIMITED
In U.S.A. 716-852-4521 In Canada 416-255-9108 FAX 416-255-3791

THE HEART OF A GREAT TV TRANSMITTER!

Thomson Tubes Electroniques!

Make sure the UHF transmitter you invest in comes with the unique competitive advantage of a TH 563 tetrode from Thomson. With 25 kW in common and 35 kW in vision-carrier amplification, the TH 563 is based on the same principles as the TH 582, which routinely achieves more than 20,000 hours of operational lifetime.

Efficient, compact, linear – TV transmitters using the new TH 563 tetrode from Thomson outperform their competitors with unsurpassed reliability.

THOMSON TUBES ELECTRONIQUES

For additional information, mention code **T T**

Circle (52) on Reply Card

POLARIS EXPANSION

France : BOULOGNE-BILLANCOURT
Tel.: (33-1) 49 09 28 28
Fax: (33-1) 46 04 52 09

Italie : ROMA
Tel.: (39-6) 639 02 48
Fax: (39-6) 639 02 07

Brasil : SAO-PAULO
Tel.: (55-11) 542 47 22
Fax: (55-11) 61 50 18

Japan : TOKYO
Tel.: (81-3) 264 63 45
Fax: (81-3) 264 66 96

Deutschland : MÜNCHEN
Tel.: (49-89) 78 79-0
Fax: (49-89) 78 79-145

Singapore :
Tel.: (65) 284 34 55
Fax: (65) 280 11 57

España : MADRID
Tel.: (34-1) 519 45 20
Fax: (34-1) 519 44 77

Sverige : TYRESÖ
Tel.: (46-8) 742 02 10
Fax: (46-8) 742 80 20

Hong-Kong : WANCHAI
Tel.: (852-5) 865 32 33
Fax: (852-5) 865 31 25

United Kingdom : BASINGSTOKE
Tel.: (44-256) 84 33 23
Fax: (44-256) 84 29 71

Inde : NEW DEHLI
Tel.: (91-11) 644 7883
Fax: (91-11) 644 7883

U.S.A. : TOTOWA, NJ
Tel.: (1-201) 812-9000,
Fax: (1-201) 812-9050

25kW UHF TV Transmitters with all the advantages of VHF and more. That's advanced UHF tetrode technology!

- Highest overall plant efficiency
- No diplexer
- Inherent tetrode linearity
- Simplistic VHF-type correction
- Full 10% aural power
- Tube change in minutes
- Proven over time
- Sensibly priced

New advances in tetrode technology and transmitter design now offer the UHF broadcaster the huge benefits enjoyed by VHF stations for years. . . and then some! Only from Acrodyne.

Call us for all the details.

◀ Gino Ricciardelli, chief engineer; WICZ-TV, Channel 40, Binghamton, NY

Tetrode-equipped transmitters for 20 years

ACRODYNE

Acrodyne Industries, Inc.
516 Township Line Road
Blue Bell, PA 19422
1-800-523-2596
In Pennsylvania, (215) 542-7000
FAX: 215-540-5837

Circle (53) on Reply Card

Continued from page 74

rates of 1 in 10^4 were audibly undetectable. At 1 in 10^3, the effect of the errors were noticed slightly. Even at an error rate of 1 in 10, it is still possible to hear an audio signal, although it is distorted and noisy. The important factor is that the degradation appears to be gradual as error rate increases.

Practical implementation

The audio data-compression system may operate at any sampling rate up to 48kHz. This rate can be selected on the evaluation version of the system by a user-supplied clock. (See Figure 2.) The resulting output is a TTL datastream with a bit rate that depends on the initial sampling rate used.

For example, with a 32kHz sampling rate, the output data rate is 128kb/s per audio channel. With a sampling rate of 48kHz, the data rate is 192kb/s. A wide range of sampling rates can be used. It is even possible to use the system in applications that require only 7.5kHz audio bandwidth by sampling at 16kHz, thereby lowering the data rate to only 64kb/s.

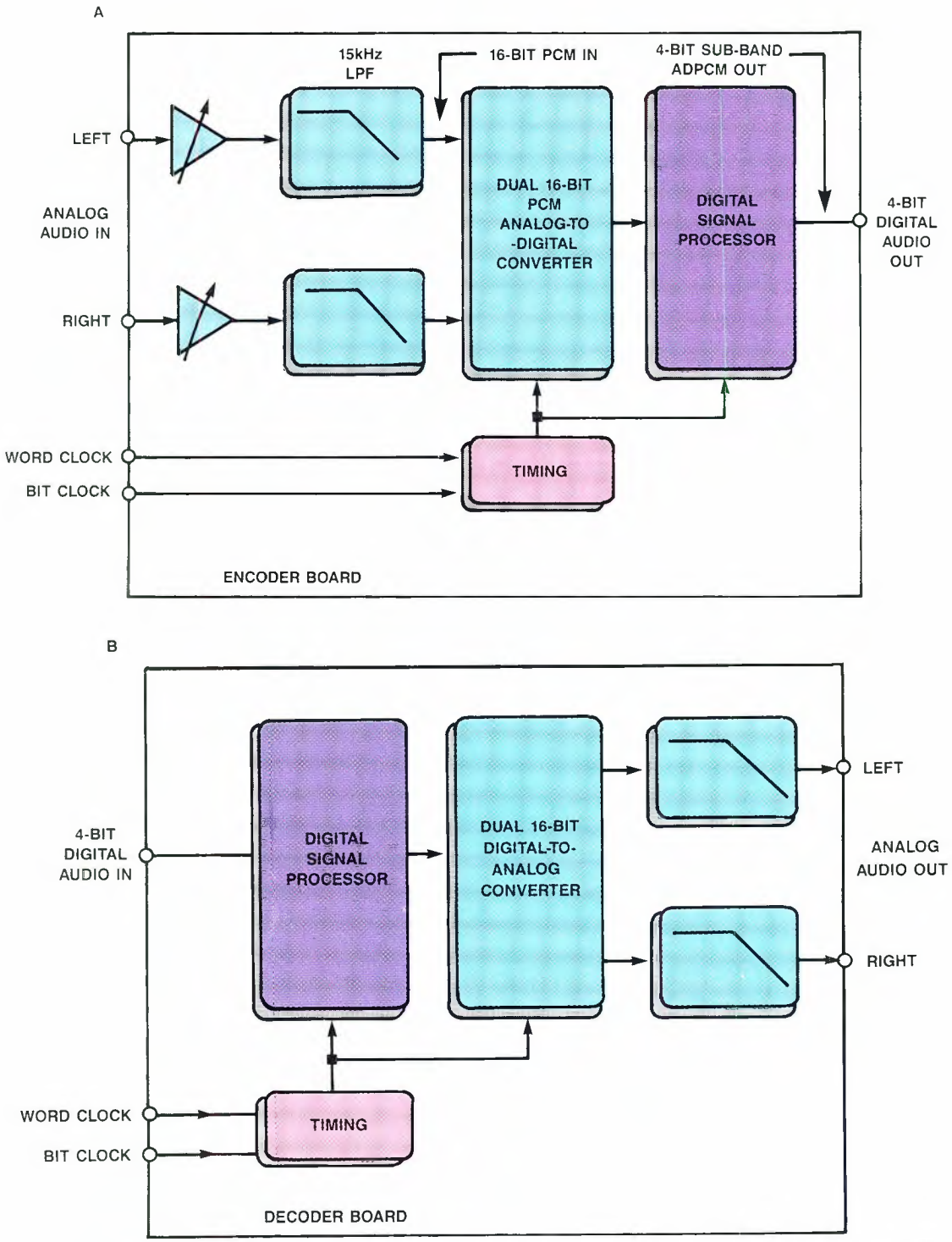


Figure 4. *A pair of encoder and decoder cards makes up a complete working system. This is only one of three system configurations available.*

DISCOVER A HOT NEW TALENT. GIVE LEADER'S SYNC/TEST GENERATORS A FREE SCREEN TEST.

Notice the sleek, high-tech profiles. Now move in for a close-up look at Leader's impressive line of video sync/test generators. Then call us and we'll outfit your production, post-production, or service facility with one of our state-of-the-art sync/test generators for a free 2-week trial period—with no obligation.

You'll find Leader's affordable, full-line coverage includes a model ideally suited for your needs. The model 411 is a sync and test signal source, perfect for use in production and post-production facilities. It features digital gen lock and its own internal clock and can be driven by either. The 411 generates sync timing with test patterns having the tight tolerances only possible with digitally synthesized signals. And a 10-bit DA ensures excellent accuracy for all test signals.

The sophisticated and versatile LCG-420 modular sync/test generator is right on the mark for video analysis and evaluation of broadcast cameras and VCRs. The new 408, incorporating the latest in CPU technology, is your best choice for service and repair. And for portable applications, try our compact, battery-powered LCG-409 pattern generator. But whichever you choose, you'll discover the quality and reliability that are built into every Leader product.

So call and ask about our free "Screen Test"—it could make *you* the hot new talent! For our full-line catalog, in NY call 516 231-6900. Or call toll-free:

1 800 645-5104

LEADER

FOR PROFESSIONALS WHO KNOW THE DIFFERENCE

Leader Instruments Corporation, 380 Oser Avenue, Hauppauge, New York 11788
Regional Offices: Chicago, Dallas, Los Angeles, Boston, Atlanta. In Canada call Omnitronix Ltd., 416 828-6221.

Circle (57) on Reply Card for product information.
Circle (56) on Reply Card for product demonstration.

The converters use a 64X oversampling ADC, offering continuously variable sampling rate and a 4X oversampling digital-to-analog converter.

Additional data can be carried by inserting auxiliary data into the compressed bitstream. This is done by overwriting the LSB of each 16-bit ADPCM code word. (See Figure 3.) One 16-bit output word is generated for every four 16-bit input words. Keep in mind that the overwriting procedure used will reduce the overall audio fidelity slightly. The maximum rate of the auxiliary data will be 8kb/s per audio channel.

Usefulness

The technique eventually might be used in several ways. At the heart of the system are the programmed DSP chips. Anybody who purchases a processor really is buying the algorithms within the chips. The system is available in three forms: as a rack-mounted developing system, complete with power supply; as a pair of Eurocard boards (an encoder and decoder, as shown in Figure 4,) or simply as the programmed DSP chips.

Eventually, the user (who may be another manufacturer) may need to purchase only the chips. The compression algorithms have been patented, and it is not possible for anyone else to download them from the DSP chips.

Applications

Bit-rate or bandwidth reduction is a valuable means of saving money when purchasing space in a satellite band, broadcast band, integrated services digital network (ISDN) or any other telecommunications environment. Alternatively, a data-compression system allows the user to fit more audio channels into existing bandwidth.

Standardization is a question that must be raised, because of the increasing number of competing systems offering different methods of bandwidth reduction. If program material is to be shared or sold among users of satellite links, a proliferation of compression methods will not aid this interchange.

Further applications may be seen in the area of audio data storage. To date, most systems that store digital audio on computer media such as hard disks use linear PCM as the coding method. This results in the need for about 330Mbytes of storage space to contain one hour of monophonic digital audio (48kHz, 16 bits).

This is practical only for small numbers of channels. Recording 20 channels of audio for one hour would require 6,600Mbytes (6.6Gbytes) of storage. That amount of storage is simply not available at a reasonable cost. The APT-X 100 compression system would allow the storage requirement to be reduced by a factor of four. One hour of mono then would require only 82.5Mbytes.

Unfortunately, it is not possible to simply retrofit an existing audio system with this technology. Because of the many design implications in recording and handling compressed audio, the technology would have to be implicit in the design from the start. Even so, the incentives might be considerable.

Bibliography

Forshay, S.E. "Economical Digital Audio for Broadcasting." *Wireless World*, March 1987.

Rumsey, F.J. "Stereo Sound for Television." Focal Press, 1989.

Smyth, S.M.F. "Digital Audio Data Compression — A Practical Solution." NAB convention paper, 1989.

Watkinson, J. "The Art of Digital Audio." Focal Press, 1988.

BBC, NICAM 728 Specification for two additional digital sound channels with System 1 television. BBC Engineering Information, August 1988.

Triple Play

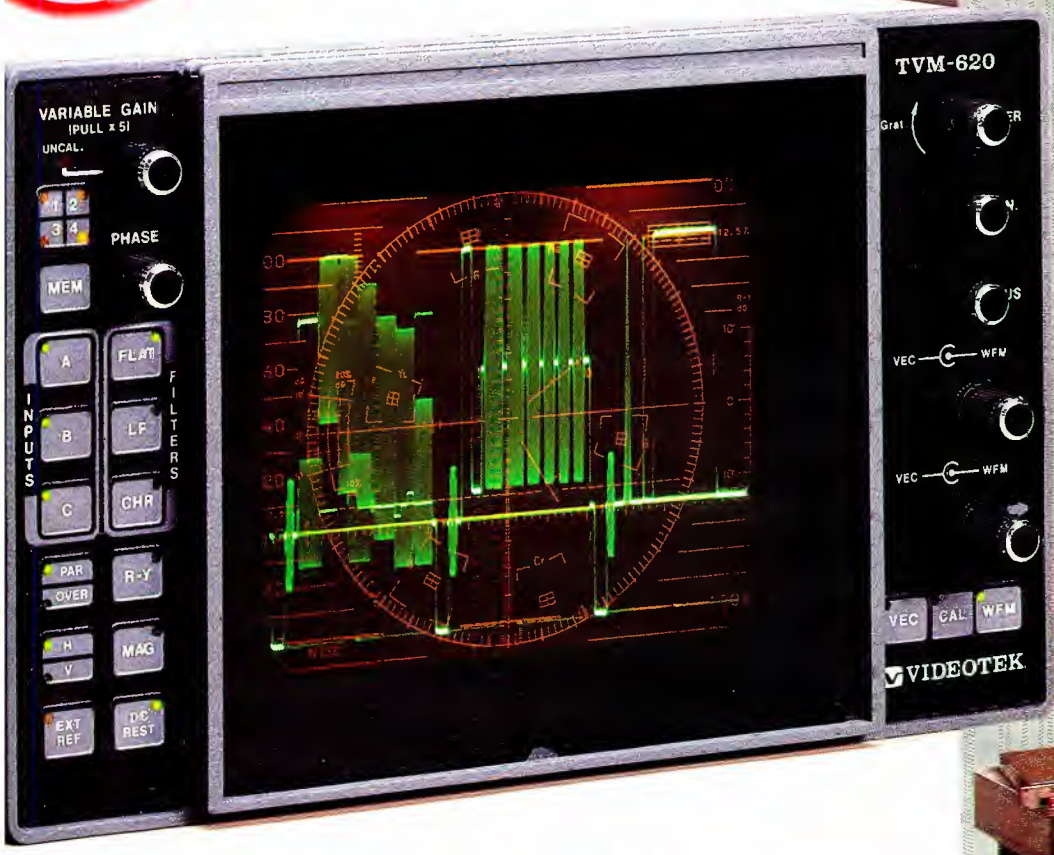
Videotek's new combo monitor gives you more inputs, more output and more memory for less money.

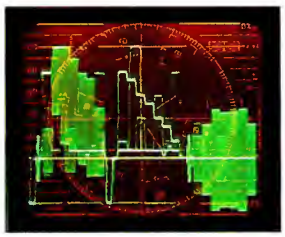
Only Videotek's TVM-620 waveform monitor/vectorscope gives you three selectable inputs for multiple viewing combinations, a roster of other winning features *and* the economy of a two-in-one unit.

Parade or overlay modes let you view any combination of up to three inputs simultaneously with one touch of our new membrane control panel. And ours is the only combo monitor that currently offers user-defined, one-button memory recall.

For portable monitoring of video signals during remote shoots, the TVM-620 is available with an optional internal AC/DC power supply (ADC-1). A four-pin XLR connector provides an easy interface with a variety of DC power supplies.

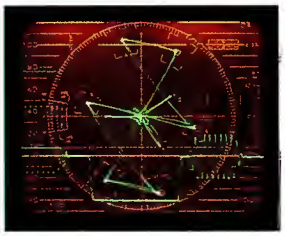
Engineers look to Videotek for thoughtfully-designed equipment that's built to be reliable and priced to be in your ballpark. See your Videotek dealer today about the TVM-620 plus our full line-up of test equipment.





Triple Filter Parade— 1 H each of Flat, Low Pass and Chroma Filters

Triple Vector Overlay— SMPTE Bars on A, B and C inputs delayed by 6° and 12° to demonstrate phase error



Combination Display— Simultaneous waveform and vector displays of a single input

VIDEOTEK INC.
Designed for real needs.
Priced for real budgets.

243 Shoemaker Road
Pottstown, Pennsylvania 19464
(215) 327-2292
TWX 710-653-0125 FAX (215) 327-9295

Circle (61) on Reply Card

Denon DN-950FA CD cart player

By Christopher Scherer

When the compact disc was introduced, it brought with it many new responsibilities for broadcasters. Nonetheless, it has found a home in almost every radio station in the country.

At first it was difficult to find a commercially available (consumer) player that could withstand the abuse that it would receive in a control room. Later, several professional models became available, but the design of these units was based on consumer decks. Denon took a different approach with the DN-950FA CD cart player. The company designed it as a broadcast application unit, with features and controls familiar to most operators.

The basics

The DN-950FA is a second-generation CD player, built according to the same ideas that launched the original DN-950F. The design approach was based not on a CD player, but on a cart machine. The idea was to bring the convenience and simplicity of cart machine operation to the playing of CDs.

The major difference in the operation of this player is that the user never actually touches the CD. Each disc is housed in its own cartridge, which is inserted into the machine. This not only avoids several steps that take time away from running a show, but also may increase the life of the disc.

In analyzing the processes used to load and unload a CD, Denon found that a conventional player requires 26 discrete steps to load the disc and obtain audio. The DN-950FA accomplishes this in 10 discrete steps. (See Figure 1.) The conventional player requires nine steps to stop, remove and store the disc. This player does the same thing in two steps. (See Figure 2.)

The case is held securely shut by two small screws, preventing unauthorized access to the CDs. The case is made of a more flexible plastic than that used for conventional cases. If it slips through the DJ's fingers, it will not shatter.

Front panel

The player's face resembles a cart machine. Two illuminated buttons are labeled *play/pause* and *stdby/cue*. Four search buttons are labeled < <, <, >, > > (fast reverse, reverse, forward, fast forward), and two concentric rotary switches are *track select* and *single/continuous play mode*. The red numeric LED is easy to see and read, displaying track number (up to 99) and time in minutes, seconds and frames. The track number indicator also serves as a power indicator when the machine is not loaded.

Performance at a glance

- *16-bit quantization*
- *Separate D/As for each channel*
- *Digital filtering with 4X oversampling*
- *Start time: 200ms*
- *Output level: +23dB maximum*
- *Harmonic distortion: 0.01% or less at 1kHz maximum output level*
- *Fast search and cue times*
- *Service manual, power cord and one cartridge included*
- *Rack-mountable or stand-alone*

Upon inserting a cartridge, the operator selects the track desired by number with the rotary track select switch. Pressing the play button outputs audio. Cuing is performed automatically by the machine after track selection.

While cuing is in progress, the stdby/cue indicator flashes. When cuing is complete (usually within two seconds), the light stops flashing and remains steady. When play begins, the play/pause indicator is red. It turns white when the machine is paused, and when play is complete, it flashes white.

The indicators do not have bulbs, but use LEDs that are easy to see, regardless of the room lighting. This should provide some relief from the constant bulb changing that is common on many pieces of gear.

The time display can be set (on the back panel) for countup or countdown timing. The frame's indication can be defeated on playback with a back-panel switch as well. The actual frame indication is useful for cuing, but may be distracting during playback.

The back panel contains all of the output, power and remote-control connectors. Also available are the DIP switches for selection of operating options.

Scherer is an engineering consultant, Fairfield, CT.

Small Monitor. Big Difference.

In the recording business, little things can often make big differences. Studio monitors, highly sophisticated critical listening devices, are certainly no exception. Our Control Series™ compact personal monitoring systems each provide the performance characteristics demanded in today's recording environments.

Take our Control 5™ for example. You get power handling capacity of 175 watts, outstanding dynamic range, smooth frequency response and excellent clarity and imaging. This high power, low distortion system is housed in a non-resonant polypropylene structural foam enclosure.

Today you can find Control 1's in home studios and midi workstations; Control 5's in major recording and teleproduction facilities; Control 10's in foreground and background systems, corporate boardrooms and teleconferencing facilities. And the two-way horn loaded Control 12SR, a logical extension of the technology, in sound reinforcement applications from supper clubs and discotheques to small tour sound systems. Control Series meets such diverse applications because they are, above all else, powerfully honest.

Control Series. Compact high performance monitors designed to meet a broad range of fixed and mobile applications.

Versatility, the Other Advantage.

Designed to accommodate a wide variety of specialized mounting brackets, Control Series monitors can go virtually anywhere. On the console, on the wall, on the ceiling, in a rack, on a tripod, keyboard or mic stand. Control 10's and 12SR's even come with a built-in handle so they travel like a seasoned professional.

Next time you're looking for a super compact high performance loudspeaker system, remember Control Series then go see your JBL dealer. Look at the specs, then listen to the big difference.

JBL

JBL Professional
8500 Balboa Boulevard, Northridge, CA 91329 USA
A Harman International Company

Circle (62) on Reply Card

The search functions are in single-frame increments for regular searching and 0.5-second increments for fast searching. If any cuing other than to first audio is desired, it is easily obtained with the search buttons. In this case, one second equals 75 frames.

Back panel

The back-panel layout is simple, consisting of a D-subminiature remote connector, power switch, power cord connector and fuse holder, headphone jack, the user DIP switches, output level trimmers and audio output connectors (3-pin XLR).

The DIP switches provide several user-selectable options. They include: stereo/mono output, audio cue level detect (selectable to −54, −60, −66 or −72dBm), remote/local control, end of message (EOM) indication (flashing play indicator from five seconds to 35 seconds remaining, in 5-second increments), frame indication on/off and elapsed/remaining time.

The remote connector has 37 pins and allows many functions to be brought out for interfacing to consoles or other controlling equipment. The DIP switch controls only some of the remote-control functions. Because each particular setup of the machine has different requirements, the manual should be consulted for in-depth description. The manual provides several examples of connecting the player to broadcast hardware.

The functions of the DIP switches are easy to understand, and a description of each one is screened on the back panel. This eliminates the need to consult the manual every time you need some information about the back-panel connections. Locating these switches on the back panel reduces the chance of tampering, and security would be even tighter if the units were rack-mounted. A unit that sets on a tabletop might be further protected from curious fingers by some type of cover. Perhaps Denon will consider this for later models.

All the servo and laser adjustments and test points are available on one circuit board. The board can be accessed by removing the player's top cover.

On the inside

Disassembly of the DN-950FA is simple. All components are easy to access, and even though the circuit boards are layered, they are interconnected with removable sockets that facilitate disassembly for easy component location. Any internal adjustments can be made without disconnecting the entire machine.

All the servo test points, test jumpers and calibration trim pots are located on the servo board. The gain and focus adjustments also are located on this board. To gain access, simply remove the deck's top cover.

The circuit boards are labeled with component names for ease in troubleshooting. Access to the crystal also is easy. If pitch changes are needed, simply remove the top cover and move a jumper on the top circuit board (servo unit). Denon includes a crystal that increases the speed by 2%. If other speed change values are desired, special crystals may be ordered.

This player employs a different transport than the one used in the original F model. Instead of a dual worm gear differential system, the player uses single worm gear drive. The helical gear helps provide

SHOOT FROM THE HIP

STUDIO
NEWSROOM
LECTURE HALL
O.R.
CEILING
CONFERENCE
ROOM
STADIUM
COURTROOM

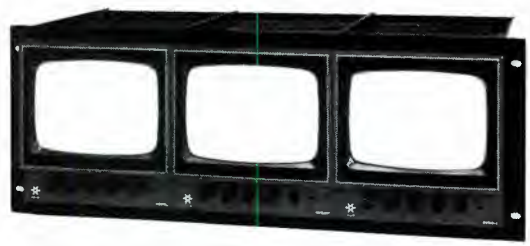
Only Vectorcam™ by Vicon offers all these pan/tilt possibilities.

Vicon Vectorcam™ camera positioning systems put professional-quality camera control at your fingertips—whether the camera is in your corporate conference room or positioned out of reach on the ceiling of a sports arena.

There's a Vectorcam™ system for your application from under $4,000 for a basic system to under $40,000 for a 4-camera programmable system with memory, 99 presets per camera station and RS232 compatibility. And Vectorcam's rugged construction, close-tolerance gearing and high quality components ensure accurate positioning with precise stops, pans, tilts, zooms and focus.

The Vectorcam™ remote control unit is available in desktop or rack-mount configurations and can be tailored to your application.

New From VICON AT NAB
Triple 6-inch rack-mounted preview monitor fits in the same rack space as a triple 5-inch monitor.



Vicon Industries Inc. 525 Broad Hollow Road, Melville, New York 11747-3703, 516-293-2200, Fax: 516-293-2627.

Professional Products Division

VICON


V6035PT


V6033PT


V7000C


V7100C


V6100PT/V6000PT

Circle (65) on Reply Card

fast cue and recue. My tests showed no problems with the transport.

In the audio electronics, separate D/As are used for each channel. One section of the service manual discusses the fine tuning of the D/As for the absolute lowest distortion. The filtering is performed with 4X oversampling.

Cleaning the laser lens is tough on some CD players. All you have to do with the DF model is remove the top cover and swing out the servo board. The lens is clearly visible and accessible.

Two units can be rack-mounted side by side in a 19-inch-wide rack. The width of the machine dictated this because of the limitation involved with the size of the CD itself. Denon does not manufacture the rack-mount adapters, but other manufacturers' adapters are available through professional equipment distributors.

An extensive service manual is included. It provides all the information you'll need for disassembly and basic adjustments. There are several foldout schematics and diagrams, as well as illustrations of oscilloscope patterns that represent optimum operation.

But how does it work?

The best application of the DN-950FA, in my opinion, is in the studio where a rotating format such as contemporary hits

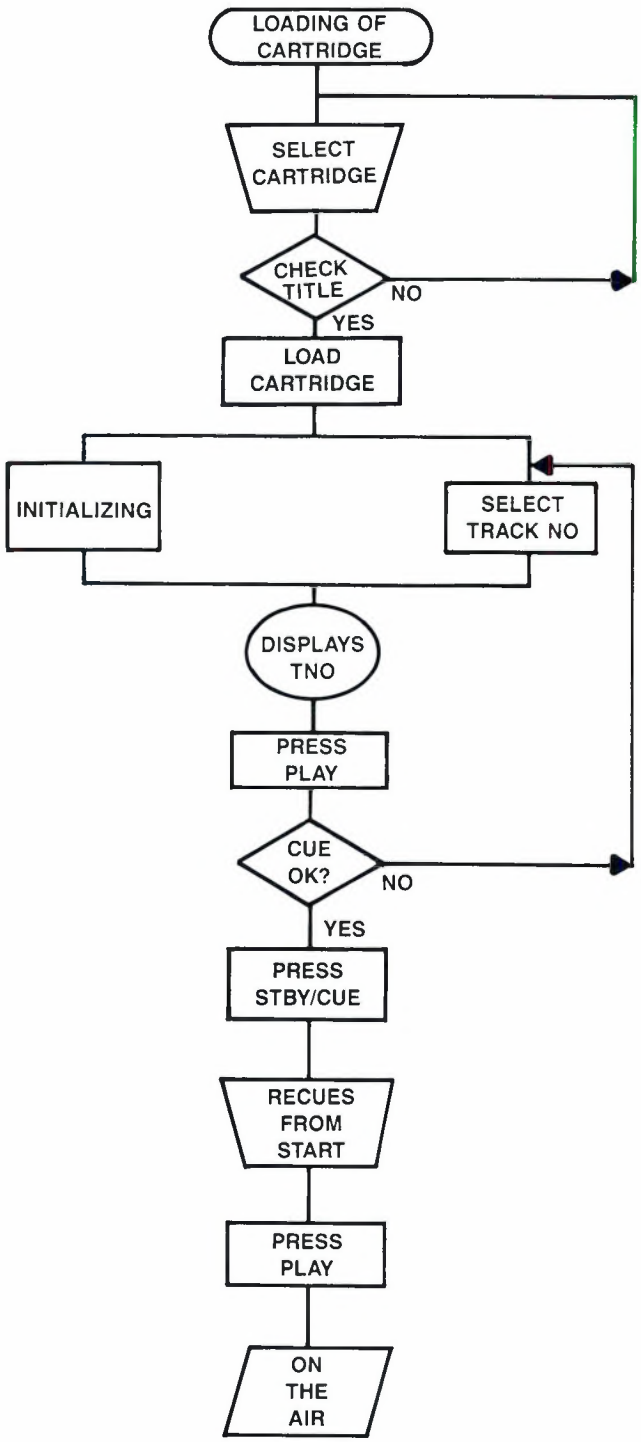
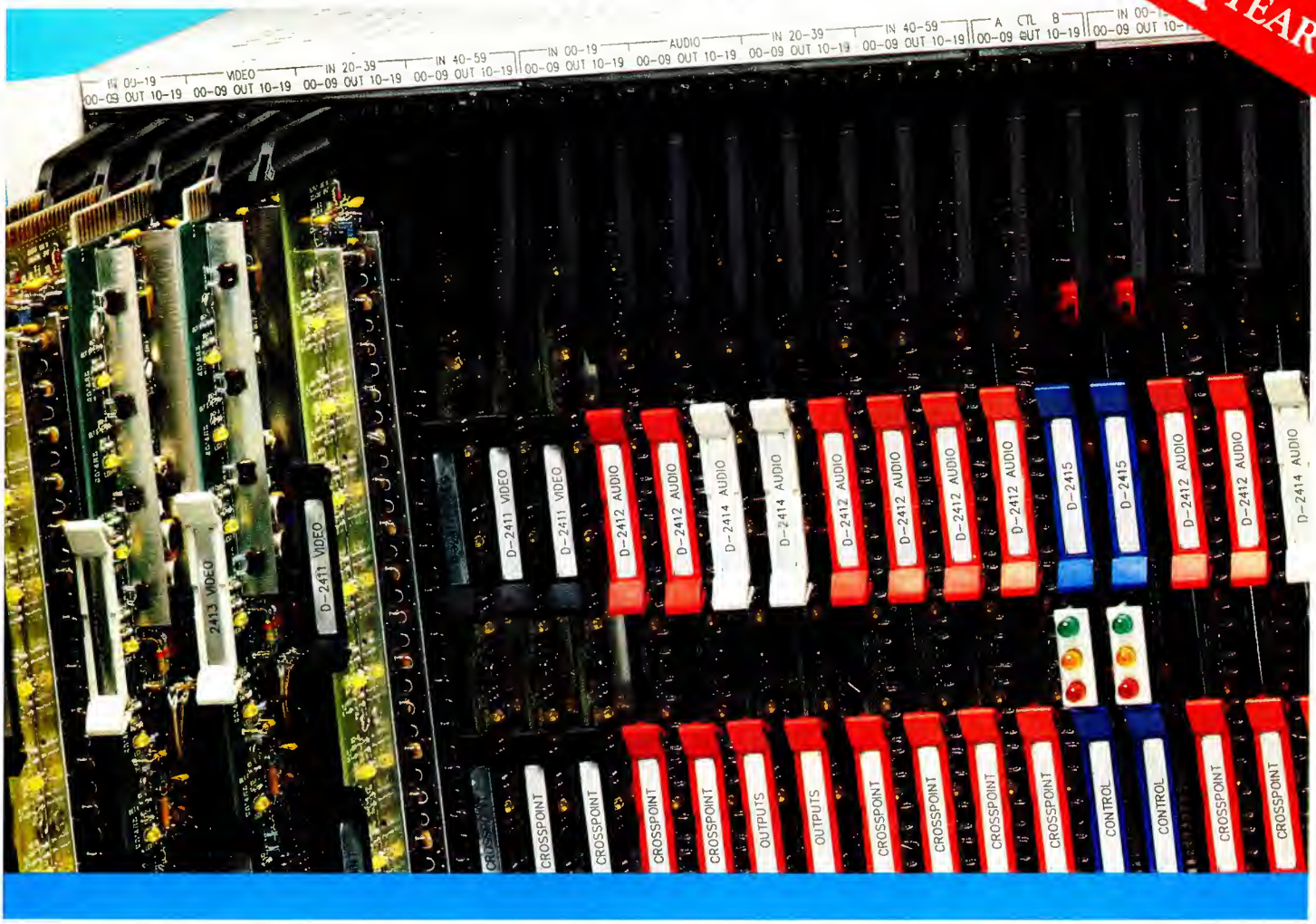


Figure 1. *Playing a CD to air requires only 10 steps with this player. Conventional players may require as many as 26.*

DATATEK'S D-2400

AUDIO/VIDEO ROUTING SWITCHER SYSTEM

CELEBRATING OUR 20th YEAR



...OPTIMIZED FOR STEREO.

The routing switcher you purchase today must be able to meet your requirements of tomorrow. Until now, this required compromises between versatility and cost.

Datatek's D-2400 switcher offers the flexibility to satisfy today's needs without sacrificing tomorrow's goals.

Systems start at 20x10 and expand all the way up to 800x800. Wide video bandwidth of 40 MHz allows HDTV and MAC compatibility. NTSC and PAL signals can even be switched in the same router. Optimized stereo performance, generous headroom and wide bandwidth characterize the audio.

Datatek's wide choice of control panels allows you to select exactly what you need for each destination. No compromises because of system limitations or high price panels.

The D-2400 joins Datatek's complete line of quality switchers including: 6x1, 10x1, 16x1, 20x1, 20x10, 25x1, 50x1, 120x4, 250x2, RS-422 data routing and digital audio.

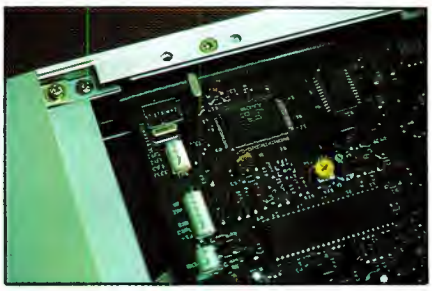
When it is time to look at routing switchers, don't make compromises. Ask about the D-2400.

DATATEK CORP.

1121 BRISTOL ROAD, MOUNTAINSIDE, NJ 07092 • PHONE: 201-654-8100
TOLL FREE: 800-882-9100 • FAX: 201-232-6381 • TELEX: 833541

Circle (66) on Reply Card

radio is used. A station with this type of format that carts music could make a direct transition. A station with a format that requires a much larger library, such as jazz or classical, may not find the player suited to its needs. Because these types of formats demand access to a large number of discs, the station would be obliged to make a sizable investment in plastic cases. In addition, this practice precludes the use of liner notes for announcers.



All it takes to increase the speed of the player is adding a new crystal and moving a jumper.

This doesn't mean that the player could not be used in these applications. The adult contemporary format at WEBE-FM made the switch to encased CDs without a problem. I previously worked at a classical music station, and I think the switch to plastic-enclosed CDs would have taken some time there.

An interesting aspect of the machine is the way it handles errors. Discs that would not play in any of the other three brands of players at the station have played perfectly, or at least with considerably less difficulty, in this machine.

The generation gap

The FA is the updated version of the original F. The company says comparing the two is like comparing this year's car to last year's model. On the outside they look pretty much alike, but there are some real differences internally.

The face of the unit bears some minor cosmetic changes. All the indicators and buttons are in the same place as before, but the location of labels has been changed. Other differences include the display of either elapsed or remaining track time. The F model displayed only time remaining. The FA model includes a crystal for a +2% speed change.

The FA model has a feature that may be handy for formats using discs provided by certain music services. Discs manufactured by Century 21, for instance, provide an index within the track for starting the next event. In the same way that cart machines sometimes use a cue tone to activate the next deck, Century 21 inserts index 3 where the next event would be "musically correct." (Index 2 is placed

PeopleLink™ – A Powerful New Solution

This is the most complicated control you'll find on the new PeopleLink™ telephone system.

PeopleLink translates your every desire into reality. Our new multi-line modular telephone system is no more complicated to operate than a simple tone pad and most functions can be initiated with the touch of a single button. PeopleLink is a powerful multi-purpose system that is absolutely user friendly. It is expandable, allowing you to spec exactly what you need to meet today's requirements with an open-ended design that easily grows with you. The system handles up to 40 lines and works with any KSU.

PeopleLink provides the ability to custom program "personalized" applications. A few simple keystrokes and each operator can easily preset their preferred applications and quickly access their program from any control surface in the system.

PeopleLink is human engineering with the emphasis on human.

The new PeopleLink integrated telephone system, designed for broadcasters by broadcasters, brings to its uniquely designed control panel every capability and every function you ever wanted.

The First Fully Personalized Phone System

Multiple control surfaces may be connected to the system and used in simultaneous independent operation.

A Variety Of Applications Handled With A Single System.

PeopleLink makes caller access clean and simple. Touch a single button to take the next call. PeopleLink ends the previous call and puts the new voice on-air. PeopleLink allows multiple callers to be on-air at the same time and, with the GUEST feature, protects VIP callers from accidental disconnection.

Running contests on-air couldn't be easier. Simply select the number of callers, announce the contest, and punch the CONTEST button. PeopleLink answers the calls, delivers a pre-recorded message and instantly puts the "winner" at your fingertips.

Recording calls is as easy as punching one button. Depress the REC button and PeopleLink sends audio to the recorder and rolls tape. Because PeopleLink includes Gentner's DH-2 Digital Hybrid, you always get the finest audio quality possible.

How To Get In Touch With A Very Simple Solution.

We've only touched on the versatility of PeopleLink. To fully grasp its potential, its flexibility and expandability, its ease of installation and operation, just pick up your phone and give us a call. It's that simple.

GENTNER

Gentner Electronics Corporation
1825 Research Way
Salt Lake City, UT 84119
(801) 975-7200
Fax: (801) 977-0087

Call me, I'm interested. Circle (69) on reply card.
Send literature. Circle (70) on reply card.

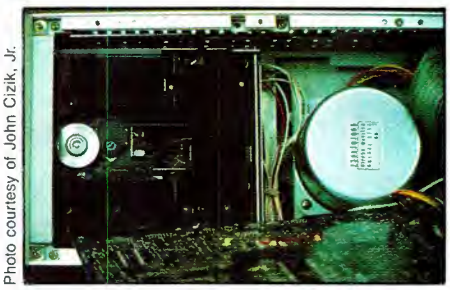


Photo courtesy of John Cizik, Jr.

Access to the laser for cleaning is quick and easy. Remove the top cover, and swing aside the servo board.

one second before index 3 if a preroll is desired.) The FA player provides a dry contact closure, which can be used to start another FA player or a cart machine.

Accessories included with the FA mod-

An open-and-shut case

Encasing the CD in a plastic box is an idea that I have kicked around myself. The fact that the disc always is protected and will not have to endure repeated handling is a major advantage. The downside is that a separate plastic case would be required for every disc used, and that probably would be costly. A station with an all-carted format still would have to purchase cartridges for each song. Unlike the carts, however, CDs do not have to be reloaded with new tape after extended periods of use.

Labeling of the plastic cases is limited to the edge, where a title or brief description can be placed. It is possible to read through the top cover, which provides information about the cuts and, sometimes, their length.

Another limitation to the case idea is that it locks the user in to this format. Most stations keep a less-expensive player on hand for emergencies. That approach, however, won't work here. Unless you want to unbox half of your library because someone spilled coffee into a player, a spare machine might be a wise choice.

On the whole, though, I like the concept of using cases. The plastic armor will prevent the reading errors (and lost airtime) caused by scratches and dirt on the discs. In the long run, maybe the more reliable playback of the protected CDs will offset the cost of the cases.

Editor's note: The field report is an exclusive **BE** feature for broadcasters. Each report is prepared by the staff of a broadcast station, production facility or consulting company.

In essence, these reports are prepared by the industry and for the industry. Manufacturer's support is limited to providing loan equipment and to aiding the author if support is requested in some area.

It is the responsibility of **Broadcast Engineering** to publish the results of any piece tested, positive or negative. No report should be considered an endorsement or disapproval by **Broadcast Engineering** magazine.

Fast.

Very Fast.

On your left, the Porsche 911 Targa Carrera, one of the fastest production cars in the world. It goes from 0-60 in just 6.1 seconds. *Fast.*

On your right, the revolutionary Schmid SIAT, the world's fastest, most precise audio network testing system. It features technology so advanced, you can check 70 critical parameters of your audio broadcasts, including noise, harmonic distortion, frequency/phase response, channel transposition and more, all at the push of a button.

Even more impressive, you can test *any* transmission network, from the simplest to the most complex, all from a single location. All in an amazing 5 seconds flat. *Very fast!*

No more time-consuming manual tests. No more annoying tone tests. No more service interruptions. Instead, faultless audio transmissions that will leave your viewers and listeners coming back for more.

Save time. Save money. All while revving up your audio performance. For more information and a *free* copy of our SIAT video presentation, call toll-free 1-800-955-9570 or mail the coupon today.

BE

☐ **Yes!** Please send me the SIAT video at no cost or obligation.

☐ Please call with additional information.

Name_____

Title_____

Company_____

City/State/Zip_____

Country_____

Phone_____ Fax_____

Mail to: Schmid Telecommunication, 15 West 26 Street, 12th fl., New York, NY 10010

U.S. Sales Office: Holzberg Inc. ☐ P.O. Box 323 ☐ Sea Bright, NJ 07760
Tel: 201-530-8555 Fax: 201-842-7552

Canadian Sales Office: M.S.C. Electronics Ltd. ☐ 147 West Beaver Creek Road Richmond Hill, Ontario ☐ L4B 1C6 Canada ☐ Tel: 416-731-9500 Fax: 416-731-5195

Headquarters: Schmid Telecommunication ☐ Rieterstrasse 6 CH-8002 Zurich Switzerland ☐ Tel: 011 41 1 206-1111 Fax: 011 41 1 201-2372

SZ Schmid Telecommunication

Circle (73) on Reply Card

el are an owner's manual, a service manual (not included with the F model), one cartridge, a power cord and the 37-pin remote connector. I wish the company had included two XLR connectors for the audio outputs. Although there are usually plenty of these around, it would be one less thing to think about when that new piece of gear arrives.

The Denon DN-950FA CD cart player was designed to be used for formats that typically use carted music. It preserves the original audio quality of the CD and eliminates the need to dub it as well. In addition, the disc is not subject to the handling abuse so common in broadcast environments.

The drawbacks are that the user sacrifices labeling space and is locked into using a cartridge format that is not yet considered a standard. The trade-offs, however, are in the many steps saved in playing CDs and in reduction of the wear and tear that results from their constant use.

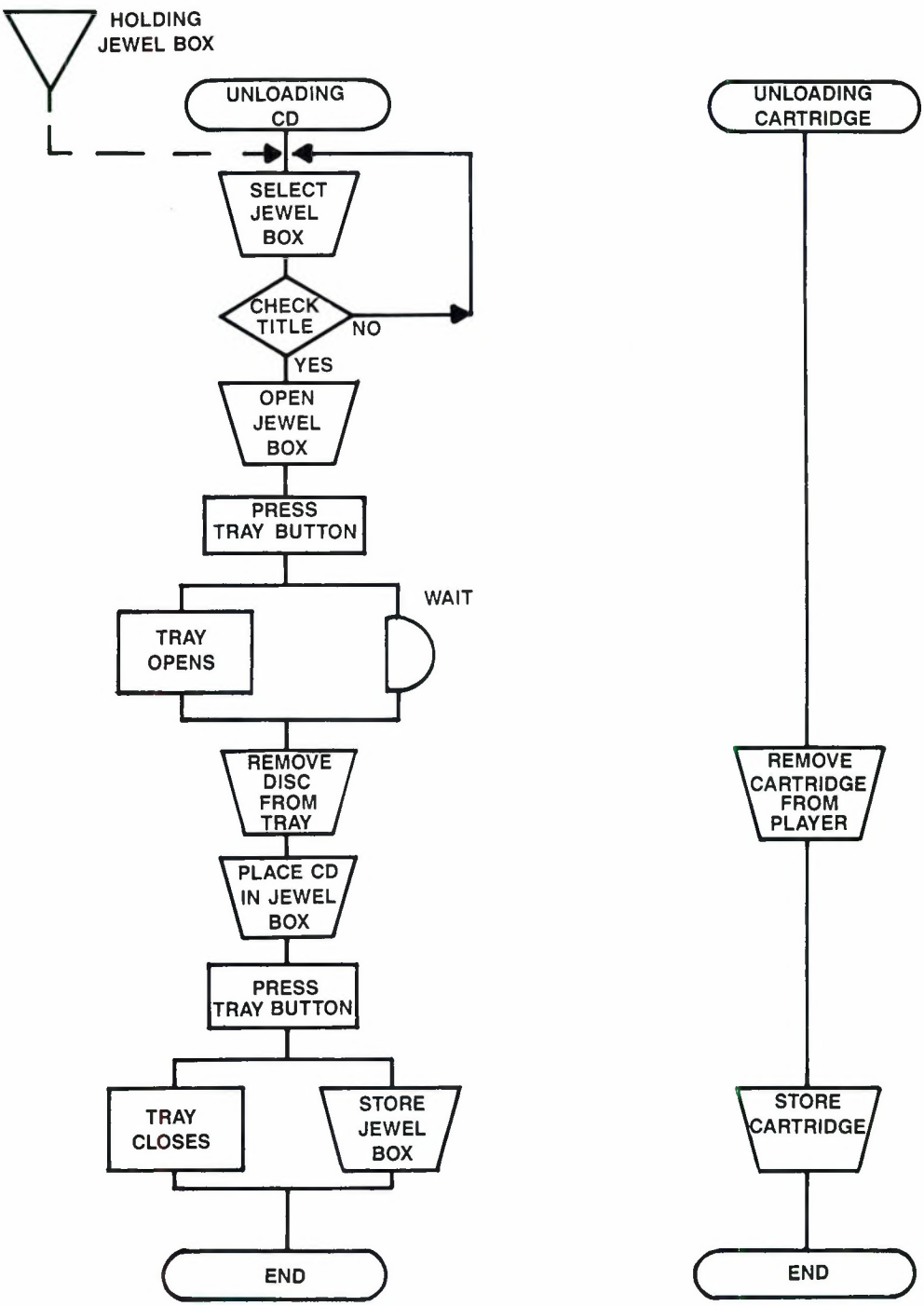


Figure 2. *Unloading a CD may require nine steps in a typical player, left. The CD cart player on the right does the same thing in two steps.*

Just what you're looking for in a television generator.

The performance. The price.

Tektronix offers the industry's most complete line of sync and test signal generators. Each one precisely matched to your specific application requirements. You don't pay for capability you don't need and won't use. Ask your Tek representative for a demonstration. There's a perfect fit, whatever your format.

TSG-170A **TSG-170D**	NTSC sync and test signal generators. Correctly SCH-phased outputs. Genlock sync generator with timing presets. Character identification with ID presets and tape leader countdown.
TSG-170D Only	D-2 digital video output plus parallel and serial audio outputs. Ideal for the NTSC house with D-2 in its future.
TSG-370	Simultaneous and independent component and NTSC composite test signal generators. Up to eight color black outputs for equipment synchronization. Ideal for component edit suite operation and maintenance. A hedge on the future for NTSC houses contemplating but not yet using analog component.
TSG-422	4:2:2 digital component test signals per CCIR Rec. 601 and SMPTE RP 125. Full test signal complement including signals for testing co-siting, dynamic range and digital/analog blanking width. Receiver test facilities including digital gray signal and data-to-clock timing offset. Genlock and color black outputs.
1910	NTSC Test Signal Generator/VITS Inserter. NTC7, FCC, ANSI T1.502 and EIA RS-250-B test signals. Provisions for insertion of externally generated signals. Remote control via RS-232-C.

Tektronix®
COMMITTED TO EXCELLENCE

Circle (74) on Reply Card

New products

Communications receiver

By Ace Communications/Monitor Division

• **MVT-5000:** hand-held receiver; continuous coverage in 25MHz-550MHz and 800MHz-1,300MHz ranges; 100-channel unit receives civil, military aviation and public-service bands; AM, narrowband FM modes; 0.4μV sensitivity at 12dB SINAD in FM mode; programmable from 20 front-panel keys, battery-backed RAM.

Circle (350) on Reply Card

Internal focus zoom

By Canon USA/Broadcast Equipment

• **J14a×8.5B-IRS:** TV zoom lens with internal focusing; front element remains fixed during focus adjustment; square lens shade, polarizer attachments do not need resetting after focusing; increased protection against weather, elements; reduced chromatic aberration, distortion.

• **U-4 pan/tilt system:** remote-controlled camera mount; weatherproofed unit may be operated by wired remote control or connected with a modem for pan, tilt, focus, zoom, iris and extender control functions via telco.

Circle (357) on Reply Card

Maintenance supplies

By AMP

• **Coaxial connectors:** collections for RG-58, RG-59 cable use; one includes 20 BNC series plugs with a Super Champ BNC hand tool; a UHF kit includes 25 UHF series plugs and the hand tool is fitted for the UHF component.

Circle (351) on Reply Card

Digital audio interface

By Apogee Electronics

• **AD1000, DA1000:** reference A/D converter; stand-alone, portable package supporting AES/EBU and S/PDIF digital interfacing; non-random dither sequence tailored for musical signals; low-jitter clock for minimum noise; enhanced oversampling filter; dither feature allows an additional three bits of data to be encoded into a 16-bit datastream for playback on any system.

Circle (352) on Reply Card

Digital audio tests

By Audio Precision

• **BITTEST.DSP:** software package for System One Dual Domain; generates data patterns to analyzer bit-level error detection of digitized audio data as it passes through interfaces, transmission links and recording processes; several signal formats available; error checking with algorithms, insensitivity to time delay.

Circle (353) on Reply Card

Vocal plosives filter

By Audio Visual Assistance

• **Studio pop filter:** fine-mesh black nylon filter; retained in seamless plastic rim with mic stand adapter; placed between talent and microphone to reduce effects of consonants B, P, T; 5-inch diameter.

• **Radio mic belts:** hides, secures wireless mic transmitter; 2-inch-wide elastic, nylon hook-and-loop fastening; adjusts to many sizes; elastic and nylon pouch accepts most popular transmitter types; extension belt available for larger sizes; XLR ankle

Betacam is rapidly becoming one of the most popular production formats in both field and studio applications. And Ampex 198 Betacam and 298 Betacam SP videocassettes are popular professional choices for a full range of needs. When you need high reliability in an ENG/EFP tape, the choice is Ampex 198. Or, when you need the ultimate in performance, the choice is Ampex 298, with its high-coercivity metal-particle formulation. Both offer you high-impact ABS plastic cassettes for rugged dependability and the unique Ampex labeling system for easy access and storage. And all backed by the industry's most acclaimed service and support organization. No wonder they're so popular. They're from Ampex.

AMPEX

THE PROFESSIONAL CHOICE

Ampex Recording Media Corporation
401 Broadway, Redwood City,
CA 94063, (415) 367-3809

Circle (75) on Reply Card

strap secures cabled mic connector to the talent's ankle.

Circle (354) on Reply Card

Graphic titler

By AVS Broadcast

• **ManuScript:** RISC-based character generator system from G2 Systems; 10ns resolution with anti-aliased text, dynamic re-sizing; 10-font capability includes support for 47 languages; encoder and linear keyer.

Circle (355) on Reply Card

Digital recorder software

By Digital Dynamics

• **CueList:** upgrade package for ProDisk-464 recording/editing system; allows disk-based audio system to place a series of cues into an EDL for sound-for-picture editing; after its construction, the EDL may be edited for rearrangement of cue positions.

Circle (361) on Reply Card

Noise-control products

By Azonic

• **Type AZP4:** wall sound-absorbing material with 4-inch pyramid shape; available in sections 4″×48″×48″; average noise-reduction coefficient (NRC) rating of 1.05 in tests over 250Hz to 2kHz range.

Circle (356) on Reply Card

Bookshelf speaker

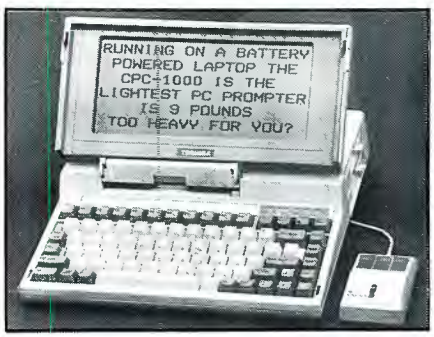
By Celeston Industries

• **Model 3:** compact speaker systems; response from 75Hz to 20kHz rated −3dB; suitable for amplifier outputs from 10W-60W; 1-inch tweeter with 5-inch mid/bass driver; rigid closed-box cabinet design of particle board; integral crossover; walnut, black ash finishes; for near-field monitor applications.

Circle (358) on Reply Card

Laptop prompting

By Computer Prompting



• **CPC-1000:** for IBM and compatible laptop PCs; ASCII-based script files may be prepared on other computers or with integrated word processor; 4-hour scrolling capacity; mini-trackball or keyboard controls scroll direction, speed; operates from floppy, hard disk or RAM disk; hard-copy output includes line numbers to aid in locating a specific spot in a long script.

Circle (360) on Reply Card

In control.

Take control of news and program feeds with the new Agile Omni Broadcast satellite receiver.

Capture virtually any C/Ku band feed by manually or remotely selecting the preset satellite format and transponder position. The receiver automatically sets the satellite RF center frequency; full/half transponder channel spacing; I.F. filters; antenna polarity; audio subcarrier bandwidth, center frequency, and de-emphasis; and video polarity.

And with remote control options, you can set up one or a whole network of receivers from a master control computer. The analog-to-digital converters allow remote diagnosis of signal strength, monitoring of receiver performance and diagnosis of problems. So you can reduce costs, human involvement — not to mention human error — and never miss an important satellite feed.

There's a lot more you should know about the Agile Omni Broadcast — and Standard — than we can tell you in a single ad. Like the RS250B (satellite) proof of performance and certificate option, and Standard's unique Gold Standard warranty and repair program.

Which is a very good reason to call Standard today at (800) 243-1357.

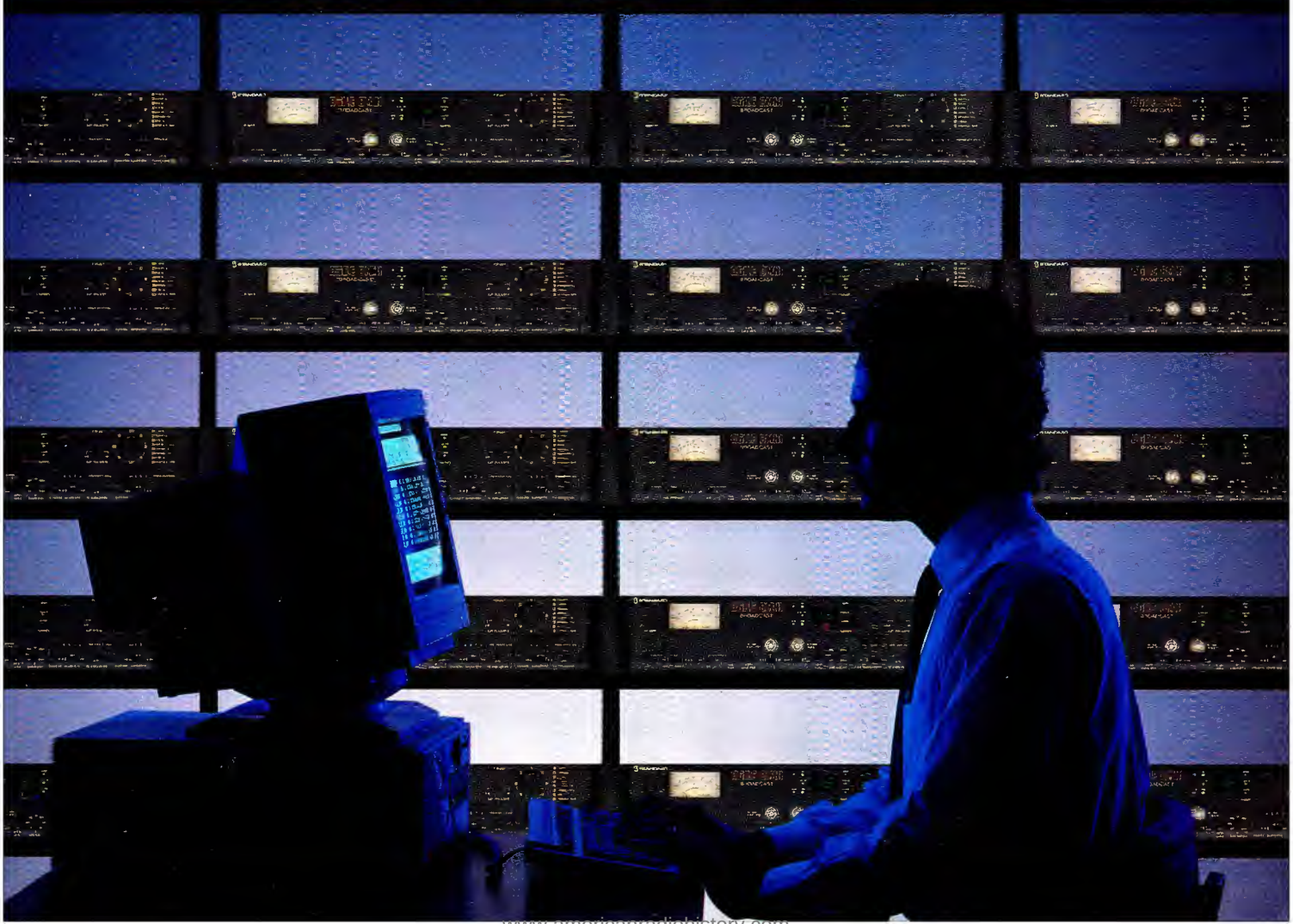
We put you in control.

Raise your standards.

Standard Communications

SATCOM Division
P.O. Box 92151
Los Angeles, CA 90009-2151
Telephone: (800) 243-1357
In California (800) 824-7766
(213) 532-5300 Telex: 67-7173

Circle (77) on Reply Card



Maintenance cleaner

By Chemtronics

• **Flux-Off:** defluxant for use after soldering; recommended for leaded, hybrid and surface-mount assemblies; contains no ozone-destructive materials to remove various rosin fluxes and ionic contaminants from printed circuit boards.

Circle (359) on Reply Card

Titler software, network

By Dubner Computer Systems

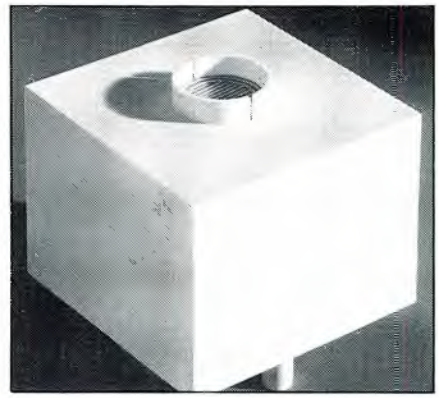
• **K-Works:** software package of utility programs for use with 20K, 30K character generators; allows operator to access functions not usually available on these systems, such as pastels against vivid colors, specific object placements and object animation.

• **Affiliate ID:** network message service, remote machine control device; based on Dubner 6K system; allows multistep sequencing functions with triggering for remote machine control capability; package includes hardware modifications.

Circle (362) on Reply Card

Antenna minder

By Environmental Technology



• **LCD-3, LCD-4:** automatic controller for satellite antenna de-icing and rain-blower systems; operates de-icing systems between 17°F and 38°F during precipitation, powers rain blower during precipitation above 17°F with 1-hour operation after either condition; on-board microprocessor monitors activity; bypass switch for on-site testing, automatic control resumed after 40 hours if personnel leaves mode switch in bypass position.

Circle (364) on Reply Card

Specialty camera tubes

By EEV

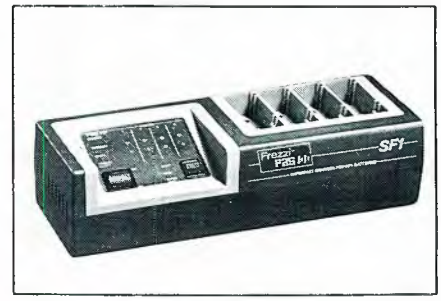
• **XQ1610, XQ-1615:** 1-inch, 2/3-inch IR Leddicons; high spectral response above 2 micron in infrared light; good spatial resolution, fast response; for front-loading vidicon cameras; magnetic deflection, focus; applications include night vision, surveillance, thermal imaging.

• **Pevicon:** pyroelectric vidicon; 1-inch format; infrared imaging capability to see through smoke aids fire fighting or monitoring by surveillance camera in fire-risk areas.

Circle (363) on Reply Card

Battery charger

By Frezzi Energy Systems



• **SF-1:** automatic multicharge rate support for all NP-1 type batteries; three modes for Super Fast, Fast and Slow charging rates; high-speed rate provides one battery in 30 minutes; fast rate rejuvenates two batteries in 60 minutes; slow rate refreshes four batteries in eight hours; operates over a wide range from 110Vac and 220Vac.

Circle (366) on Reply Card

Monitoring device

By GAMMA Microwave

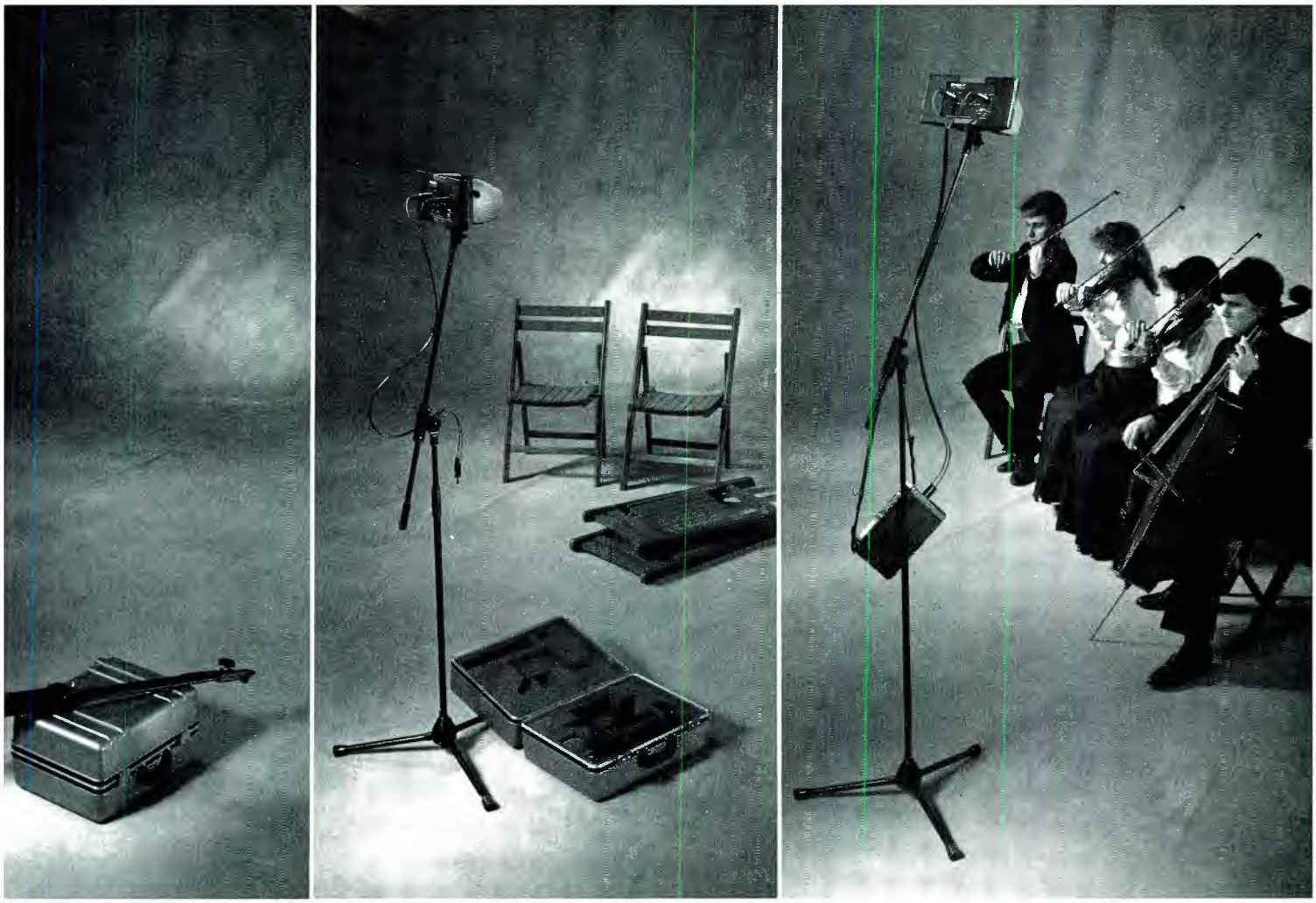
• **Arc sensors:** solid-state electro-optical sensors detect infrared, visible arcs in microwave waveguides; 15Vdc or 28Vdc operation with fail-safe features; available for all standard waveguide sizes; voltage trip port to track levels of reflected power.

Circle (367) on Reply Card

Light source

By Gray Supply Company

• **Studio lamps:** full line of lamps for studio lighting, including tungsten filament and metal halide types; also instrumenta-



There's no faster, easier or better way to record incredible stereo.

When you compare Crown's new Stereo Ambient Sampling System™ (SASS™) and a DAT recorder with traditional recording methods you'll discover there's no faster or better way to record natural, beautifully imaged stereo.

Lightweight, durable and extremely easy to set up, the SASS microphone is an exciting improvement in stereo recording. Combined with a DAT machine, it becomes a high-quality, no-compromise recording system that goes everywhere.

Crown's SASS eliminates traditional stereo recording compromises in sound quality, ease-of-use, and cost. No longer do you have to settle for weak low-end or off-axis coloration common to Midside, X–Y and near-coincident pair mics. Assembly and positioning time is also reduced significantly compared with conventional stereo micing techniques.

The SASS is available in two versions: the SASS-P, with switchable battery or phantom power and Crown's finest studio-grade PZM®

capsules; or the SASS-B, which uses the famed Bruel & Kjaer 4003 and 4006 studio mics (not supplied).

Regardless of which you choose, you'll enjoy full ambience without coloration, excellent sum to mono, and extraordinary broad frequency response. With SASS's superb imaging capabilities, every sound is audibly reproduced in its precise position resulting in a stereo experience of uncanny realism.

Readily adaptable to all common stands, the SASS includes a carrying case and accessories.

No matter what your stereo recording requirements are—from sampling to electronic news gathering to remote recording of live events—you'll find Crown's SASS family the simple choice. See your Crown representative or call toll-free for information: 1-800-535-6289.

crown®

Crown International, Inc. • P.O. Box 1000
Elkhart, Indiana 46515-1000 • 219/294-8000

Circle (79) on Reply Card

tion panel lamps, projector bulbs, arc lamps, Philips, Osram units.

Circle (369) on Reply Card

Effects control

By Grass Valley Group

• **DPM-100:** digital picture manipulator; 2-channel system with integrated keying; enhances switchers with an additional mix/effects bank; assigns effects layers upstream or downstream of a switcher on a "by keyframe" basis; available in NTSC, PAL, component video, D-1 or D-2 forms.

Circle (368) on Reply Card

Audio modulator

By Learning Industries

• **FMT411F:** fixed-frequency modulator; use any specified frequency in the ranges 4.5MHz-10MHz, 52MHz-88MHz or 88MHz-126MHz; four audio bandwidths from 3.4kHz to 15kHz available; typical use for modulation of audio signal to 4.5MHz for microwave or fiber transmission.

Circle (373) on Reply Card

Premium cartridge

By Fidelipac

• **Audiomax 4000:** audio cartridge supports elevated recording levels; bias and phase compatibility with existing AA-4 carts; newly designed shell with DYN-600X formulation offers minimum oxide shedding, low coefficient of abrasion and improved phase-tracking characteristics; 100% user guarantee in standard lengths from 10 seconds to 10.5 minutes.

Circle (365) on Reply Card

Multichannel combiners

By LOMA Scientific

• **700SDF series:** stackable waveguide filters; direction coupler design for ITFS, OFS, MMDS operation offers insertion loss less than 0.7dB and isolation from any input to any output at 40dB; allows up to 16 non-adjacent channels in 2.5GHz-2.7GHz range to be combined for transmission by a single antenna.

Circle (375) on Reply Card

Microwave components

By Loral Microwave-Narda

• **No. 4920 series circulators:** three models cover 2GHz-4GHz, 4GHz-8GHz

and 7GHz-12.4GHz spectra; 1.30:1 VSWR maximum, greater than 18dB isolation between equipment connector to the devices; SMA female connectors provided.
• **No. 4196-20 directional coupler:** serves 6GHz-18GHz signals with power capability to 100W CW; 20dB coupler has a minimal directivity of 12dB.

Circle (376) on Reply Card

Maintenance shop equipment

By HUB Material Company

• **MC5000:** solder station; programmable system with LCD menu to select tip temperature, tip style, °F/°C, parameter memory; 4-digit lockout to prevent calibration changes; 42W macro, 20W micro systems.

Circle (370) on Reply Card

Fiber-optic router

By Integrated Switching Systems

• **PATHFINDER:** high-speed, digital fiber-optic matrix switcher; I/O modules perform conversion to/from optical to electrical form; crosspoint formed from gallium arsenide devices; various connector facilities available; for 800nm-1,300nm wavelengths with multimode or single-mode fibers.

Circle (371) on Reply Card

Low-noise amplifier

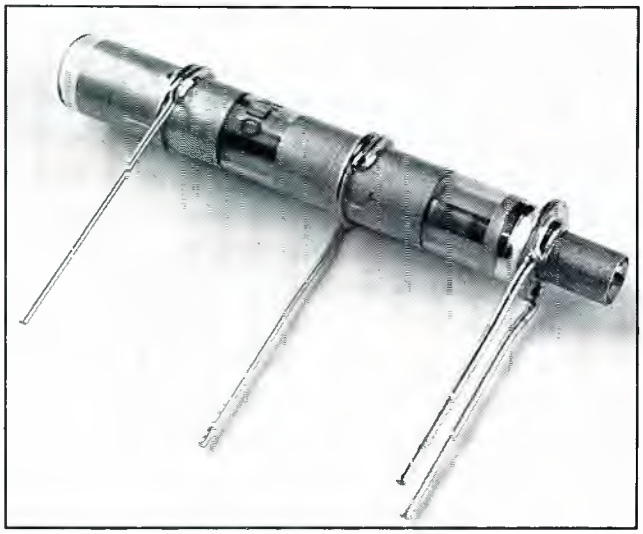
By LNR Communications

• **CF4-35:** LNA for C-band satellite reception; 35°K noise temperature uses cooled GaAs FET devices; cooling by thermoelectrical means; available in single, dual and tridundant configurations.

Circle (374) on Reply Card

Trimmer caps

By Voltronics

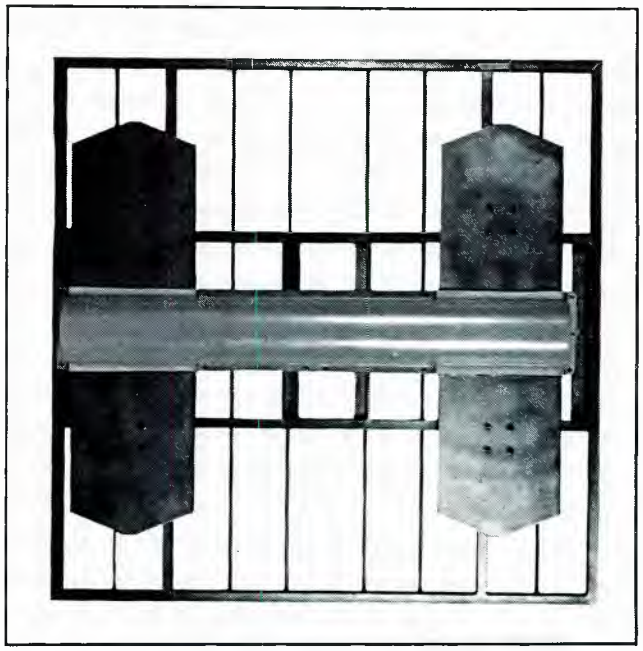


• **Differential trimmers:** non-magnetic, tunable capacitors; dual differential design permits one section to increase in value, second section decreases; for 30pf device, crossover occurs around 18.5pf; 0.312″D×1.67″L; rated to 1.5kVdc, withstands 3kVdc; RF peak-pulse rating greater than 1kVdc; thermal coefficient 0-±50ppm/°C; non-rotating piston design; available in 3pf-30pf range.

Circle (399) on Reply Card

VHF panel antenna

By SIRA/Sistemi Radio



• **3VTV-04:** high-band VHF transmitting antenna; panel design covers entire 174MHz-230MHz band; insulated dipole support avoids shunt effects that interact at some frequencies and reflections that modify the phase center; also available in a half-panel version 3VTV-02 and an extended-frequency version to 254MHz.

Circle (389) on Reply Card

Digital audio production

By Studer Editech

• **Dyaxis 2+2:** multichannel hard disk recording, playback system; playback and overdub on four channels simultaneously with dual audio processors; synchronizer and master clock module syncs to house clock, film tach, SMPTE LTC/MTC/VITC.

• **DAT back-up:** software allows backup of Dyaxis system on DAT tape with edit information stored on a floppy disk.

• **Excellerator DSP:** module based on Motorola 56000 processing device for direct interconnection between a Mac II PC and the Dyaxis processor; includes play-length modification without pitch change.

Circle (400) on Reply Card

In The Category Of "Innovative Broadcast Facilities," These Are The Nominees.

If there actually were such a category, they would all be winners.

Why? Because they've purchased a Sony Multi-Cassette System.

In fact, Sony has installed over 40 Multi-Cassette Systems nationwide in the past eighteen months alone. A winning solution to a very real challenge confronting broadcast facilities.

It's a vision worthy of recognition. And one which Sony supports with their commitment to technical and service leadership.

For more information, contact your Sony Broadcast Sales Engineer. Or call 800-635-SONY.

SONY®

BROADCAST PRODUCTS

Circle (87) on Reply Card

S-video TBC

By JVC Professional Products

• **SA-T411U:** provides time base correction with noise-reduction circuit; 4:1:1 sampling of input video to digital components; separate luminance, chroma timing correction prior to noise correction to extend dub capability beyond a fifth generation; frame memory corrects timing error over two fields; DOC feature; dual-band recursive noise filtering adjustable in 15 steps.

Circle (372) on Reply Card

Video filters

By North Hills Electronics

• **Model 1124VF, 1124VB:** video low-pass filters; covers 0-4.2MHz with suppression of the audio carrier at 4.5MHz; trims spurious output of highly enhanced video circuits in cameras and fast rise times in character generators; available in 50Ω and 75Ω with BNC or F-type connectors; 30dB attenuation band between 4.5MHz-1GHz.

Circle (377) on Reply Card

Stereo microphone

By Schalltechnik/Schoeps

• **VMS02IB, KCY 5I:** combines a stereo microphone pre-amplifier, figure-8 and cardioid Collette-series mic capsules and an active Y cable; use as M-S microphone; may operate as X–Y mic by exchanging capsules for matched cardioid or omni units; battery-powered, drives aux/line inputs.

Circle (385) on Reply Card

Surge reduction

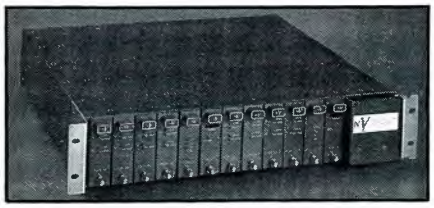
By Northern Technologies

• **TCS-1000-C:** power-line protection system; 120Vac/208Vac 3-phase unit for 4-wire WYE service; high-speed silicon avalanche diode devices offer dissipation capability of 1,000 joules per millisecond; with linear clamping characteristics; response time of 5ns or less; metal oxide varistor MOV devices increase initial pulse-dissipation rating.

Circle (378) on Reply Card

High-definition audio

By nVision



• **NV2000:** multichannel, audio multiplexing system; 20-bit encoding and distribution designed for use with HDTV, digital and type C recording equipment; 110dB S/N with all program audio and secondary signals carried in one datastream; basic unit configured for 4-channel use.

Circle (379) on Reply Card

Transcoding TBC

By Panasonic A/V Systems

• **TBC-200:** Y/C time base correction with transcoding features; NTSC, S-VHS inputs; NTSC, S-VHS, Y/R–Y/B–Y outputs; component formats acceptable for M-II and Betacam systems; 16-line correction window; H/V Y/C delay adjustable; available with rack slides for mounting.

Circle (380) on Reply Card

UHF power equipment

By Philips Components/Discrete Products

• **YK1267:** 70kW klystron for 470MHz-860MHz range operation; ABC annular beam control; 65% efficiency for UHF TV broadcast; air-cooled; for visual service; companion YK1221 for aural power amplifier.

Circle (381) on Reply Card

Satellite receiver

By R. L. Drake

• **ESR1424:** programmable receiver with full-function UHF remote control and VideoCipher II Plus descrambler; on-screen graphics menu guides programming; supports discrete, matrix or digital stereo sound; 100 audio and 100 video presets with program name memory; stores 50 antenna positions for 1-button control of earth-station antenna control with automatic C-/Ku-band operation; 8-event integrated VCR timer; interference filter and selectable audio bandwidth filters.

Circle (382) on Reply Card

Receiver controller

By Standard Communications

• **CRC-850:** hardware, software package allows total control of MT830 satellite receiver from a PC; permits 60 changes in receiver functions per day, including all satellite format parameters, such as polarization and frequency; remote operation of audio-video levels, alarms; three audio subcarrier demodulators.

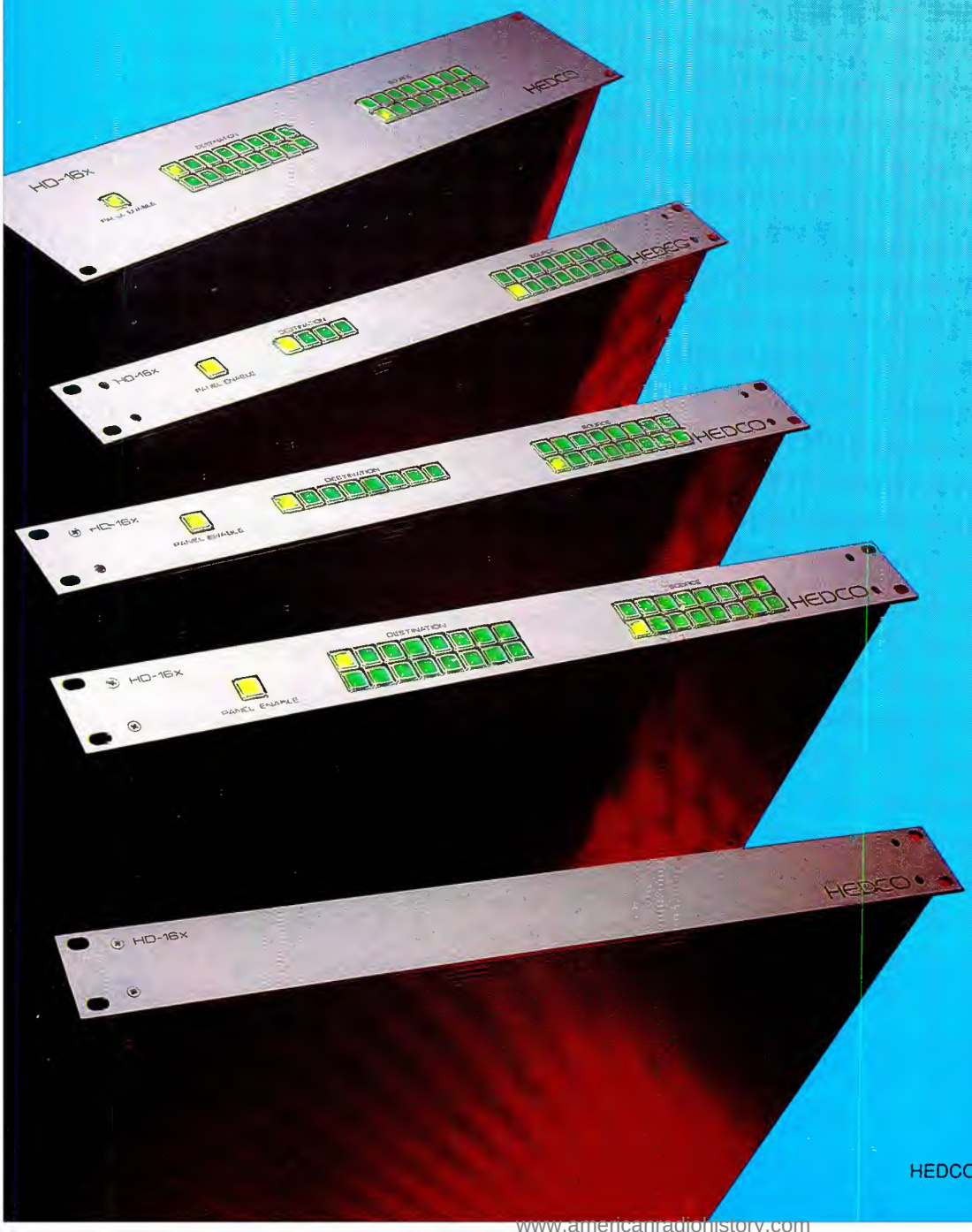
Circle (390) on Reply Card

The 16X Router Series offers:

system compatability

This latest family of broadcast quality 16 x 16 switchers allows video, audio and data routing in the same system, all operating on a common control bus.

Fill your routing requirements now and add on as you grow. Single or multiple units up through 8 levels can be controlled from one or more locations with a variety of control panels or the optional RS-232 interface.



FEATURES

Video

- Available in 16 x 16, 16 x 8, 16 x 4, 8 x 8, and 4 x 4 composite; 8 x 8, 5 x 5 and 4 x 4 component
- Vertical interval switching
- Terminating inputs
- Differential inputs/outputs
- Expandable to 64 x 64 with 8 levels

Audio

- Available in 16 x 16, 16 x 8, 16 x 4, 8 x 8, and 4 x 4
- Stereo, dual, or monaural in 1 RU
- Balanced Inputs/Outputs
- Expandable to 64 x 64 with 8 levels

Data*

- True 4-wire system providing 2- way digital paths for routing of RS-422 signals
- ANSI/SMPTE 207M-1984 interface standard pin-out using 9-pin subminiature "D" connector
- Regenerative, operationally transparent
- Expandable to 64 x 64 with 8 levels

Control

- Proprietary RS-485 compatible
- Panels available in local/remote 16 x 16, 16 x 8, 16 x 4, 8 x 8, 4 x 4, single/dual bus, and breakaway
- Alpha-numeric remote
- Thumbwheel (single, dual or triple bus)
- Optional RS-232 interface module

** HD-16 Data Router available only in 16 x 16*

Contact your HEDCO dealer for information or call:

HEDCO (800) 433-2648
Fax: 916-273-6948

HEDCO

Circle (88) on Reply Card

HEDCO P.O. Box 1985, Grass Valley, Ca 95945

The delay-system screen display should convey clearly the detailed event list, system and VTR real-time activity so that error conditions can be quickly assessed and equipment maintenance procedures planned.

Continued from page 42

provided you carefully assess your needs and select a system that not only matches them, but also offers a future growth path. Examine reliability issues in fine detail, but not just on the equipment itself. Take a system-level view of your facility and its personnel skill levels when choosing an approach to redundancy, and don't be shortsighted.

Differences in initial system costs may be dwarfed by operations costs saved or incurred over the life of the system. Although redundancy may appear expensive at the outset, balance that against the cost of being off the air.

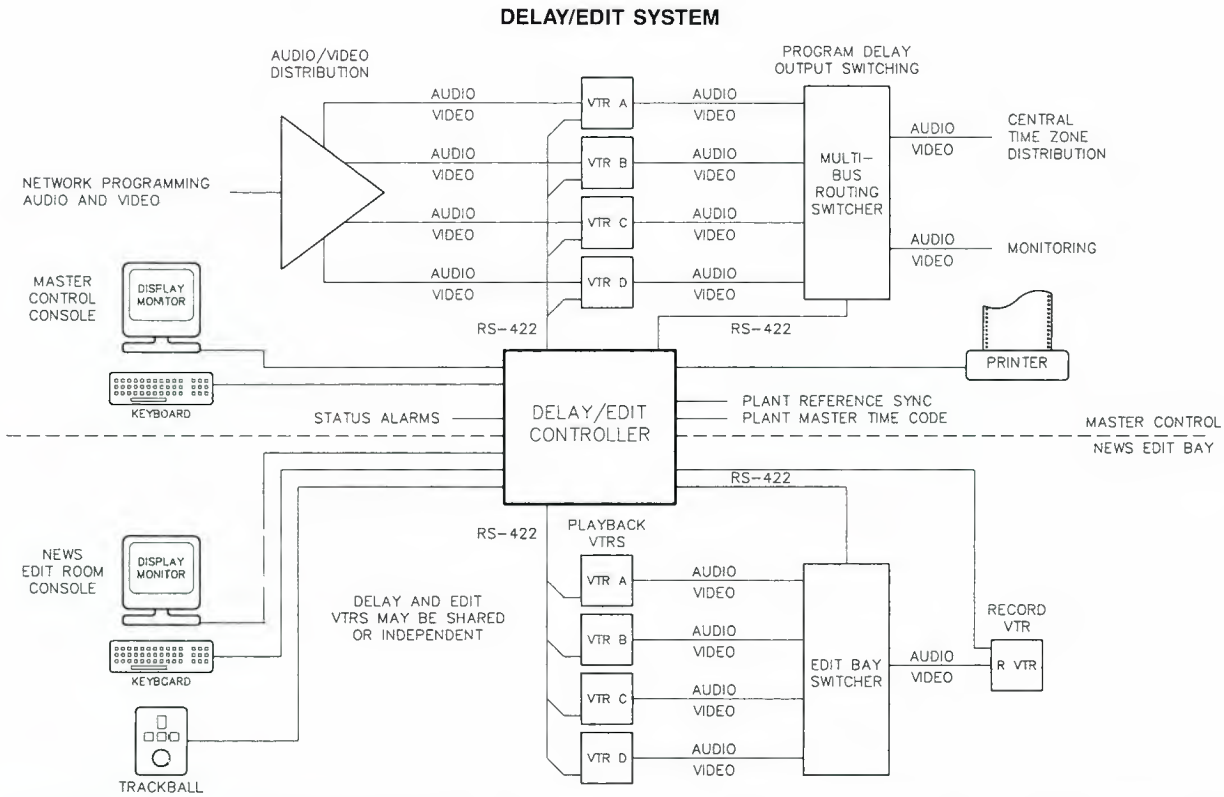


Figure 4. *New delay controllers offer extended general-purpose station automation and editing functionality beyond simple time delay, which may benefit facilities needing to delay for only a few hours per day.*

Continued from page 52

Carry my load

"How long do I want to support the load?" is the first question to ask. If your goal is to keep things running long enough so that you can power things down in an orderly manner (graceful degradation), then you will require much less backup power than a facility that intends to support all or part of its operations during extended periods without incoming ac power. A collection of UPS units will serve nicely for graceful degradation. Equipment can stay powered for the few minutes of most power outages, and when the UPS batteries are nearly exhausted, station personnel can turn equipment off and wait for the lights to come back on.

Broadcasters who intend to stay on the air in spite of power failures could select the combination of UPS and generators. The UPS will get you through the interval between the power failure and when the generator comes on-line. Before you order anything, however, you must ask a few questions to avoid purchasing equipment that is mutually incompatible.

A UPS comes in three basic configurations: off-line, hybrid and on-line. Some of these have greater utility for broadcasters than others. A bonus with some configurations is that they might also provide significant power-line filtering and conditioning, which helps increase the reliability of computer-based equipment.

The off-line

The off-line UPS is the simplest form. UPS is a misnomer because the inverter is normally off. For this reason, the off-line UPS also is known as the standby power source (SPS). During normal operation, an SPS routes raw utility ac power directly to the computer while trickle-charging the battery. When the incoming utility voltage drops below a certain value (typically 102Vac), a detection circuit switches to battery power via a dc-to-ac inverter. This switchover causes a loss of power or glitch, which typically lasts 5ms to 10ms.

Theoretically, an SPS is designed to switch to its battery before the microprocessor in a system senses a power loss. In many situations, an SPS can be an inexpensive solution to blackouts. However, during normal operation, many units provide no line conditioning, voltage or frequency regulation and little or no surge and spike protection.

A significant advantage of an off-line UPS is its low cost. The unit can be less expensive because the inverter in these systems is normally off, so the charging and sense circuits are simple and inexpensive. Because the inverter in these devices may not be designed for long-term use, they may not be the best choice for critical applications.

The hybrid UPS

Some off-line systems add surge and spike suppressors, ferroresonant or electronic line conditioners or utility-interactive designs. The price goes up with each modification. A UPS with line conditioners or interactive designs is a hybrid UPS. This type of device has several descriptive names, such as triport, line interactive, electronic flywheel, hot standby, no break, load sharing, bidirectional and single conversion.

The addition of electronic or ferroresonant conditioners is intended to smooth out the load transition from utility-supplied to inverter-supplied power. A typical hybrid is designed to help eliminate the switching glitch or resulting inverter output droop by using the capacitance of its electronic or ferroresonant conditioner to feed the load line while the unit switches the entire load from the utility to its inverter and battery.

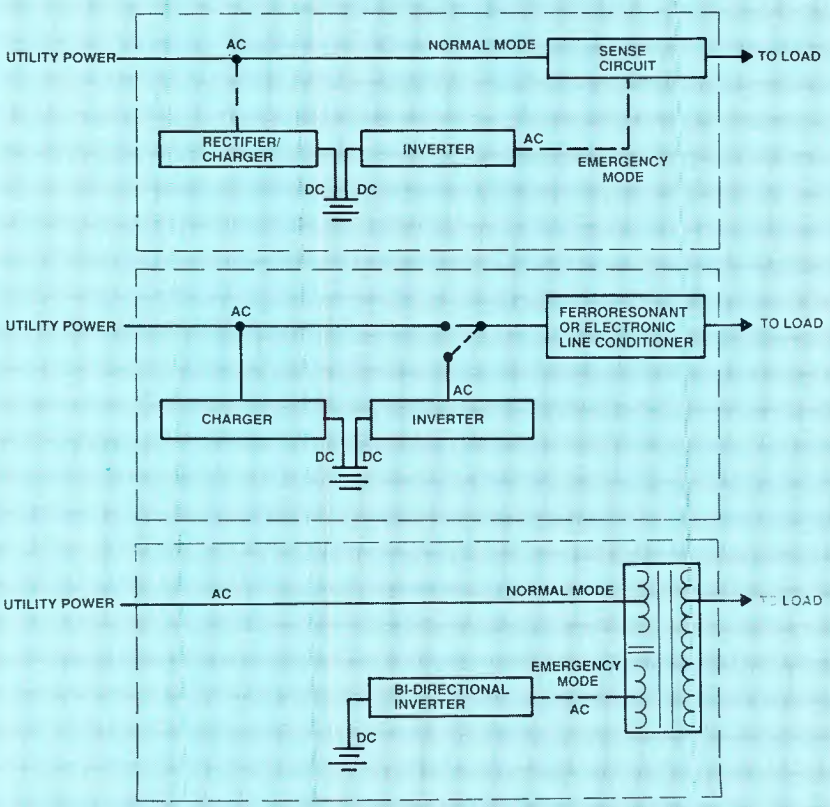


Figure 2. The hybrid UPS is sometimes less expensive and has fewer components, but it is inherently an off-line unit. Some units may be "fooled" by brownouts and frequency shifts. It usually has limited line conditioning and regulation.

The on-line UPS

In contrast, the on-line UPS always operates on its inverter and no switching takes place. A well-designed on-line UPS is a solid-state generator that continuously breaks down and filters utility ac power to dc. Then, via its inverter, it provides new, clean ac power. Regardless of the utility power's condition, the output of an on-line, sine wave UPS remains steady at the designed voltage/frequency. The unit protects against blackouts, surges, sags, spikes, transients, noise, frequency variations and brownouts.

Until recently, one drawback of the on-line UPS had been a higher price. Recent advancements, however, have resulted in on-line, sine wave units that are smaller and lighter than some off-line or hybrid units, yet are only marginally more expensive.

Sine wave vs. square wave

All three UPS types are available with sine wave or square wave outputs or some modification thereof. Sine wave power is best because it is the same as the waveform provided by the utility company. Most loads prefer a sine wave because it consists of linear or rms-sensitive elements and non-linear or peak-sensitive elements. A square wave output only approximates the utility waveform and may overstress the rms-sensitive system elements while starving the peak-sensitive elements. The result can be overheating and premature component failure.

Evaluating UPS performance

Evaluating and selecting a UPS from the numerous models available can be complex, but it need not be difficult. The following questions should help you discern the highest-quality UPS for your application:

1. Which type is it: off-line, hybrid or on-line?

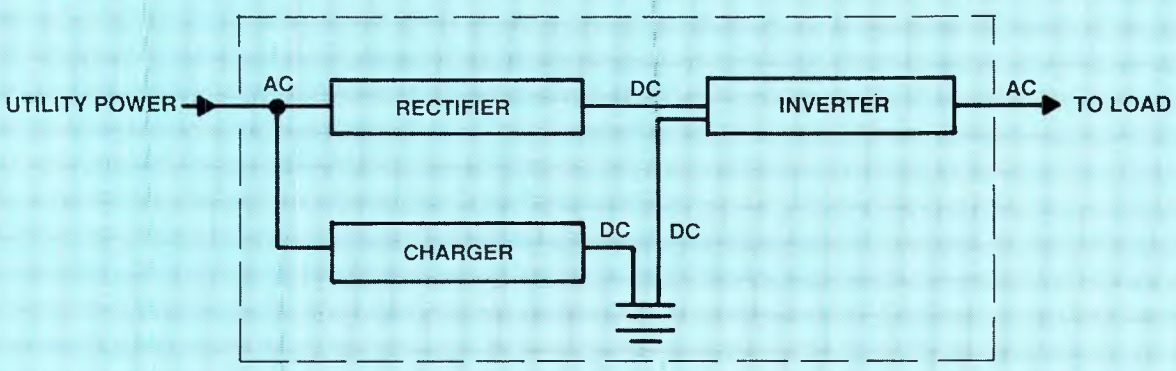


Figure 3. The on-line UPS offers 100% line condition and regulation, sustained brownout protection, sine wave output, yet no switching. However, it is usually more expensive, larger and heavier. The unit's inverter should power 100% of the load at all times.

2. To find out whether a UPS is on-line, ask whether the rectifier powers the inverter, which in turn powers 100% of the load continuously. If yes, it is on-line. If no, it is off-line or hybrid.

3. Is the inverter output square wave, quasi sine wave or sine wave? To find out whether a UPS provides a clean sine wave at all times, you can ask the manufacturer for photographs of its output waveform at full load, both on utility power and on battery. The two can be very different.

4. What is the lowest input voltage it can accept without discharging the battery? (The lower, the better.)

5. What is the crest factor ratio? Crest factor is the ratio between the non-linear (repetitive peak) current and the linear (rms) value. A UPS rated at 750Va with a high crest factor ratio (2.5 or higher) will typically support the same non-linear load as a 1,000Va unit with a low crest factor ratio (2.0 or less).

6. Can the backup time be extended by adding extra batteries? (The longer, the better.)

7. Does it maintain at least ±3% voltage regulation during battery operation all the way down to low-battery shutoff? (If not, the equipment receiving power from the unit could be damaged.)

8. What range of input frequency can the unit accept without discharging its battery? (The wider, the better, especially for use with on-site generators. Make sure you inform your vendor that you intend to operate the UPS in conjunction with a generator. Some units do poorly in this application.)

9. Is it UL-listed?

Scan conversion

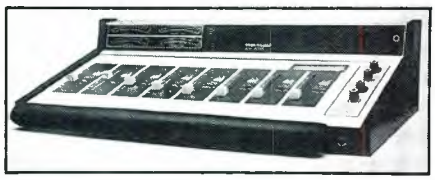
By RGB Spectrum

• **X-series:** video encoder in RGB/Videolink series converts computer-graphic video to RS-170A NTSC or EBU PAL signal specifications; gen-locking or stand-alone operation with composite, S-VHS, Betacam and M-II outputs; linear keyer; models available for 45kHz-80kHz scan rate or PC, PS/2 and Mac II computers.

Circle (384) on Reply Card

Audio mixer

By Ramko Research



• **xL series:** stereo audio consoles; 4-, 6-, 8-, 12-channel with single and dual outputs; separate mono mix as balanced out; two inputs per channel with 9-input connection for last channel; VCA signal control; high RF immunity, double shielding, RF beads, Star grounding system; on-air light relay; rotary raders; optional slider faders, mix-minus bus, clock/timer, programmable machine start-stop controls.

Circle (383) on Reply Card

Facility security systems

By Thorn Automated Systems

• **Sitewatch 50:** entry and access control system; integrates control of energy management, HVAC, access control, time/attendance, clock dismissal bells and other functions; supports 2-16 card readers for 2,000 card holders, multiple access-approval levels, control files of programmable logic; operable through video terminal or PC with modem, but does not require interaction with PC at all times.

Circle (392) on Reply Card

FM stereo analyzer

By Sencore

• **AM stereo/FM stereo analyzer:** microprocessor-based analyzer for servicing of AM/FM stereo receivers; troubleshoot sensitivity, selectivity, separation, pilot threshold with RF, IF, C-QUAM, MPX, SCA audio and tunable sweep and marker generators.

Circle (387) on Reply Card

Low-power audio

By SESCOM

• **PO-58:** stereo amplifier; 2W 8Ω output with individual right and left channel level adjustments; mono-stereo switch; jacks for speakers or headphones; can drive headphones or a pair of small efficient speakers with low distortion, broad frequency response.

Circle (388) on Reply Card

Cable management

By Seam-Tech

• **RIP-TIES:** nylon hook-and-loop straps attach permanently to a cable; other end has convenient pull tab; securely holds coiled cables, bundles; can provide strain relief by attaching to conduits, scaffolds to avoid cables from being pulled off a connector.

Circle (386) on Reply Card

Editing software package

By Video Access

• **East Lister:** off-line editing program; creates EDL file while operator views raw or transferred film footage on VHS, 3/4 or Beta VCRs; writes EDL data to a disk file for importing into the on-line editing system; requires DOS 3.0 minimum; EGA, VGA, mono 256k graphics adapter.

Circle (396) on Reply Card

Stereo synthesis

By Titus Technological Laboratories

• **The Last Word TLW-2:** microprocessor-based automatic stereo synthesizer and corrector; two stereo inputs allow second set to be used in loss-of-channel or loss-of-signal events; polarity inversion; full metering operable by remote control; programmed sequencing, time delays in auto, manual modes.

Circle (394) on Reply Card

Switcher software features

By Videotek

• **Prodigy switcher upgrade:** feature designates preset audio bus as a live program video bus, eliminating a separate audio-switching option; "Snapshots" from memory do not affect the program video bus setup.

Circle (398) on Reply Card

Machine control

By Videomedia

• **V-LAN universal control network:** a machine control interface for VideoCreator animation produced on IRIS 4-D silicon graphics workstations; with the network, the video workstation maintains frame-accurate control of video recorders and allows scan conversion to record images from high-resolution monitors in real time.

Circle (397) on Reply Card

Audio amplifier

By Target Technology

• **TTD-200 studio amp:** stereo audio power amplifier; configured as two separate units; individual remote VCAs track closely for gain adjustment from a single control; dual 40W to 8Ω or mono 90W.

Circle (391) on Reply Card

Studio clocks

By Time Service Systems

• **Illuminated series:** impulse clocks for studios, control rooms; dial sizes of 10-, 12-, 16-inch with Telenorma silent movements; stepdown transformer supplies long-life aircraft for illumination.

Circle (393) on Reply Card

Continued from page 4

the convention center. The Fellows luncheon is scheduled for Sunday in the Marriott, and the annual banquet will be Tuesday evening in the Marriott.

Paltex and Aston join forces in U.S. marketing program

Negotiations between Paltex International, Tustin, CA, and Aston Electronic Designs, Surrey, England, have resulted in an exclusive licensing agreement whereby Paltex will take over manufacturing, sales and technical support of all Aston products for NTSC applications and markets.

All Aston sales and marketing will be carried out at the Tustin offices of Paltex. Manufacturing, quality assurance and distribution will remain in the Aston facility in Olathe, KS.

International Conference call for papers

The Institution of Electrical Engineers will hold its fourth International Conference on Television Measurements, June 20-22, 1991, at the Casino in Montreux, Switzerland, following the 17th International Montreux Television Symposium.

Papers are sought describing measurement techniques in the fields of cable television, conventional terrestrial TV broadcasting and direct broadcasting by satellite. Synopses should be submitted by Oct. 28, 1990. Diagrams should be included if necessary. Final papers, which will be printed in an IEE conference publication, must be typed on special lay sheets that will be supplied to the authors. The papers should not exceed eight sides of these sheets (including diagrams).

News From Europe

By John Blau,
European correspondent

Broadcasting bill draws criticism

The U.K. broadcasting bill, announced in December, has been strongly criticized by Britain's mainstream broadcasters. The government upheld most of its controversial proposals, which had been announced in an earlier policy paper. Those proposals included auctioning off the Independent TV (ITV) franchises, renaming the network Channel 3 and replacing the Independent Broadcast Association (IBA) with the new, less rigid Independent Television Commission (ITC).

The most surprising aspect of the bill is the plan to set up a licensing framework for non-domestic satellite services. The plan is an attempt to bring all non-DBS programmers, including UK cable-only channels and the satellite stations aboard Intelsat and Astra, under the control of ITC. These channels previously were governed by the Cable and Broadcasting Act and regulated by the Cable Authority, which is to be incorporated into the ITC.

EC to study pan-European DBS

The European Commission (EC) announced early this year that it will conduct two studies into the future of satellite services.

The first study, called "Options for Development of the Broadcast Satellite Services in Europe in Light of DBS Second-Generation Technology," will focus on the feasibility of establishing a "pan-regional multizone" DBS system rather than the nationally bound systems conceived by Warc 77. EC officials say that a pan-European DBS system is a logical step, considering the technological advancements in the 12 years since Warc 77. They view the current concept as redundant, pointing out that many of the countries granted DBS frequencies in 1977 have not pursued DBS and do not plan to. They say that it would be far more efficient for countries to combine frequencies.

The second study is labeled "Technical Aspects of the Frequency Allocation of Fixed Satellite Services in Europe." It will examine ways of generating more open competition in the ground equipment market and in the transponder supply market, as well as encouraging the development of business satellite communications in Europe. This aim is already part of the EC's Green Paper on telecommunications, which would bring the regulation of satellite services into line with existing policy.

CNN on the airwaves in Moscow

Cable News Network (CNN), Atlanta, has reached an agreement with the Soviet state broadcaster Gosteleradio for over-the-air transmission in Moscow. Programming is to be scrambled, but details on the type of decoders to be used and their distribution are not known.

CNN broadcasts already can be received at a number of locations in Moscow. The first public relay, at the Savoy Hotel, started last summer. The arrangement with Gosteleradio provides for additional relays in other Soviet cities. Leningrad is likely to be the next.

Japan benefits from Eastern Europe sales

Japan shipped a total of 286,000 videotape recorders to EC nations in 1989, representing a 36% drop in sales. Its color TV exports, however, numbered about 21,000 sets, an increase of 37%. The gain was caused partly by the near tripling of exports to West Germany. Meanwhile, Japan's exports to the Soviet Union more than doubled.

EC to back joint HDTV venture

The EC is to help set up a joint venture of leading European broadcasters, programmers and equipment suppliers to compete with the Japanese for the world adoption of an HDTV standard. The Brussels-based commission, which has been actively promoting HDTV research through the Eureka 95 project, has switched its emphasis from the technology to its application.

The new venture is to take the form of a "European Economic Interest Grouping," a flexible, new type of company that can be set up with a minimum of capital under recent EC rules. The main goal of the venture is to ensure that a full range of HDTV equipment is available to programmers and broadcasters. By bringing together more than 30 production companies and manufacturers such as Philips and Thomson, the commission aims to guarantee European HDTV better access to the market.

Private TV comes to Eastern Europe

Eastern Europe's first private TV station has begun broadcasting from the top of a student dormitory in the Polish city of Wroclaw.

West Germany launches another

Six months after launching its first telecommunications satellite, West Germany has put its second one into orbit. DFS

The PROM-SLIDE™

the card to play

Whether you're frustrated with maintaining your old master control slide chain, or tying up expensive equipment for those same few stills, the Leitch **PROM-SLIDE™** is what you've been waiting for.

This single compact card will ensure that your station ID, logo, standby message, or custom test signal is always available, with full color frame resolution, at the input of your switcher.

Play your cards right and call us today to find out more about the **PROM-SLIDE™**.

LEITCH ®

Leitch Video of America Inc., 825K Greenbrier Circle, Chesapeake VA 23320 - Tel: (804) 424-7920 or (800) 231-9673 Fax: (804) 424-0639
Leitch Video International Inc., 10 Dyas Rd., Don Mills, Ont., Canada M3B 1V5 - Tel: (800) 387-0233 Fax: (416) 445-0595 Telex: 06 986 241

Circle (98) on Reply Card

Kopernikus 2, a medium-powered satellite, also will be used for beaming broadcasts.

Grundig joins HDTV effort

A West German company, Grundig, has taken over development of a digital norm converter for signaling within the framework of Eureka 95. The company has been involved in developing a broadband video recorder for recording programs broadcast in HD-Mac.

3-D TV is off the drawing board

When researchers from across Europe met at the end of last year for the second conference on 3-D TV at the Institute of Broadcast Research in Munich, they agreed to delve more deeply into the technology. The resulting research project, entitled "Stereoscopic TV Standards, Technology and Signal Processing," is part of the COST (European Cooperation in the Field of Scientific and Technical Research) program. A prototype was demonstrated at the 1989 Berlin International Consumer Electronics Fair.

The 3-D technology was introduced in the 1950s, but required that viewers wear special glasses. The current research is focusing on a 3-D system that does not involve wearing glasses. The Heinrich-Hertz Institute in Berlin already has developed such a system, but it has one major drawback in that the 3-D image can be seen on the screen only from a certain angle.

Thomson to receive government support

The French government has agreed to inject about $349 million into Thomson, the state-owned electronics group, to support its ambitious research program in HDTV. Thomson plans to spend up to $700 million on HDTV over the next four years and begin marketing a preliminary version of HDTV by the end of this year.

WDR makes debut in HDTV production

The West German state-run broadcasting company Westdeutsche Rundfunk (WDR) has started work on its first production using Eureka 95 HDTV technology. The production also will feature digital sound recording.

The broadcaster also announced what it called a "world premiere." Apart from being Europe's first public service broadcaster to introduce an all-digital sound-mixing system, WDR also claims to have produced the first "DDDD" compact disc.

European companies to work with NBC

Philips Consumer Electronics and Thomson Consumer Electronics, the U.S. subsidiaries of the Dutch Philips and the French Thomson, are to join NBC, RCA and the David Sarnoff Research Center in a venture to develop improved TV broadcasts, including HDTV. The primary goal of the venture, called the Advanced Television Research Consortium, is to introduce wide-screen, higher-resolution television to U.S. homes by 1993. The proposed system is to provide an enhanced image, require only one broadcast channel and be compatible with existing American TV sets.

Commercial TV is Launched in the Netherlands

Commercial television in the Netherlands has finally broken through the dikes. RTL-Veronique began broadcasting in October, putting to an end the 70-year-old monopoly of the Netherland's publicly owned broadcasting system.

The station took advantage of a loophole in the Dutch broadcasting law that bans commercial radio and television in the country, but allows foreign-based commercial broadcasters to hook up to the Dutch cable system. Cable reaches approximately 80% of all Dutch viewers. RTL Veronique is receiving support from Philips, who is involved in Europe's HDTV efforts.

The fate of its rival, TV10, another Luxembourg-based commercial broadcaster is still undecided. It is unlikely that the Dutch commercial channel will be launched on Astra following the decision by Joop van den Ende Productions and the public broadcaster TROS to withdraw programming support. The surprise move led to the collapse of a plan to launch a Dutch-language channel on the TV10 transponder, backed by TF1, Esselte and NBC.

The Dutch broadcasting system is designed to accommodate the pillarization of Dutch society. Eight broadcasting organizations provide programming for three public service channels. These, in turn, reflect religious and political pillars, such as Protestant, Roman Catholic, liberal or conservative. Viewers choose the broadcasting organization in line with their views and pay fees to help finance them. Government officials are concerned that commercial broadcasting could destroy the country's unique pluralistic system.

Word of warning on EC TV legislation

The future of European TV will be significantly affected by the EC's directive on broadcasting, according to a report by consultants Coopers & Lybrand. The report, called "Television in 1992," is said to be the largest and most comprehensive published on the topic. It warns that the Commission, in winning approval for the directive, has made broadcasting part of Community law but finds that most European companies are not paying enough attention to what the Commission is doing.

The report also said that deregulation in the European audio-visual industry is a myth and that regulation is growing rather than diminishing.

Wall to East German TV opens

When the Berlin Wall opened in November, the East German media wall also was lifted. For years, Germans in the East have been able to view West German television. Now, Germans in the West want the same.

The West German public service satellite channel, 3Sat, has worked out an arrangement with East German broadcasting authorities to air the Aktuelle Kamera, the East German news program. The signal is received in West Berlin and then relayed by microwave to 3Sat's headquarters in Mainz for uplinking to the three satellites currently used by 3Sat. There also is talk of putting both East German national TV channels on satellite to be fed into all of West German public cable networks.

The country also recently placed an order for more than 100,000 VCRs with the Japanese manufacturer Sanyo.

Proposals anger French private TV

Proposals from the Culture and Communication ministries to put strict limits on non-European programs have outraged private TV channels in France. The quotas would require 60% of prime-time programming to be of European Community origin, and half of that to be French-language originals. The stations currently air films and series during prime-time, many of them American.

Philippe Ramond, managing director of channel La 5, referred to the plan as

Figure 4. *The serial datastream consists of both databits and clock signal multiplexed onto a single conductor. This avoids the bulkiness and timing problems of parallel.*

Continued from page 62

tical to build systems with the size and power the analog world has enjoyed for years.

Serial transmission of digital video signals allows routers to use BNC connectors, thereby reducing the overall connector panel size requirements. Only one crosspoint is needed for each complete signal, which drastically simplifies design, shrinks the package, reduces power demands, and eliminates the potential problem of unequal signal paths within the router. A serial digital router has all of the advantages of an analog router plus the benefits of digital.

Similarly, serial signal transmission greatly simplifies distribution through distribution amplifiers. Parallel distribution amplifiers face the same size and power difficulties evidenced by other parallel equipment. Now, serial interfacing combined with VLSI chip development has made digital signal distribution as simple and convenient as analog distribution. A single cable carries the entire signal into the DA module, which can regenerate the signal to assure datastream integrity while sending it to multiple separate destinations.

Analog domain interface

Teleproduction facilities will certainly become increasingly digital. High-end plants will become all-digital. However, there will be some applications, such as incorporation of archival material recorded on analog formats, where it is desirable to receive from or deliver signals to the analog domain.

High-quality, analog-to-digital and digital-to-analog converters are essential to making the best possible transition between analog and digital. Ideally, manufacturers will produce modular systems to allow users to configure independent modules as required.

Because of the problems associated with analog connections, the A/D and D/A converters should be located as close as possible to the analog equipment, using digital transmission as much as possible. Ideally, the conversion should be performed inside a given piece of equipment, such as an analog recorder, so that the analog connections can be kept short and levels can be properly adjusted during alignment. Because many "analog" products contain some digital parts, such as the time base corrector in a recorder, it should be possible to have digital inputs and outputs, avoiding multiple A/D and D/A conversions.

Visible results

An example of this latter approach is provided by the serial input modules, which are available for certain broadcast video monitors, making it possible to maintain the signal in digital form from origination through to the final display.

Although the all-digital suite has been talked about for many years, it is only recently becoming a reality. Digital signal processing and recording expands the creativity of the program producers and eliminates many of the barriers and constraints normally imposed by analog signal quality degradation.

Bibliography

"AES Recommended Practice for Digital Audio Engineering-Serial Transmission Format for Linearly Represented Digital Audio Data." AES3-1985 (ANSI S4.40-1985)

Dworsky, Lawrence N. "Modern Transmission Line Theory and Applications." *John Wiley & Sons*, 1979.

"Interfaces for Digital Component Video Signals in 525-Line and 625-Line Television Systems." CCIR Recommendation 656, 1986.

"premeditated homicide," claiming that there aren't enough Franco-European productions on the market to fill the time span. Ramond hopes that Francois Mitterrand, the first French prime minister to open up television to the private sector, will come to the defense of the stations. Mitterrand, who also is heading a program to promote the French language, has issued a report outlining ways to market French television worldwide.

Sony to open plants in France

Sony plans to begin manufacturing magnetic tape in France at the beginning of 1991. The company will begin construction of a new factory at Dax, in southwest France, which will supply two Sony videotape and audiotape plants nearby in addition to a group audiotape factory in Rovereto, Italy.

In 1974, Sony opened its first European factory in Britain. The company now has 30 plants outside Japan, spread across Europe and North and South America as well as Asia. It is the country's largest producer of video- and audiocassettes.

Luxembourg continues to attract broadcasters

Luxembourg's minister of the interior, Jean Spautz, speaking to journalists at the Berlin Consumer Electronics Show, said that his country continues to favor greater cross-border broadcasting in Europe.

Although the smallest, Luxembourg was among the first EC members to bypass a national public service network in favor of the privately operated Compagnie Luxembourgeoise de Telediffusion (CLT). Extensive cable networks, restrictions on commercial channels and bans on advertising in neighboring Belgium, West Germany and the Netherlands have helped Luxembourg emerge as a key spot for pan-European broadcasting.

The German-owned RTL Plus station was one of the first private channels to set up a studio in Luxembourg, sidestepping German law to broadcast programs to other European countries. Two Dutch private commercial channels will broadcast from Luxembourg to Dutch viewers later this year, while the country's ASTRA medium-power satellite continues to spin its web of coverage Europewide.

West German cable TV grows

Of West Germany's 25.7 million households, some 12.6 million were cabled as of June of this year, according to the Deutsche Bundespost. The ministry reported that, after the telephone, cable is the second fastest-growing telecommunications sector. Analysts predict, however, that cable's popularity is likely to decline because of a 30% increase in cable fees and because the two commercial satellite channels — Sat-1 and RTL Plus — have been allowed to broadcast terrestrially.

Research studies for the first half of this year indicate that viewership of commercial programs is increasing rapidly, at the expense of the public service networks ARD and ZDF. Although these two stations remain the most favored in West Germany, the gap between them and the commercial channels has been almost closed,

at least in cabled households. Of all channels competing for some 160 minutes of viewing time, ARD reported the largest share with 40 minutes (24.2%), ZDF with 36 minutes (22.2%), Sat-1 with 35 minutes (21.6%) and RTL Plus with 17 minutes (10.7%).

Prime-time viewing still is dominated by the ARD and ZDF. Movies, entertainment shows and news reach a wider audience through these networks than on the commercial stations. Industry analysts concede, however, that the commercial channels have nibbled a large chunk out of the public networks' viewership by successfully scheduling a variety of light entertainment programs.

Poland and U.S. cooperate on cable

The first U.S.-Polish communications joint venture, a $900 million, 20-year cable TV project, was signed by Chase Enterprises and the Polish government in December.

The new company, Polska Telewizja Kablowa (PTK), began the first phase of construction in January, for 1.8 million homes in Warsaw and Krakow. It hopes to begin offering services by the middle of the year.

Philips to build HDTV tubes in U.S.

N.V. Philips is planning to build a $100 million plant in the United States to manufacture color TV picture tubes and HDTV components. This decision reflects Philip's concrete effort to promote the European HDTV standard in the United States. The plant is to be built in two phases, through Philips Display Components, a division of North American Philips. The first phase is designed to make one million 29-inch standard and high-grade color picture tubes a year. The second phase is intended to produce tubes for upscale HDTV models.

Capital Radio uses computerized DJ

Most fans outside Capital Radio's headquarters in London are unaware that a computer is doing some of the work of their favorite disc jockeys.

A tailormade software package for Capital's FM and "golden oldies" stations makes sure that the DJs are giving their listeners what they want to hear. The software, called Selecter, was developed by Andrew Economos, former head of computer systems at NBC. He leases the PC-compatible software to about 40 radio stations in the United Kingdom.

Economos developed the system to track songs played so that royalty payments could be made, but it is being used as a programming tool by Capital. A station's record library is activated with classifications (title, artist, date), a description of the song category (pop, soul, rock) and values (key, tempo and texture). The computer is programmed to use these details in meeting the station's requirements. For Capital, which is on the air 24 hours a day, seven days a week, Selecter can plan up to 168 hours of programming in an hour.

SMPTE technical conference to be held in Toronto

The Society of Motion Picture and Television Engineers (SMPTE) 134th Technical Conference and Equipment Exhibit will be held in Toronto, Canada, at the Metro Toronto Convention Center, Nov. 10-14, 1992. The technical sessions, equipment exhibit, Coffee Club and Honors and Awards Luncheon will be held at the convention center. The banquet and the Fellows Luncheon will be held in another hotel.

As previously scheduled, the 132nd Technical Conference and Equipment Exhibit will be held Oct. 13-17, 1990, at the Jacob K. Javits Convention Center in New York City. The 133rd conference will be held Oct 26-30, 1991, at the Los Angeles Convention Center, Los Angeles.

British satellite sales are up

The number of U.K. homes with satellite TV receivers increased to 352,000, according to the latest FT satellite monitor. The boom over the past several months has been attributed to the heavy promotion by Sky TV. Continental Research, which produces the monitor, estimated that the number of dishes in place at the beginning of 1990 could reach 600,000 homes.

U.S. shows interest in U.K. cable

U.S. companies have shown keen interest in the bid for six U.K. cable franchises. There were bids from US West, Videtron, Starstream and U.S. Cable for the

Continued on page 124

People

Dan Rau has been appointed director of sales and marketing for Marti Electronics, Cleburne, TX.

Memorial services were held Feb. 15 for **Daniel R. Brewer**, former director of engineering and technical services, Paramount Pictures Video Operations.

Before joining Paramount in 1983, Brewer was director of video engineering at CFI since 1981. He was videotape technical supervisor at Universal from 1977 to 1981 and at the Burbank Studios from 1973 to 1977. He also served in engineering positions at USC (1972-1973), RCA (1948-1954 and 1963-1972) and NBC (1954-1960). Brewer served on the RCA Service Engineer Group that worked with the National Television Systems Committee on the development of color television. In 1982 he received a technical achievement award from the Academy of Motion Picture Arts & Sciences. He also was a Governor of the National Academy of Television Arts & Sciences and a member of many engineering societies. He is a past president of the Society of Television Engineers.

Trent Fisher has been promoted to manager of quality assurance for RITTAL, Springfield, OH. He is responsible for ensuring constant maintenance, supervision and improvement of product quality and the quality of the manufacturing processes. He also monitors and assures adherence to worldwide industry standards and deals with specific customer requirements.

Sandra Hale has joined Studer Revox, Nashville, as public relations/copywriter.

Larry W. Burke has been elected president and chief executive officer and a member of the board of directors for Robinson Nugent, New Albany, IN. **Samuel C. Robinson**, a member of the board, has been appointed chairman of the board.

Jeff Muhleman has been appointed sales manager for the Los Angeles office of Beers Associates, Westboro, MA.

O.G. Mills has been named regional sales manager for TV products for Angenieux Corporation of America, Miami. He is based in Tampa and handles sales and field-service support in the Southeast and Southwest.

Richard Foate has been named national sales manager for Alpha Audio, Richmond, VA. He is responsible for expanding the national and international markets of the systems division. He also is responsible for launching the DR-2 digital disk-based recorder.

Burton Richter has been elected to the board of directors of Varian Associates, Palo Alto, CA.

Robert M. van Zyl, Kevin M. Miller and **Wen Li** have been appointed to positions with Videotek, Pottstown, PA. van Zyl is vice president of operations. Miller is manager of engineering and Li is mechanical engineering manager.

Daniel J. McCarthy, George I. Hardy, Carl C. Guastaferro and **Eric P. McCulley** have been appointed to positions with Microwave Radio, Lowell, MA. McCarthy is Northeastern regional sales manager. Hardy is Southeastern regional sales manager. Guastaferro is Western regional sales manager, and McCul-

ley is Midwestern regional sales manager.

William P. Edwards has been named satellite operations coordinator for the University of Oklahoma Television and Satellite Services Operations, Norman, OK.

Paul Stewart has joined Paltex, Tustin, CA, as Aston product specialist. He provides technical and training support for the dealer network.

Richard K. Wheeler, Mark Gray and **Harry Taxin** have been appointed to positions with Sony. Wheeler is president of Sony Operations and Technical Services, San Jose, CA. Gray is president, Sony Communications Products Company, Teaneck, NJ. Taxin is president, Sony Systems and Technology, San Jose, where he is responsible for R&D systems development and design. Taxin still is responsible for Sony's Advanced Video Technology Center (AVTC).

Burt Young, Michael Arbuthnot and **Tom Hindle** have been appointed to positions with BTS, Salt Lake City. Young is Midwest regional sales manager. He is located at the Chicago sales and service office. Arbuthnot is manager of marketing programs. He works with all areas of product management to develop marketing programs for the various product lines. Hindle, currently the product manager for the Vidifont character generator line, has accepted additional responsibilities and serves as key accounts manager, covering New York. He handles all sales of company products to the networks and their New York-based owned-and-operated affiliates.

Gordon Tubbs has been appointed regional sales manager for the East and Canada for the broadcast equipment division of Canon USA, Englewood Cliffs, NJ.

Don Reynolds has been named product manager for Dynair Electronics, San Diego. He is responsible for overall product planning, pricing and market research.

Frank Oakes, Stuart Hesselson, Mike Kirk, Al Markiewicz and **Greg Smith** have been appointed to positions with EEV, Elmsford, NY. Oakes is director of business development. Hesselson is marketing manager for the industrial, medical and scientific markets. His group is responsible for developing commercial business for the company's products in these markets. Kirk is marketing manager, broadcast and communications. His group is responsible for marketing the company's power and imaging devices. Markiewicz has rejoined EEV, and heads up the new Northeastern district office. He is responsible for developing OEM business on the East Coast. Smith has rejoined EEV and is responsible for the sales of broadcast products in Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, Oklahoma and Texas.

Chris Smith has been appointed president of Essex Marketing Services, Simsbury, CT.

Max Berry and **Halfon Hamaoui** have been appointed to positions with Faroudja Research Enterprises, Sunnyvale, CA. Berry is manager of strategic planning in the New Jersey office. He will help define strategies for SuperNTSC and HDTV. Hamaoui is executive vice president. He is responsible for marketing, manufacturing, administration and sustaining engineering.

Robert J. Miller has been hired by Gardere & Wynne, a communications company in Dallas. Miller provides regulatory and business counsel for communications companies and

related industries that deal with the Federal Communications Commission, Congress and state regulatory bodies.

John J. Rourke, Christopher P. McCabe, Nancy Salas and **Thomas P. Delehanty** have been promoted to various positions with Hughes Television Network, New York. Rourke is director, communications services. McCabe is director, MIS. Salas is manager, telecommunications facilities. Delehanty is assistant manager, communications services.

Lance Korthals has joined JBL Professional, Northridge, CA. He is vice president of market development and is responsible for steering the growth of new professional markets and companies.

Lisa Schraml has been appointed manager of marketing and sales for JVC, Los Angeles. She is head of the New York office.

Jon Foster has been named broadcast technical instructor for Harris Broadcast Division, Quincy, IL. He teaches first-year courses for the company's cooperative program with John Wood Community College. He also will work in the field-service department to become familiar with the products and then will instruct some of the customer seminars.

Business

TSL establishes international offices

Transmission Structures Limited (TSL), Vinita, OK, has opened two international sales and services offices. The offices are located in London and Arecibo, Puerto Rico, and will provide faster and more complete service to their international markets.

Digital Microwave develops digital video division

Digital Microwave, San Jose, CA, has entered the digital video transmission market with the formation of a separate division, DMC Digital Video. The initial product offering focuses on digital microwave radio systems for digital transmission of broadcast video and audio.

New England Digital training available on West Coast

The *Full Sail Center* for the recording arts has opened a branch in Hollywood, CA. The school is making its basic and intermediate New England Digital tapeless studio seminar available to more students than ever before. The focus on the West Coast branch is in the training of current professionals on the industry's most advanced workstations.

Ampex offers voluntary retirement

Ampex, Redwood City, CA, has developed an early retirement program available to 400 U.S. employees. To be eligible, employees must be at least 50 years old and have five years or more of service. The retirement program has been put to

use as a means of balancing employment while slowing expense growth.

The company will continue to hire in areas such as sales and engineering.

BERC opens San Diego office

Broadcast Equipment Rental Company (BERC), Burbank, CA, has opened a San Diego-based office. The facility is a full-service video rental operation for the broadcast, production, convention and industrial video communities.

BTS consolidates U.S. operations

Broadcast Television Systems (BTS), Salt Lake City, has moved studio equipment and computer graphics manufacturing corporate headquarters for North and South America, and one of its three worldwide manufacturing centers to its Salt Lake headquarters. Facilities in Stamford, CT, and Mahwah, NJ, will no longer handle these services. Salt Lake City also will become the technical support center for BTS service engineers on both continents.

All changes are expected to be completed this month.

Canon Broadcast relocates headquarters

Canon USA Broadcast Equipment Division has relocated its headquarters to Englewood Cliffs, NJ. The address and phone numbers are Canon USA, Broadcast Equipment Division; 610 Palisade Avenue, Englewood Cliffs, NJ 07632; 201-816-2900; 201-816-97029 (fax).

C-COR acquires Acunet Data Systems

C-Cor Electronics, State College, PA, has obtained Acunet Data Systems, the Canadian-based distributor of C-Cor products.

Acunet, renamed C-Cor Electronics Canada, will operate as a wholly-owned subsidiary of C-Cor Electronics and will have sales responsibility for C-Cor's cable and data products throughout Canada.

Mathews Studio Equipment gains ITE

Mathews Studio Equipment Group, Burbank, CA, has purchased Innovative Television Equipment.

Paltex and Aston establish marketing plan

Paltex International, Tustin, CA, and *Aston Electronic Designs Limited*, Surrey, England, have joined forces in an exclusive licensing agreement whereby Paltex will take over manufacturing, sales and technical support of all Aston products for all NTSC applications and markets.

All Aston sales and marketing efforts will be carried out at the Tustin offices of Paltex

Sony facility opens for business in Europe

Sony Broadcast & Communications is conducting the transfer of high-definition video to 35mm film at its Basingstoke facility. The facility is the second in the world to offer electronic beam recorder transfer, applying the service already provided by Sony PCL in Tokyo.

Battery test system streamlines work

By Rick Leipert

Like countless broadcast facilities, the Broadcast Education Department of the British Columbia Institute of Technology (BCIT) uses many rechargeable batteries in its portable equipment. The batteries range from single 0.5Ah cells to 7Ah multicell batteries.

Rechargeable batteries are great as long as the people using the batteries charge them properly and the capacity of the batteries is reasonably close to normal. A failure in either area usually will result in a complaint. At BCIT, matters are complicated because of the number of people learning to use the equipment.

Leipert is an engineer and assistant instructor in the broadcast department at the British Columbia Institute of Technology, British Columbia, Canada.

Automated testing

The members of the engineering staff became frustrated with the large amount of time they were devoting to resolving battery problems. Usually the battery was fine, and the complaint was based on operator error. Even so, each complaint had to be checked out.

The evaluation process required fully charging the battery, then discharging it in a controlled manner while monitoring its performance. Charging the battery was not a problem, but the monitored discharge was complex and time-consuming. At first, the staff used clip leads, resistor loads and voltage-sensitive alarms as test circuits. The process was neither time- nor cost-efficient.

What the staff needed was a flexible, simple-to-use test system that would connect the proper load to the battery and monitor the discharge. A printout of the test results also would be handy for future reference. Sounds like a job for computer control, doesn't it?

After looking at various personal computers, the staff decided that the Commodore 64 was well-suited to the task. It's inexpensive, has a built-in clock and a user interface and requires only an external disk drive to make it fully functional. Although the system described here uses a printer, that would be optional. Almost any type of video monitor can be used. The computer provides both video and RF (TV) outputs. When it is not being used to

COMPUTER-DRIVEN BATTERY TESTER

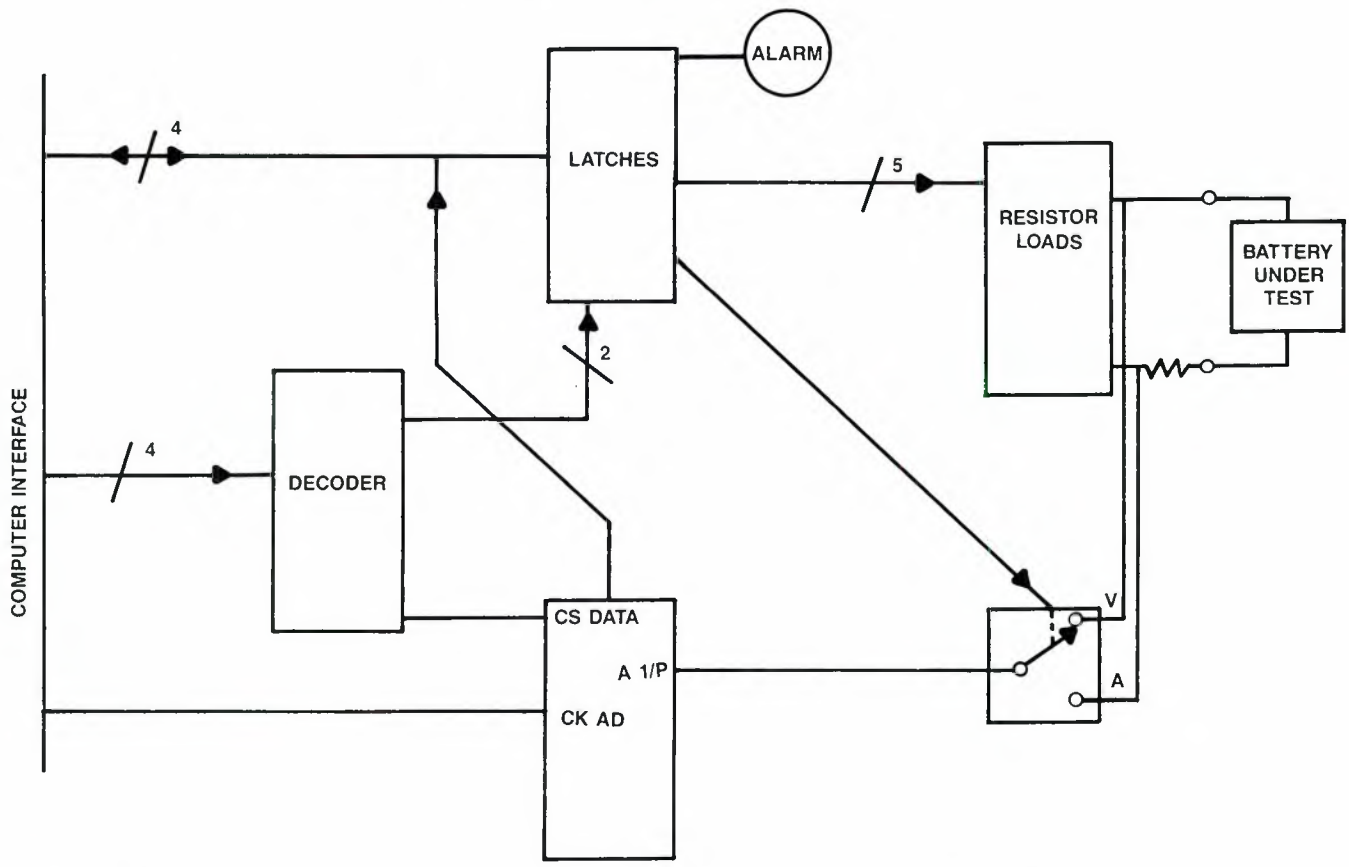


Figure 1. The system relies on a C64 computer, but other computers could be used with minor changes. A complete schematic is available.

control the battery tester, the computer system still can be used for other duties, such as word processing, inventory control and making jackfield and intercom labels.

Testing procedure

The test bed developed by the staff has a connector for each type of battery, the required selection of power load resistors, and an A/D (analog-to-digital) converter. A bit of interface circuitry to allow computer monitoring and control also was needed. The circuit was built into a large chassis with a ventilated box on the top to enclose the power resistors.

A block diagram of the system is shown in Figure 1. The eight bits of data coming from the computer bus are split into two 4-bit nibbles. One nibble is used for function selection, and the other is used for bidirectional data flow. The decoder selects the function, and the latches act as memory cells for computer commands.

Commands select appropriate power load resistors and voltage range or current input to the A/D converter. All power and signal switching is done with semiconductors for reliability. The system uses LEDs as mode and function indicators.

The program is written in BASIC because it is more than fast enough for this task, and it can be modified easily as new battery types come along. The program menu allows the operator to select from among the six most common battery setups. The operator also has the option of designing a setup.

During the test, an on-screen graph of voltage vs. time is created. Other test parameters also are displayed. The test ends when the computer detects a predetermined low battery voltage limit. The computer then disconnects the battery and begins sounding an alarm to call the operator. The operator may choose to print the test results, move on to another test or quit.

This system has saved the BCIT engineering staff hours of tedious work. The system allows testing of all new batteries before they are placed into service. The printed test results provide a useful reference on battery performance.

Additional help available

A BASIC program listing, Commodore format program disk and/or a full schematic diagram with parts suggestions is available from the BCIT Development Assistance Center. The price schedule follows.

Program on a 5¼-inch floppy disk,
C64 format, fully annotated $35
Printed listing of program 35
Schematic diagram of test system . . 35

All orders must be accompanied by full payment. Prices shown are in Canadian dollars for orders shipped to Canadian destinations. All other orders should be paid in U.S. dollars or the equivalent. The items are intended solely for the personal use of the purchaser and are not intended for any commercial purpose unless prior written authorization is received from the BCIT Development Assistance Center Society. To order, use the following address or phone number:

British Columbia Institute of Technology
Development Assistance Center
3700 Willingdon Ave.
Burnably
British Columbia, Canada V5G 3H2
604-432-8373

Continued from page 117

Tyneside franchise.

Spain opens airwaves for three stations

Most politicians would discreetly avoid breaking up a TV monopoly under safe government control, but Spain's socialist prime minister, Felipe Gonzalez, has done just that.

Amid a storm of criticism, the Spanish government opened up the nation's TV airwaves by granting licenses for three commercial stations, including one backed by Italian TV mogul Silvio Berlusconi. Media tycoon Rupert Murdoch, however, lost out.

Spain has the lowest newspaper readership in the EC, and as much as 80% of the population depends on television for the bulk of its political and cultural diet. Maintaining a monopoly on Spanish broadcasting was a cornerstone of General Franco's grip on Spain. Its breakup stems from a 1982 ruling by the Constitutional Court that upheld private television as a consequence of the constitution's guarantees on freedom of speech.

Gonzalez, who came to power later that year, took five years to draw up a private TV bill. Only at the beginning of this year did he establish a government authority, modeled on Britain's Independent Broadcasting Authority (IBA), to review the groups eager to become part of the private TV scenario.

The controversial awarding of the licenses, seven years after the constitutional ruling, has drawn harsh accusations of favoritism. In spite of this, plurality at last has come to Spanish broadcasting. The winners of the licenses are: Antena-3 Television, Canal Plus-Sociedad de Television and Gestevision-Telecinco.

The two losing applicants were Univision Canal 1 SA, a combination of the Grupo Zeta magazine and newspaper group, Murdoch's News International and other Spanish investors; and Canal C, a group formed by 25 Catalonian businessmen.

The three new channels will be competing with publicly owned state and regional stations for a slice of the national TV advertising pie, which last year amounted to about $1.22 billion.

Classified

Classified advertising now available as Classified Display or By-the-word.

Classified Display: $100 per column inch, per insertion, with frequency discounts available. 1 inch minimum, 10 inches maximum per ad. Blind ads $40 additional. Reader Service number $50 additional. Spot color available for $150 (color determined by publisher).

By-The-Word: $1.75 per word, per insertion. Initials and abbreviations count as full words. Blind ads $40 additional. Minimum charge $40 per insertion.

Contact Renée Hambleton, at (913) 888-4664, for information on frequency and pre-payment discounts. To place your classified ad send your order and materials to Broadcast Engineering, Classified Ad Mgr., P.O. Box 12901, Overland Park, KS 66212.

HELP WANTED

CHIEF ENGINEER

Excellent opportunity now available for hands on chief engineer. Responsibilities include design and installation of a new state of the art post production facility and transfer suite in Charlotte, N.C. Candidate must have experience dealing with clients in a post environment and hands on knowledge of Sony one inch tape machines, Grass Valley switchers and editors and the Ampex ADO 3000. Knowledge of film transfer, the Rank-Cintel Turbo Telecine and the DaVinci color corrector a plus. Send resume and salary requirements to:

P. O. Box 3732
Cincinnati, OH 45201

Director of Engineering

Major University Telecommunications Center.

Search Extended

Responsible for the design and implementation of all technical facilities and compliance with all applicable FCC rules and regulations. Will supervise Center maintenance, capital expansion and management of technical personnel and budgets. Experience in "C" and "Ku" satellite systems maintenance and operation required. Minimum requirements: BSEE or related degree plus 5 years of progressive and related technical experience with 2 years additional experience in an administrative capacity. Equivalent combinations of education and experience may substitute for stated qualifications. For full consideration resume must be received by May 18, 1990.

Send to: Director of Engineering Search,
Educational Television Services,
Oklahoma State University, Stillwater, OK
74078-0585

OSU IS AN AFFIRMATIVE ACTION/EQUAL OPPORTUNITY EMPLOYER Must meet IRCA Requirements.

HELP WANTED

CHIEF ENGINEER, WBBH-TV, FORT MYERS, FLORIDA! Due to promotion of former Chief, this top-notch NBC affiliate has an immediate opening for CHIEF ENGINEER. Must have extensive record troubleshooting and maintaining high power UHF transmitters. Needs to be an expert re BETA, BETA SP, 1", ENG, SNG, STUDIO CAMERAS AND STUDIO TERMINAL EQUIPMENT. "Hands On" type of chief required. Rapidly growing 96th market. Send resume to Steve Pontius, VP/GM, WBBH-TV, 3719 Central Ave., Fort Myers, Florida 33901. WBBH-TV IS AN EQUAL OPPORTUNITY EMPLOYER. 04-90-1t

EARTH STATION TECHNICAL STAFF. IDB Communications Group, Inc. seeks qualified technicians and engineering supervisors at The Teleport in Staten Island, NY. Experience in earth station maintenance and systems integration (RF/Audio/Video) required. Intelsat experience a plus. Resume and salary requirements to: IDB Communications Group, Inc., The Teleport, 5 Teleport Drive, Staten Island, NY 10311. Attn: Director of Engineering. 04-90-1t

NEW YORK FACILITY ENGINEER: Busy, diversified Sony-based house with GV-300 switchers, full effects edit suites, studio and graphics seeks ambitious engineer with minimum (5) years experience. Send resume and salary requirements: Broadcast Engineering, P.O. Box 12901, Dept. 712, Overland Park, KS 66212. 04-90-1t

TV TRANSMITTER SUPERVISOR for VHF station. Transmitter maintenance experience required. Also supervise 7 station transmitter remote control center. KELO-TV, 501 S. Phillips, Sioux Falls, SD 57102. 04-90-1t

TV MAINTENANCE ENGINEER. KPLR-TV. St. Louis Cardinal baseball station. 3-5 years broadcast TV experience. Strong background in VHF-TV transmitters, broadcast microwave and satellite communication equipment. Experience with RCA FH line transmitters preferred. Applicant should also be experienced in VTR's and various studio equipment. Some moving expenses covered. Call Rod Wisdom, 314-454-6310 or send resume to KPLR-TV, Rod Wisdom, 4935 Lindell Blvd., St. Louis, MO 63108. EOE. 04-90-1t

MAINTENANCE ENGINEER WANTED: Must have 2 years **Recent Experience** repairing general studio equipment. Ability to repair VTR's, switchers, and studio cameras a must. Resume and Salary History to: Mike Taylor, KSWO-TV, Box 708, Lawton, Oklahoma 73502. 04-90-1t

TV BROADCAST MAINTENANCE ENGINEER. Immediate opening for experienced video tape repair, or UHF transmitter engineer. Southern California area. P.O. Box 121569, San Diego, CA 92112-5569, FAX (619) 575-6951. 04-90-1t

MAINTENANCE ENGINEER: Responsible for the repair and maintenance of studio, transmission and remote facilities, including extensive microwave transmission network. Experience in maintenance and repair of broadcast television equipment required, as well as experience in satellite and microwave transmission systems. Associates degree in electronics required, as well as supervisory experience, SBE certification and FCC General Radiotelephone License. Salary commensurate with experience. Send resume and cover letter to: Director of Operations, 10 Tower Office Park, Suite 600, Woburn, Mass. 01801. **NO CALLS.** 04-90-1t

LARGE POST PRODUCTION FACILITY IN ATLANTA is seeking motivated maint. engineers with repair experience in the post production or broadcast industries. Persons should be experienced in maintenance down to component level on edit suites and associated equipment: ½", ¾", 1", VTR's, switchers, editors, DVE's, routing, audio, etc. Send resume to Video Tape Associates, 1575 Sheridan Rd. N.E., Atlanta, GA 30324. Attn: Trevor Mincher. 04-90-1t

Classified

HELP WANTED

BROADCAST ENGINEERS WANTED: 2 broadcast engineers with experience in ¾" tape equipment. Studio and transmitter knowledge helpful. Great benefits, no agencies please. Send resume to Don Roden or Steve King, WHNT-TV, 200 Holmes Ave., Huntsville, AL 35801 or call (205) 533-1919. 04-90-2t

TV MAINTENANCE ENGINEER—WLWT. Career opportunity for experienced engineer. Position includes responsibilities for television transmitter and studio equipment maintenance. Extensive background in broadcast engineering, FCC license & driver's license required. Send resume to: Georgia Jones, WLWT, 140 West Ninth Street, Cincinnati, Ohio 45202. Equal opportunity employer. 04-90-1t

BROADCAST ENGINEER for AM side of dominant AM/FM combo in mid-west. Must have good interpersonal skills and a demonstrated knowledge of audio and studio construction. Will also be required to engineer remotes. Five years minimum experience as chief or assistant. Familiarity with RF/FCC rules helpful. AM engineer reports to chief engineer. Send resume and salary history to: Jeff Glass, Nolte Communications, 3901 Brendenwood Road, Rockford, IL 61107. Nolte Communications, an Equal Opportunity Employer. 04-90-1t

TV MAINTENANCE TECHNICIAN—Requires self starter having experience with Sony ¾" and Beta, Ikegami, TK-47 and VPR-3 equipment maintenance. Experience with microwave, D2, satellite and VHF transmitters as well as an FCC General Class License is preferred. Contact Marty Peshka, Maintenance Supervisor, WTNH, P.O. Box 1859, New Haven, CT 06508 or call (203) 784-8888. EOE.04-90-1t

HELP WANTED

TNT

TURNER NETWORK TELEVISION

TELEVISION ENGINERS

Turner Broadcasting System, the leading News, Sports and Entertainment system in satellite communications, has career opportunities for engineers with *broadcast maintenance* experience. These positions demand an extensive background in television engineering and at least two years or training in electronics technology. Turner Broadcasting System offers an excellent benefit and compensation program. Send resumes to:

Jim Brown, Corp. Engineering
TURNER BROADCASTING SYSTEM, INC.
One CNN Center, Box 105366
Atlanta, Georgia 30348-5366

TBS is an equal opportunity employer.

HELP WANTED

VIDEO SYSTEM DESIGNER

utilizing automated controls BS or AS Computer Science or Electronics (or equivalent) plus 2 years video system design/implementation and/or computer programming. AutoCAD desired. **Responsibilities:** design/develop imaging systems supporting aerospace research, product research/selection, procurement specifications, prototyping, documentation, field support of installation/fabrication. System formats, analog, digital, composite, component, baseband, broadband, and microwave including associated hardware. Security clearance will be required. Resume to:

Planning Research Corporation
303 Butler Farm Road, Suite 106,
Hampton, VA 23666
(804) 865-1010. W. Hamilton. E.O.E.

TELEVISION SYSTEMS ENGINEER

Design, install and troubleshoot sophisticated new sports-related video facilities for a dynamic expanding and established television company. This individual should be knowledgeable in all of the new technologies and must possess strong managerial skills. Direct client contact and liaison with several existing facilities as well as all new installations is required.

Engineering degree, experience with sports-related remote operations, and satellite broadcast is a plus. Excellent salary & benefits. Send resume to:

VPC
P. O. Box 840, New Hyde Park, NY 11040

Advertising sales offices

SANTA MONICA, CALIFORNIA
Herbert A. Schiff
Telephone: (213) 393-9285
Telefax: (213) 393-2381
Jason Perlman
Telephone: (213) 458-9987
Telefax: (213) 393-2381
Schiff & Associates
501 Santa Monica Blvd. Ste. 504.
Santa Monica, CA 90401

OXFORD, ENGLAND
Nicholas McGeachin
Intertec Publishing Corp.
Roseleigh House
New Street
Deddington
Oxford OX5 4SP
England
Telephone: (0869) 38794
Telefax: (0869) 38040
Telex: 837469 BES G

TOKYO, JAPAN
Mashy Yoshikawa
Orient Echo, Inc.
1101 Grand Maison
Shimomiyabi-Cho 2-18
Shinjuku-ku, Tokyo 162, Japan
Telephone: (03) 235-5961
Telex: J-33376 MYORIENT

NEW YORK, NEW YORK
Diane Gottlieb-Klusner
Telephone: (212) 702-3404
Telefax: (212) 702-7802
Mike Trerotoli
Telephone: (212) 702-3405
Telefax: (212) 702-7802
866 Third Ave.
New York, NY 10022

CHICAGO, ILLINOIS
Vytas Urbonas
Telephone: (312) 435-2361
Telefax: (312) 922-1408
55 East Jackson
Suite 1100
Chicago, IL 60604

FREWVILLE, SOUTH AUSTRALIA
John Williamson
Hastwell, Williamson, Rep. Pty. Ltd.
109 Conyngham Street
Frewville 5063
South Australia
Phone: 799-522
FAX: 08 79 9522
Telex: AA87113 HANDM

CLASSIFIED ADVERTISING
OVERLAND PARK, KANSAS
Renee Hambleton
P.O. Box 12901
Overland Park, KS 66212
913-888-4664

TECHNICAL SUPPORT ENGINEER (Cameras)

This is an excellent opportunity to join one of the world's leading broadcast equipment companies. You will provide technical assistance (installations, trouble shooting, repairing, etc.) for our camera product line. Requires extensive experience with broadcast cameras.

BTS, Inc. is a joint venture company of Philips and Robert Bosch Corporations. We have been in business for over 30 years and serve the professional broadcast industry with an extensive line of professional video equipment.

We offer excellent salaries, benefits and opportunities for personal and professional growth. Salt Lake City offers all-round recreational opportunities, reasonable housing and good schools. Please send resume in confidence to: **Ken Oswald, Manager of Human Resources, BTS, Inc., P.O. Box 30816, Salt Lake City, Utah 84130.**

BTS Broadcast Television Systems, Inc.

Equal Opportunity Employer

Classified

HELP WANTED

TV MAINTENANCE ENGINEER
needed for a national Christian studio post production satellite uplink facility. Three years component level maintenance experience. Ampex, AVC, ADO, VPR-3, Beta, Scientific Atlanta Uplink. Positions available in San Diego and Dallas. Competitive salary and benefits (Paid vacations, holidays, incentive programs, medical & dental insurance) with an exciting organization. Send resume to: Personnel Dept., Word of Faith, P.O. Box 819099, Dallas, TX 75381-9099

CHIEF BROADCAST TECHNICIAN EMORY UNIVERSITY
Responsible for the total technical and engineering operation of Emory Medical Television. Applicant will be responsible for maintenance and repair of large duplicating facility which includes 3/4" and 1/2" VTR formats; maintenance and repair of FCC licensed ITFS transmitter and repeater, television production equipment including cameras, switchers, and related electronic test equipment. Must have a Bachelor's degree in Electronics or related field and four years experience or equivalent education and experience. First class federal communications commission radiotelephone operator's license. Send resume to: Job #340-1132, Emory University Personnel Department, 637 Asbury Circle, Atlanta, GA 30322. An Equal Opportunity/Affirmative Action Employer. 04-90-1t

FOR SALE

BCS BROADCAST STORE, INC.
VIDEO/AUDIO/RF
Buy • Sell
Consign • Service
Over 3000 items in inventory
Burbank, CA 818.845-7000
New York, N.Y. 212.268-8800

Circle (106) on Reply Card

(5) Ikegami HL-77's, (1) Ampex VPR-20, (2) Sony BVU-200's, (2) Sony BVU-200A's, (1) Sony BVE-500 Edit Controller, (1) Sony BVE-500A Edit Controller, (3) Ampex 1200 Quad VTR's, (2) Ampex 2000 Quad VTR's, (1) Ampex AVR-2 Quad VTR, (1) Ampex 4000 Edit Controller, (1) ISI Model 821 Master Control Switcher.
All bids must be received by April 30, 1990. All equipment sold as is. Shipping and handling is the responsibility of successful bidder. Submit bid to:

KENTUCKY EDUCATIONAL TELEVISION
600 Cooper Dr., Lexington, KY 40502
Phone: (606) 233-3000, Ext. 318
Attention: Michael Howard

HIGHEST PRICES for 112 Phase Monitors, vacuum capacitors and clean, one kw or greater powered AM and FM Transmitters. All duty and transportation paid. Surplus Equipment Sales, 2 Thorncliffe Park Dr., Unit 28, Toronto, Canada M4H 1H2, 416-421-5631. 6-89-tfn

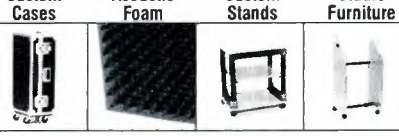
FOR SALE: Tubes 3CX1500A7, 4CX250B, 4CX5000A, 4CX3000A, and more. We carry lg. inventory, all major brands (EIMAC, AMPEREX, RCA) Call Stew 1-800-842-1489. 01-90-12t

CAPACITORS OVERNIGHT: CAPACITORS for transmitters. CAPACITORS for power supplies. CAPACITORS overnight from stock. Sprague Mallory Cornell-Dubilier and others. The CAPACITOR PEOPLE: KELLNER ELECTRONICS, INC. FAX 1-800-425-3664. Charlotte, Vermont. Call 1-800-323-0460 for CAPACITORS. 03-90-tfn

FOR SALE

FACTORY DIRECT

Custom Cases	Acoustic Foam	Custom Stands	Studio Furniture



Request Catalogue 800-343-1433, 516-563-0633
Island Cases, 1121-20 Lincoln Ave., Holbrook NY 11741

DEMO & USED EQUIPMENT BROKER
100'S OF ITEMS DISCOUNTED TO 70%. MOBILE TRUCKS: 45' sports—$625,000, 43' & 40' equipped—OFFER, 30' partially equipped—OFFER, 38' & 22' empty—$60,000. 1" A/B ROLL SYSTEM-3) VPR-2B vtr's, A-52 DVE, Ross 514-12 switcher, Epic controller, Marquee 3000 Char. gen. much more—OFFER. CHYRON 4100EXB 2 ch. char. gen.—$38,000. GRASS VALLEY 16003F 16 in., 2ME.—$16,500. AMPEX VPR-2B/TBC-2B 1" VTR's—16,000. ABEKAS A-52 digital effects—$17,500.
PROVID SUPPLY CORP
ANDY TURNER 708-215-9010

PRODUCTION TRUCK on Iveco 220 chassis with V6 diesel. Dual 7.5 KW generators, dual air conditioners. Complete AC power and control panel. Four electronic racks but no electronics. For information, call (305) 751-6692.04-90-1t

TEKTRONIX 1450 DEMOD with TDC-1 Tuneable Downconverter. $10,000.00. 916-636-8448. 04-90-2t

16MM THOMPSON TTV 2520 flying spot telecine: Sequence programmer, C.C.U., 875/525 conversion kit; Cabled housing, spare motor, remote control panel; Magnetic & optical audio, 1200m reels, Kodak adapters. 78 hours of scanning time, 38 hours of film transport. MAKE US AN OFFER. A/V DEPT., JAN CARON, 514-871-8122 or FAX at 514-871-1360. 04-90-1t

COMARK 25MX UHF TRANSMITTER now available. Call Keith Townsdin, KADN TV, Lafayette, LA. 318-237-1500. 04-90-2t

FOR SALE: Revox A77 Tape Machines; McMartin B-500 Audio Console; Spot Master - Model 1072 record, play, delay, cart machine; Harris DCU-D detector control units. Call 814-676-5744 and ask for Sam 4-90-1t

FOR SALE: UHF TV transmitter RCA TTU55B, channel 30 using two Varian VA954B vapor cooled klystrons. Accumulated hours 75,000. Still in use. Call Guy Coignaud, (514) 521-2424, ext. 5151. Fax.: (514) 873-7739. 04-90-1t

SERVICES

TRANSMITTER TUBE REBUILDING SINCE 1941: 3CX2500, 4CX5000, 4CX15000 and many others. Write for details. FREELAND PRODUCTS INC., 75412 Hwy. 25, Covington, LA 70433. (504) 893-1243 or (800) 624-7626. 6-79-tfn

UHF KLYSTRON TUBE REBUILDING. SAVE 50-76% on External/Integral cavity Klystrons. New tube warranty. Major market stations use our services. CALIFORNIA TUBE LABORATORY. For full details (901) 324-4490 or (805) 995-1072. 04-90-6t

SERVICES

WE PLACE TV MANAGEMENT, SALES & ENGINEERING PERSONNEL
America's Leading Source For A Decade
For Information Phone or Write
Mark Kornish

key systems
international, inc.
479 Northampton Street
Kingston, PA 18704
Phone (717) 283-1041
Fax (717) 287-5889
Employer Paid Fees

Stainless, inc.
New Towers, Antenna Structures
Engineering Studies, Modifications
Inspections, Erection, Appraisals
North Wales, PA 19454
215-699-4871 FAX 699-9597

BROADCAST TRAINED MAINTENANCE ENGINEERS will repair your ENG/EFP cameras, VTR & related audio/video equipment. Quality work. Quick turnaround. For information call MNP Technical Services, Inc. 617-932-9545. 03-90-3t

NI-CAD BATTERY PACKS RE-BUILT. All materials and workmanship warrented for one year. We also have new packs and inserts available for immediate shipment. Call Dave at Lowing Products, 616-245-2244. 04-90-4t

TRAINING

FCC GENERAL CLASS LICENSE. Cassette recorded lessons with seminars in Washington, Newark, Philadelphia. Bob Johnson Telecommunications, Phone (213) 379-4461. 05-90-tfn

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. 04-90-tfn

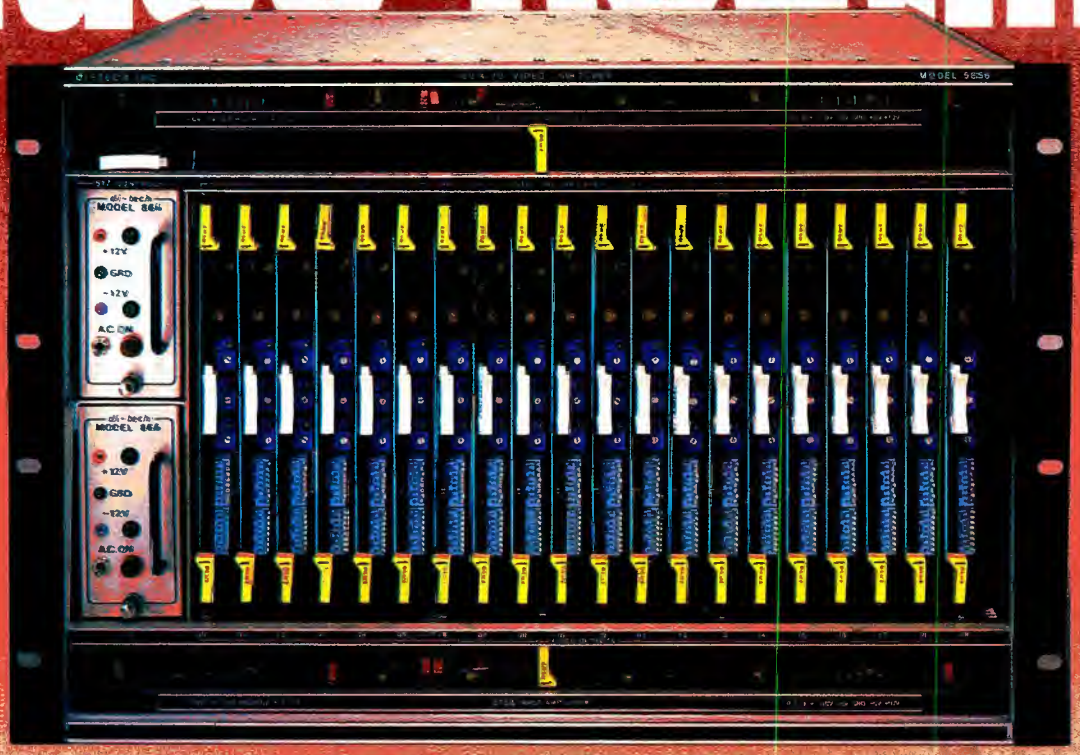
Phone
Renée Hambleton
for
Classified Advertising Information
(913) 888-4664

Professional services

Ad index

Advertiser	Page Number	Reader Service Number	Hotline
Abekas Video Systems	33	17	415/369-5111
Acrodyne Industries	77	53	800/523-0596
Alamar Electronics USA,Inc.	88	67	408/866-9373
Alta Group Inc.	62	37	408/297-2582
American Broadcasting System	58	32	800/950-2223
Ampex Corp (AVSD)	56-57,115,117	93,99	415/367-2911
Ampex Recording Media	95	75	415/367-2911
Anvil Cases, Inc.	118	101	818/575-8614
Arrakis Systems, Inc.	21	13	303/224-2248
Audio Precision	13	8	800/231-7350
Auditronics, Inc.	59	33	901/362-1350
Behlman, Div. of Fiskars Electronics	60	34	800/456-2006
Belar Electronics Laboratory, Inc.	123	105	215/687-5550
Belden Wire and Cable	67	44	800/BEL-DEN4
Benchmark Media Systems	90	71	315/452-0400
Broadcast Electronics, Inc.	11	7	217/224-9600
Broadcast Store, Inc., (BCS)	126		818/845-7000
Broadcast Supply West	107	89	800/426-8434
Broadcast Video Systems, Ltd.	100,116	80,94	416/764-1584
BTS Broadcast Television Systems	73	47	800/962-4BTS
Chrontrol	58	31	800/854-1999
Clear-Com Intercom Systems	101	85	415/527-6666
Computer Assisted Technology	120	103	212/360-2591
Continental Electronics, Div. of Varian	109	90	214/381-7161
Cortana Corporation	116	96	505/325-5336
Crown International	99	79	219/294-8222
Datatek, Inc.	87	66	800/882-9100
Di-Tech Inc.	IBC	2	516/667-6300
Dynair Electronics, Inc.	55	30	619/263-7711
Ergo 90	116	95	714/632-7045
Geleco Electronics, Ltd.	116	97	416/421-5631
Gentner Electronics Corp.	39,89	20-21,69-70	801/975-7200
Grass Valley Group, Inc.	9	6	916/478-3000
Gray Engineering Laboratories	98	78	912/883-2121
Harris Corp.	27	12	800/4HA-RRIS
Hedco	105	88	800/433-2648
Henry Radio	90	72	800/877-7979
Hitachi Denshi America Ltd.	3		800/645-7510
Ikegami Electronics, Inc.	34-35	18	201/368-9171
Illbruck	29	15	800/662-0032
Jampro Antennas, Inc.	28	14	916/383-1177
JBL Professional	83	62	818/893-8411
JVC Professional Product Co.	19	11	800/582-5825
LDL Communications	69	45	301/498-2200
Leader Instruments Corp.	79	56,57	800/645-5104
Leitch Video Of America, Inc.	113	98	804/424-7290
3M Magnetic Media Div.	53	29	800/328-1684
Markertek Video Supply	100	82	800/522-2025
Micro Circuits, Co.	119	86	616/469-2744
Microtime, Inc.	37	19	203/242-4242
Midwest Corp.	1	3	800/543-1584
Mohawk Wire & Cable	88	68	800/422-9961
NCA	75	51	716/852-4521
Nemal Electronics	30	49	914/359-3333
Nesbit Systems, Inc.	84	55	609/799-1482
Newton Instruments	111	91	919/575-6426
Nikon Corporation	5	4	516/222-0200
North Hills Electronics, Inc.	46	24	516/671-5700
Odetics, Inc.	63	38	800/243-2001
Opamp Labs, Inc.	100	81	213/934-3566
Orban, Div. of AKG Acoustics, Inc.	7,17	5,10	800/227-4498
Otari Corp.	15	9	415/592-8311
Panasonic Pro Industrial Video	64A-H	41	800/553-7222
Polyline Corp.	96	76	708/298-5300
Polyphaser Corp.	120	102	800/325-7170
Pro Audio Asia	30	48	
Roscor	80	58	708/539-7700
Sachtler Corp. of America	61	36	516/867-4900
Schmid Telecommunications	91	73	201/530-8555
Shintron Electronics	60	35	800/358-6872
Shure Brothers Inc.	IFC,48A-D	1,26	708/866-2553
Sierra Video Systems	102	64	916/273-9331
Sony Broadcast Products	103	87	800/635-SONY
Sony Communications Prod/ Broadcast Div.	24-25		800/635-SONY
Sony Communications Prod/Pro Video Division	40-41		800/523-SONY
Sony Communications Prod/Pro Audio Division	110		800/635-SONY
Sony Pro Video Tape	71	50	201/930-7669
Standard Communications	97	77	800/243-1357
Standard Tape Laboratory, Inc.	100	83	415/786-3546
Tascam, Div. TEAC Corp. of America	72,121	46,104	213/726-0303
Tektronix, Inc.	45,50-51,93	23,28,74	800/452-1877
Telemetrics, Inc.	31	16	201/427-0347
Thomson Tubes Electroniques	76	52	201/812-9000
Total Spectrum Manufacturing, Inc.	47	25	914/268-0100
Utah Scientific, Inc.	43	22	800/453-8782
Vicon Industries	85	65	516/293-2200
Videotek, Inc.	81	61	602/997-7523
Ward-Beck Systems, Ltd.	BC		416/438-6550
Winsted Corp.	118	100	800/447-2257

Wideband Video Routing



for RGB or HDTV

Images originating on film or tape often find their way into computer generated art. By maintaining an RGB component environment, quality is preserved while images are transferred to and from the analog domain. However, signal degradation can occur, if routing switchers designed for NTSC operation are pressed into service for RGB use.

*The **Model 5856** is designed for routing RGB (or the HDTV signals of tomorrow) to meet monitoring, recording or other production requirements. A video bandwidth of 45 MHz @ -3dB will preserve the original crisp, sharp look. Matrices as large as 60x20, or 20x20 RGB, are delivered in a single 7RU high chassis.*

*Call or fax **di-tech** today for complete information on the Model 5856 wideband routing switcher, or the complete line of audio, video and RS232/422 switching products.*

Circle (2) on Reply Card

di-tech inc.

48 Jefryn Boulevard, Deer Park, New York 11729 (516) 667-6300 • FAX (516) 595-1012

More versatility!
More important functions!

The D8212 Distribution Amplifier System just keeps on growing!

All of Ward-Beck's substantial investment in R&D is directed towards one single objective ... to bring you the very best professional audio systems.

That's why other manufacturers, who try to satisfy a wider range of audio and videc applications, simply cannot match the performance and quality of Ward-Beck audio products such as the proven D8212 DA System.

Now Ward-Beck is proud to announce the addition of new modules for the D8212 System. These include the M8200 transformerless, remote sensitivity microphone pre-amplifier, a stereo DA and a test oscillator.

We invite you to ask for details on these and other high-performance products in the expanding D8212 family.

WBS

WARD-BECK SYSTEMS

Ward-Beck Systems Ltd.
841 Progress Avenue, Scarborough, Ontario, Canada M1H 2X4.
Tel: (416) 438-6550. Fax: (416) 438-3865.