

# BROADCAST<sup>®</sup> ENGINEERING

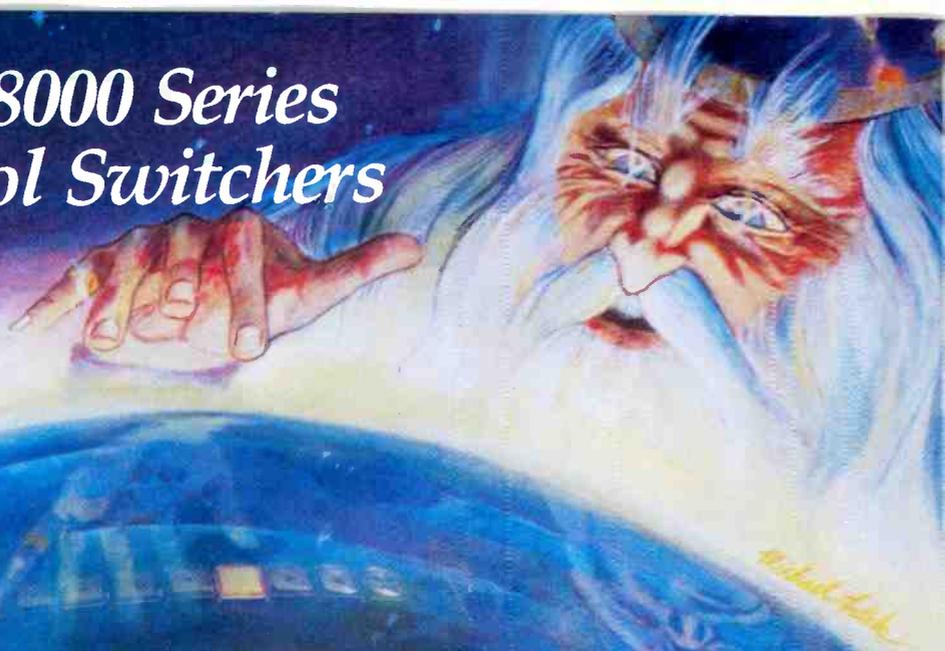
June 1986/\$3

## NAB '86: new technologies, new directions

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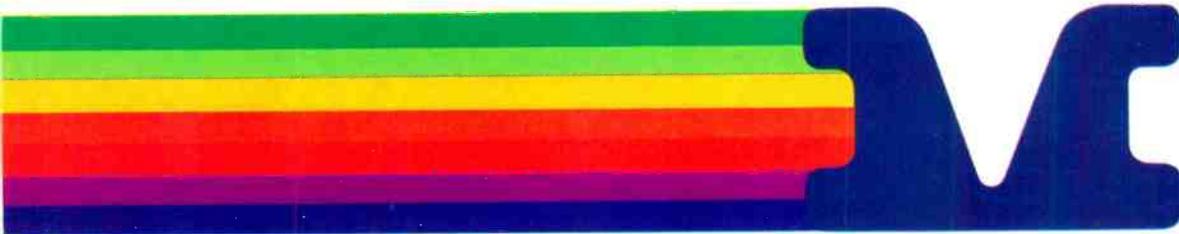
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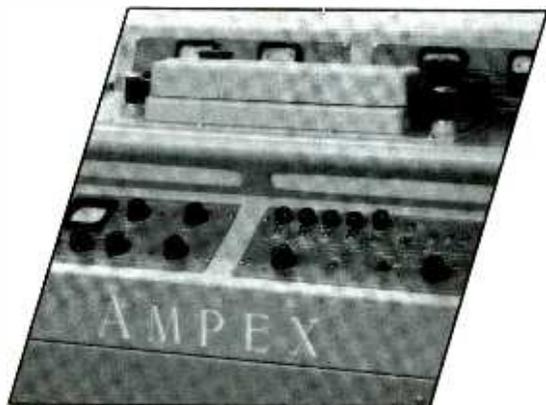
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## ON THE COVER

The 1986 NAB convention saw several emerging technologies take hold. One of these milestones was the introduction of numerous broadcast transmitters using solid-state devices as the primary power amplifying components. The modules shown on the cover (manufactured by Microwave Modules and Devices) develop 600W of RF power each in the FM frequency band. They are used in a number of new FM transmitters unveiled at NAB. (Photo courtesy of Microwave Modules and Devices.)

## BROADCAST engineering

### NAB CONVENTION REPLAY:

The annual NAB convention is the clock that drives the broadcast industry. It is the place for major equipment introductions and important company announcements. This year's show in Dallas provided more surprises than usual with significant moves by manufacturers and users into new technologies. Our NAB convention replay special report includes the following elements:

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By Brad Dick, technical editor, and Jerry Whitaker, editor

An analysis of some of the major engineering trends at the convention, and an introduction to the BE NAB wrapup report.

#### 24 Looking Toward the Future

By Brad Dick, technical editor

A detailed summary of the major technical papers presented at the NAB engineering conference.

#### 38 HDTV: Where is it Going?

By Arthur Schneider, Teledyne Camera Systems

A report on the display of high-definition TV equipment at the convention. The future of HDTV is also examined with input from several industry experts.

#### 46 Pick Hits of NAB '86

By Carl Bentz, TV technical editor and Brad Dick, radio technical editor

A look at 20 hot new products on display at the show.

#### 62 Show of Shows

Coordinated by Carl Bentz, TV technical editor

A detailed listing of the new products shown by each manufacturer at the NAB convention.

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By Don Markley, Markley and Associates

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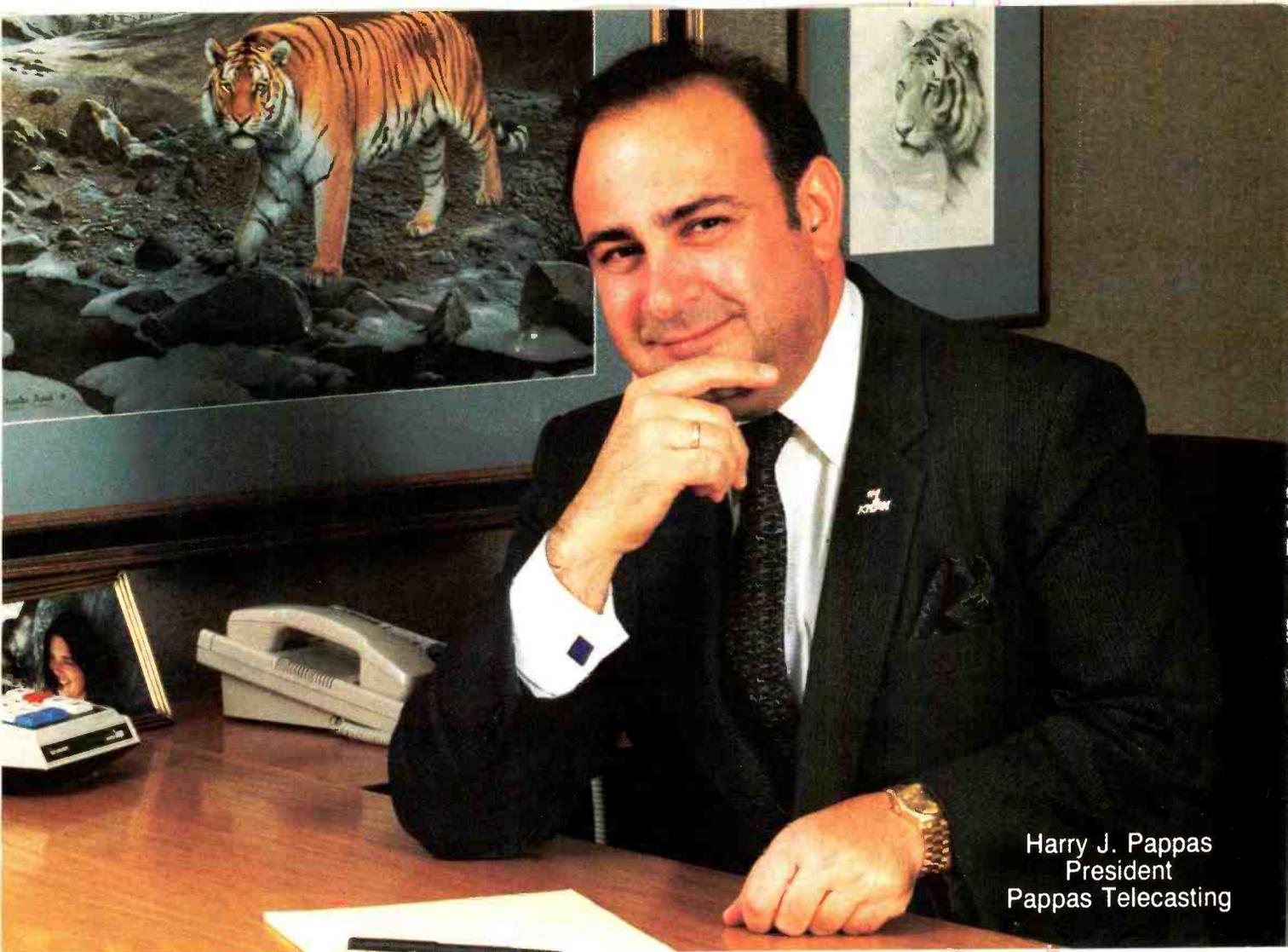
By Peter Hammar, Ampex Museum of Magnetic Recording

#### 166 Making History

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Harry J. Pappas  
President  
Pappas Telecasting

# Comark performance satisfies the most exacting customers...again and again.

Harry Pappas was so impressed with his first Comark "S" Series 220kW Transmitter, he bought a second.

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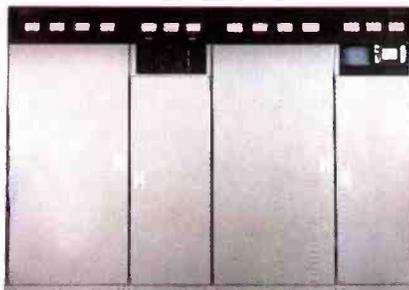
Naturally when it came to choosing the transmitter for his next station in Omaha, Nebraska, there was only one choice: Comark's "S" Series 240kW rig.

At Comark, we are especially proud to have gained the confidence of a knowledgeable industry leader like Mr. Pappas. But building superior transmitters is only a part of our story. We continue to work even harder at building a superior transmitter company.

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## COMARK

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## Ampex and Bosch to manufacture Betacam format recorders

Ampex has announced its decision to manufacture and market 1/2-inch component analog professional videotape recorders based on Sony Betacam and Betacam SP formats. This will provide Ampex entry into the emerging professional small format marketplace.

Since its introduction in 1981, the Betacam 1/2-inch format has been used for studio, ENG and EFP applications.

Ampex will manufacture products based on the Betacam and the Betacam SP video formats. While Betacam SP is an enhanced version of the Betacam format, it is compatible with existing Betacam equipment and recordings.

Specific products to be manufactured by Ampex and first production shipment information will be announced at a later date. Both companies intend to separately design, manufacture and market products that will compete on the open market.

The television systems division of Robert Bosch GmbH, Federal Republic of Germany, has finalized a cross license

agreement with Sony in the field of professional video camera and recording equipment and a license agreement for the manufacture of equipment based on the Betacam and Betacam SP format. This will extend Bosch's ENG product line into electronic field production.

The QuarterCam equipment based on the 1/4-inch Lineplex format will continue to be available from Bosch in PAL within the ENG product line.

## Panasonic to supply NBC with M-II format equipment

Panasonic Industrial Company has announced that NBC will purchase its 1/2-inch M-II format broadcast equipment. The initial purchase includes camera recorders, studio recorders, field recorders and videotape. The announcement ends NBC's 18-month evaluation of a universal broadcast format.

The M-II system provides a single recording format designed for electronic journalism, satellite news gathering, field production, studio recording, post-production, program-length on-air playback and station automation.

The M-II format uses 1/2-inch metal particle tape and achieves a quality level that rivals the 1-inch C format through at least five generations of production.

## NYMAFFC to handle Liberty celebration

The upcoming Statue of Liberty celebration promises to be a major media event. Early indications show that heavy use will be made of the RF spectrum as networks and stations from across the country converge on the New York metropolitan area in early July.

Frequency coordination for the event is being handled by the New York Metropolitan Area Frequency Coordinating Committee (NYMAFFC). The committee is comprised of representatives from all Part 74 frequency users, including ABC, CBS, NBC, CNN, INN and local radio and TV stations.

It meets regularly on the second Wednesday of every odd-numbered month at WABC-TV in New York. The meetings begin at 2:30 p.m. Special meetings also are being held to plan for the Statue of Liberty celebration.

Any organization expecting to use Part  
*Continued on page 152*

## BROADCAST engineering

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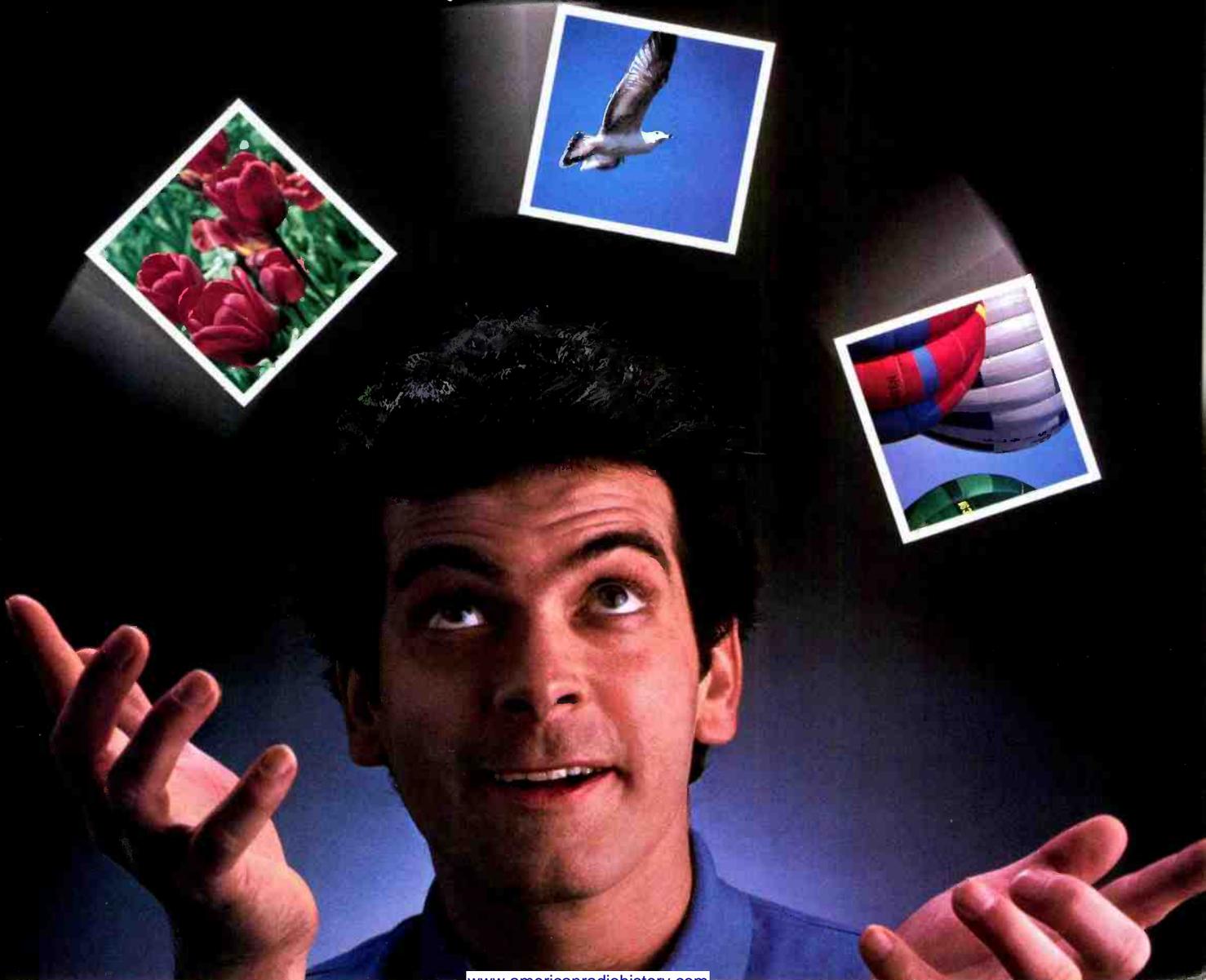
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**Abekas**  
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# IMPROVE YOUR IMAGE JUGGLING ACT



## Same song, umpteenth verse

Do you find yourself wondering if the battle over AM stereo will ever end? It's kind of like the Hundred Years' War. The fight has been under way for so long that it has become routine. And what we saw at the NAB convention in Dallas was, unfortunately, more of the same: More charges and countercharges from system proponents; more confusion on the part of AM station engineers and managers; more impatience on the part of the receiver manufacturers; and more indecision from the FCC. Yes, we're sorry to report that what we heard about AM stereo at NAB was just the *same song, umpteenth verse*.

The editors of **Broadcast Engineering**, and most engineers in the broadcast industry, have a soft spot for AM radio. Most of us began in AM when it was king. AM radio taught us our trade and taught us what broadcasting was all about. AM also taught FM—for years its poor cousin—the business of radio. And FM learned the valuable lessons of engineering, marketing and positioning *all too well*.

It is now estimated that 72% of the listening audience tunes to FM. Two years ago when **BE** first called for a meeting of the minds regarding AM stereo, the split was 65-35. Now, the linear progression of AM audience loss and FM audience growth continues with alarming predictability.

If you're into statistics, the analysis of how AM radio is losing its audience is fascinating. It is the type of thing that textbooks discuss, but students rarely find in the real world. But while statisticians marvel at the predictability of the numbers, AM radio is getting killed in the marketplace.

And speaking of the marketplace, when is it going to make up its mind about a transmission standard for stereo? It is true that a significant number of AM radio stations are broadcasting in stereo, and that the ranks of the converted include some big-market heavy-hitters. But, when the entire AM industry is considered, the penetration of AM stereo represents little more than a modest beginning, something like 10%.

Before you write to us and report that many AM stations are doing quite well, thank you, we must point out that many more are not. The big AM stations with deep pockets cannot exist on their own. The AM radio band is an *entity*, a group that must stick together in order for the whole to survive. If you will permit an analogy, AM radio is like an airplane. It can stand losing a few parts—rivets, let's say—and still function. But, remove enough parts, and the plane will crash.

AM radio is in danger of crashing. Stereo may not be the miracle cure for all of AM's problems, but it's a good starting point. AM stereo must get off the ground in a big way, and soon. Otherwise, the receiver manufacturers that have gone out on a limb and produced high-quality AM radios will conclude that AM isn't worth the trouble. Then, instead of seeing better receivers, we'll return to the simple, cheap, crummy radios that have helped put AM in the mess that it's in. Remember, consumer electronics manufacturers have no interest in products that sell hundreds or thousands of units. They're looking for sales in the *hundreds of thousands*.

There are ways out of the current mess that AM radio now faces. The first step is to resolve, once and for all, any questions about type acceptance of the various AM stereo excitors on the market. Charges have been flying lately about excessive spectrum occupancy and the FCC must conduct thorough lab tests to determine whether any type acceptance problems exist. The tests must be complete and open, and settle this question with measurements that are repeatable and technically justifiable.

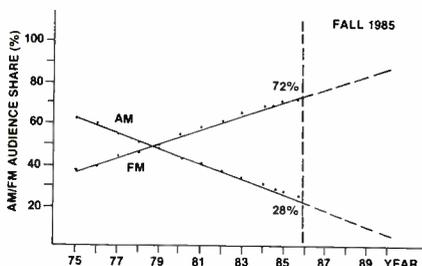
Second, each station must clean up its own act. Examine your studio and transmission facilities to see what needs to be done. No station in a state of disrepair can compete effectively. Spend the money now so you can once again transmit a quality signal to your audience.

Third, actively participate in the work of the NAB's AM Improvement Committee. This group has made a concerted effort to target areas of critical need for AM broadcasters. Get on their mailing list. Provide them with input on what works and what doesn't work in the battle to regain lost market share.

Fourth, convert your station to AM stereo. Don't wait for a clear winner in the Hundred Years' War of the marketplace. Study the literature from each manufacturer, talk with the system proponents, question other stations that have converted to stereo operation and make your *own* decision. Do it now before your market share drops even more. The conversion process is expensive, but not nearly as expensive as a vanishing audience.

All of the ingredients for a rebirth of AM radio are present today. Systems are available to transmit stereo. Quality receivers are available from a number of manufacturers. Help is available from the NAB. Don't let this opportunity slip by. It may be the last one AM will get.

AM radio, the grandfather of broadcasting, deserves more than just the *same song, umpteenth verse*.



The growth of FM audience vs. AM audience, showing the dramatic shift in listener preference over the last 10 years. The dotted line projects what the future may hold.

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# ADD NEW DIMENSION TO YOUR BOTTOM LINE



## Filing fees are due shortly

By Harry C. Martin

The FCC reports that filing fees for broadcast applications will go into effect within one year. President Reagan recently signed legislation, directing the commission to collect fees, that will be instituted this summer.

Fees affecting radio and TV stations are shown in Table 1.

### FM upgrades made easier

The commission has amended its rules allowing FM stations to upgrade their facilities on their existing or adjacent channels without opening the upgraded facilities to competing applications.

Under the previous rule, a station could not upgrade unless there was at least one additional equivalent class of channel available to accommodate other interested parties. If an equivalent channel was not available, a station seeking to upgrade could withdraw its request for the higher class or face a comparative hearing for the proposed upgrade.

In changing its rules, the commission said that because an effort to upgrade an allotment on an existing channel (or an adjacent channel) can be initiated only by a broadcaster who occupies an existing lower class channel, upgraded allotments should not be made available for applications by others. The new rule should expedite improvements in FM service.

### FM allocation rules under study

The commission proposed that any class of FM station be permitted to operate on any commercial FM channel. This would allow stations operating on the 20 channels reserved for Class A operation to upgrade their facilities. Of course, existing mileage separations to co- and adjacent-channel stations would have to be observed.

A proposal also has been made to replace the current method of defining FM station classes (in terms of minimum and maximum power and antenna heights) with a classification scheme based on a formula reflecting the maximum permitted distance to the expected mV/m service contour of each class. This change would clarify station classification requirements and provide a continuous range of technical facilities for all classes of stations.

The commission plans to delete a rule

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



that states a station's class is determined by the location of its transmitter site rather than its city of license. Under current rules, a Class B FM station is eligible for Class C facilities if it can locate a suitable transmitter site within a Class C zone area. Under the proposal, the station would be ineligible for such facilities if its community of license is located within a Class B zone.

translators operating in the non-commercial portion of the FM band. Such translators would be permitted to rebroadcast distant non-commercial FM stations only. No liberalization on the ban on local originations by FM translators is planned.

The commission's initiative resulted from a petition by the Moody Bible Institute of Chicago, which is seeking to establish a nationwide satellite-fed network of FM translators to rebroadcast one or more of its existing full-power non-commercial FM stations.

Entities wishing to file FM translator applications in anticipation of the adoption of the new rules should take into ac-

|    |  |         |
|----|--|---------|
| 1. | <b>Commercial TV stations</b>  |         |
|    | a. New and major change construction permit application fees                           | \$2,250 |
|    | b. Minor changes application fee   | \$500   |
|    | c. Hearing charge  | \$6,000 |
|    | d. License fee   | \$150   |
| 2. | <b>Commercial radio stations</b>   |         |
|    | a. New and major change construction permits   |         |
|    | (1) Application fee, AM station  | \$2,000 |
|    | (2) Application fee, FM station  | \$1,800 |
|    | b. Minor changes application fee, AM & FM  | \$500   |
|    | c. Hearing charge  | \$6,000 |
|    | d. License fee   |         |
|    | (1) AM   | \$325   |
|    | (2) FM   | \$100   |
|    | e. Directional antenna license fee (AM only)   | \$375   |
| 3. | <b>FM/TV translators and LPTV stations (new and major change construction permits)</b> |         |
|    | a. Application fee   | \$375   |
|    | b. License fee   | \$75    |
| 4. | <b>Station assignment and transfer fees</b>  |         |
|    | a. AM, FM and TV commercial stations   |         |
|    | (1) Application fee (forms 314/315)  | \$500   |
|    | (2) Application fee (form 316)   | \$70    |
|    | b. FM/TV transistors & LPTV stations   | \$75    |
| 5. | <b>Auxiliary services major actions</b>  |         |
|    | Application fee  | \$75    |
| 6. | <b>Renewals</b>  |         |
|    | All services   | \$30    |

Table 1. A summary of the filing fees soon to be imposed by the FCC.

### Limited LPMF proposed

The commission is proposing to permit satellite and microwave feeds to FM

count the strict TV channel 6 interference standards adopted last year.

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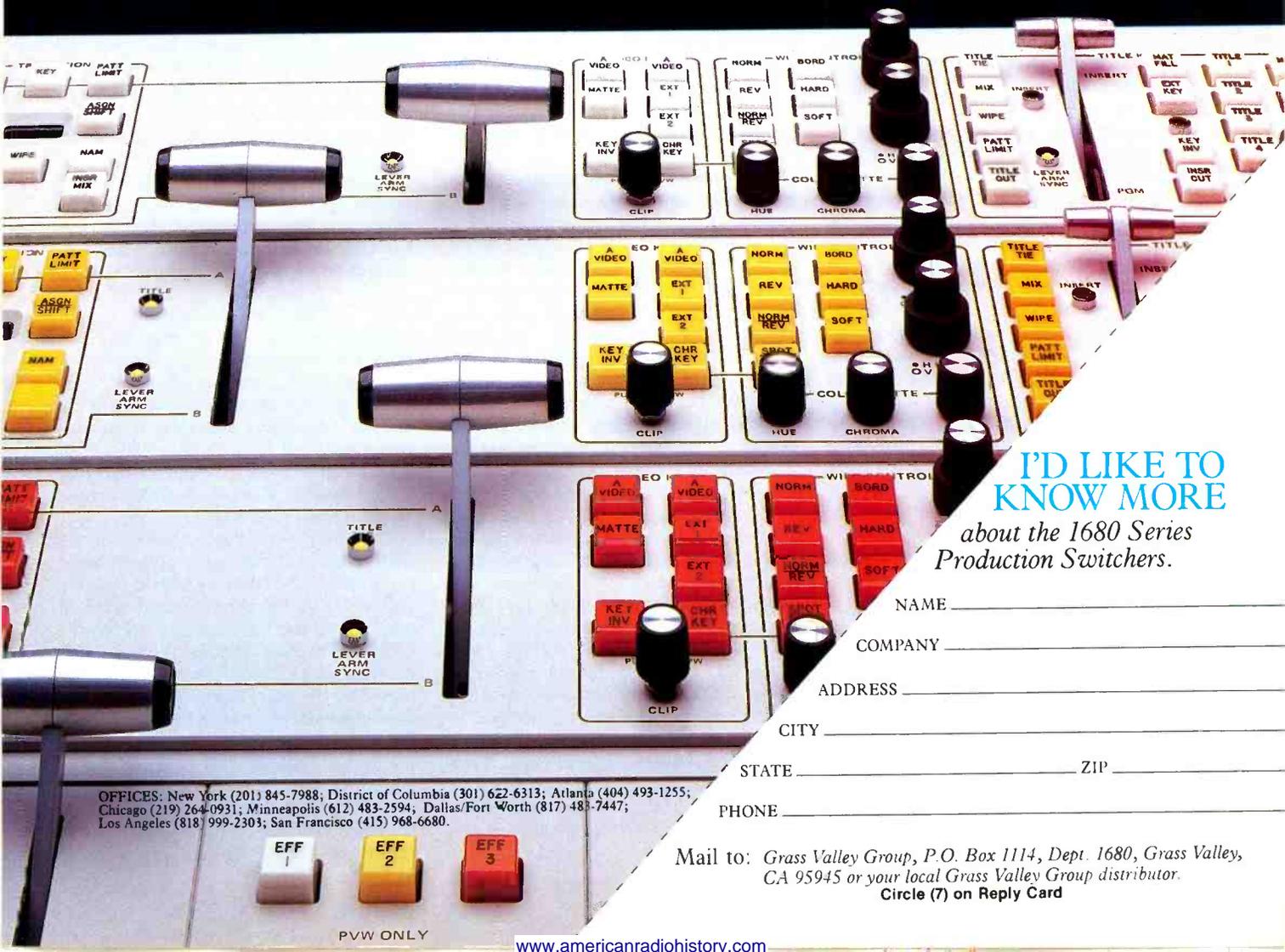
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CA 95945 or your local Grass Valley Group distributor.  
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## By the book

By Carl Bentz, TV technical editor

**B**roadcast regulations are in a constant state of change and many of them do not appear in the technical rules of Part 73. Operator licenses are a prime example.

### Valid licenses

Several years ago, the engineering side of broadcasting was deregulated when the first class radio-telephone operator license was dropped in favor of the general radio-telephone operator license (GROL). Soon after, a notice from the FCC announced the availability of the lifetime permit for broadcast engineers. Effective Jan. 1, 1986, another change occurred in section 13.77(b).

If you did not take advantage of the lifetime permit, you will be unable to do so now. When your current first class or GROL expires, its renewal will not be endorsed for broadcast. A restricted permit must be obtained for use in the broadcast station. All GROLs issued after Dec. 31, 1985, however, will not carry any broadcast authority.

### Technical concerns

Regulations on TV broadcasting contained in sections 681 to 699 have also experienced changes. In 1984, multiple-channel sound or BTSC (681) was introduced to the vocabulary. Appropriate technical requirements of the aural signal are noted in section 73.682(c). The changes deal with the use of subcarriers of the aural carrier for the use of stereo, second audio program (SAP) and a professional (pro) channel. Careful study of this section is suggested.

As broadcast operations become more digitally oriented, however, more than just audio signals may modulate the aural subcarriers. Careful control of parameters must be maintained to avoid interaction between aural carrier entities. Deviation of each entity and the overall deviation of the sum has the greatest effect on BTSC operation.

A further restriction on aural carrier modulation surrounds the pilot subcarrier frequency of  $15,734\text{Hz} \pm 2\text{Hz}$ . Protected by the commission's rules for BTSC use, the pilot signal controls multichannel decoding in receivers.

Additional methods of achieving multiple-channel sound may be used, but energy in the  $15,734\text{Hz} \pm 20\text{Hz}$  must be controlled to produce less than  $\pm 0.125\text{kHz}$  aural carrier deviation.



### Video variation

Section 73.682(a) deals with visual transmission standards. In conjunction with the engineering charts of 73.699, this section defines NTSC. Adherence to the frequency, level and timing values defined in the section will produce the best possible results in properly operating home TV receivers.

Deregulation and new uses for parts of the video signal also have brought change to this section. A few years ago, VITS and VIRS became a requirement for remote-controlled stations, using lines 17, 18 and 19. Line 21, immediately before the start of active video, provides program-related data and is used extensively for captioning.

Other uses may be made of lines 17 to 20 of the vertical interval. Experiments and applications of teletext, remote-production cue, control and source identification generally use this area. It should be noted that any additional information added to the video signal increases the bandwidth requirements of the system.

Digital signals, the most efficient method of using these  $63.5\mu\text{s}$  segments of time, allow low-level datastream voltages to be effectively recovered. Digital datastreams, however, require more bandwidth, because of the fast rise and fall times of the pulses.

Although few actual restrictions are placed on material inserted in vertical blanking lines 17 through 20, one major requirement is that the presence of these VBI signals must not significantly degrade program transmissions. A second restriction is that VBI signals must not produce transmitted emissions outside of the 6MHz band allotted for the TV channel. Line 19 may be used only for the VIRS reference signal. VITS may now consist of a stream of switched signals, all using one line. The composition of the VITS signal is variable.

Blanking has been an area of contention over the years. In some cases, it was found that many program suppliers were not adhering strictly to the timing rules. As a result, excessive horizontal and vertical blanking periods resulted, caused in

part by incorrect timing during post-production editing and signal processing. The excessive blanking was sufficient to result in black encroaching into the edges of the picture.

At first the commission required that some method be employed to fill the excess blanking. Repetition of the area along picture edges provided one often-used correction, although the result was not always aesthetically desirable. A rule was considered to require correct blanking, but through industry policing, the regulation was not made mandatory.

### Competitive spirit reigns

Without viewers, there is little point in transmitting a signal. Beyond the program schedule planned, signal quality has a decisive effect on viewer count.

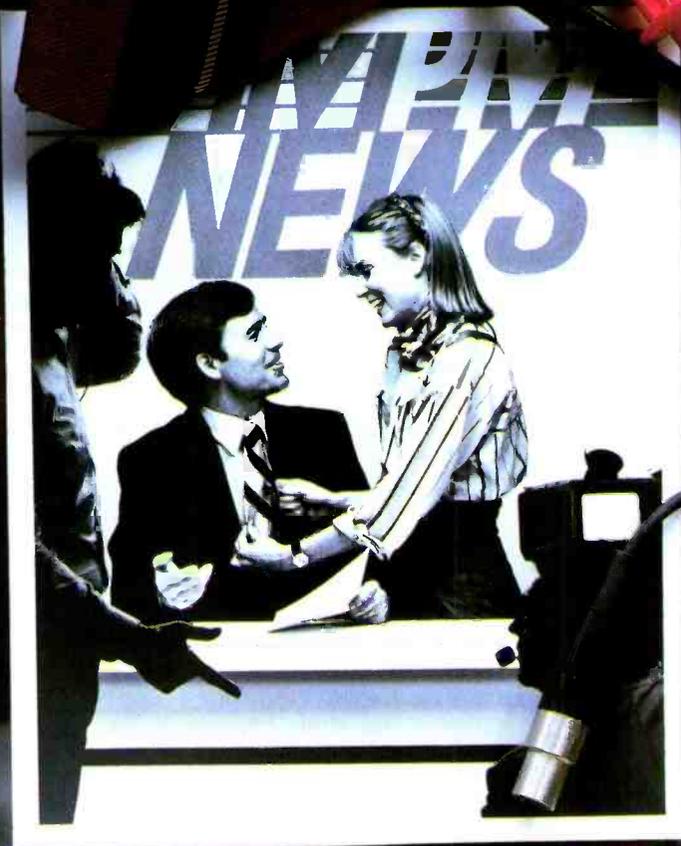
Many of the commission's reregulatory changes have been toward making the industry regulate itself. The spirit of intra-industry policing supposes that any station that consistently fails to adhere to technical standards for TV broadcasting will not maintain its competitive edge in its market. This is not to say that the commission will not continue to monitor station operation and issue citations as necessary. The commission does expect each station to take a greater interest in the quality of its transmitted signal.

### Your responsibility

During the past six months, this column has focused on several areas of the FCC rules that apply to television. Particular points were selected from the *TV Station Checklist*, available from the commission. If your station does not have a copy, contact the nearest field office or the FCC, Field Operations Bureau, Washington, DC 20554.

Make sure your station has an up-to-date copy of the rules. Your legal representatives should be able to provide you with a source for rules publication. If not, contact the Rules Service Company, 7658 Standish Place, Suite 106, Rockville, MD 20855. The cost is determined by the parts that you request. For price information, contact the service at 301-424-9402.

It is your responsibility to know and to adhere to the regulations that apply to your broadcast facility. If an FCC citation is issued to your station, you cannot claim ignorance of the law. [:-?-)]]



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## The FMX system

By Emil Torick

During the last two months, we have looked at the theory behind FMX. We found that FMX appears to resolve the problem of reduced signal-to-noise ratio encountered by stations broadcasting in stereo through the addition of a second subchannel ( $S'$ ). This signal is transmitted in quadrature with the standard stereo subchannel ( $S$ ). Let's look more closely at how the companded  $S'$  channel is generated.

### Comanding

A unique companding system is employed in the FMX generator. It is designed to minimize normal tracking error and avoids a potential modulation penalty due to the added  $S'$  signal. Figure 1 illustrates the compression slope of the compander.

At low-input signal levels, the response of the compressor is linear but 20dB higher in gain than the uncompressed L-R channel. At mid-level inputs, the compression characteristic exhibits a slightly negative slope. At high-input levels, the compression changes to a rapidly falling slope.

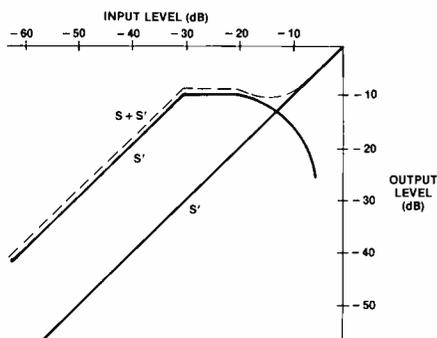


Figure 1. One key to the effectiveness of the FMX system lies in a unique compression characteristic, shown above.

The broken line of Figure 1 illustrates the effects of combining the compressed and uncompressed signals. If, instead of reducing the  $S'$  signal as it approaches 100% modulation, the  $S'$  signal was allowed to approach the same level as that of the  $S$  signal, a penalty of overall modulation to the existing service would be incurred. For left (or right) signals only, this penalty would be approximately



1.6dB. For more complex signals, the penalty could be significantly greater.

The compression characteristic shown in Figure 1 results in a negligible penalty because, for the most part, the levels of the original  $M$  and  $S$  channels establish modulation constraints.

### Decoding

Accurate decoding of the audio signals compressed according to the FMX re-entrant characteristic requires the implementation of new expansion principles. To contend with the signal-level ambiguities present in the compressed signal, the expander needs a tracking-reference signal.

Fortunately, such a signal is already present in the form of the uncompressed  $S$  signal. Figure 2 shows how this is implemented. The audio signal to be expanded is made up of the sum of the compressed and uncompressed L-R signals. The control signal for the voltage-controlled amplifier (VCA) is derived from the level difference between the expanded difference signal and the original (reference) difference signal.

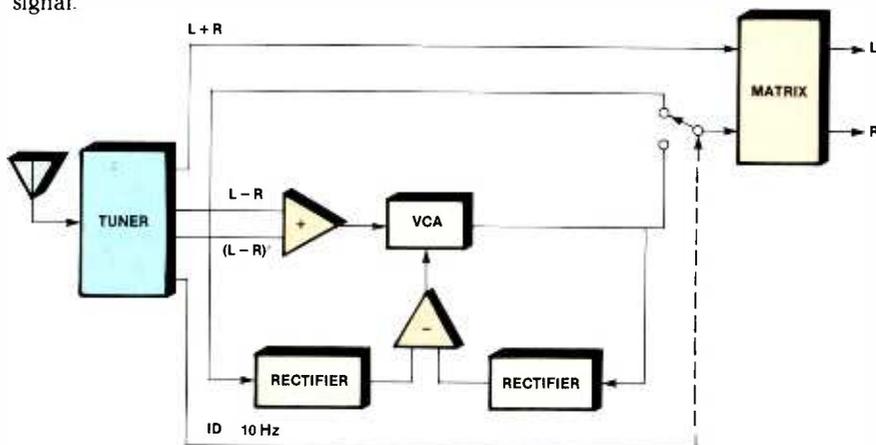


Figure 2. Block diagram of the FMX receiver decoder.

The circuit functions as a servo amplifier, restoring the compressed signal to the equivalent of the original. For signals below the threshold of compression, the expander reverts to linear

operation, thus avoiding decoding errors in the region where the reference signal may be noisy. Detection of the identification signal provides automatic switching to the new noise-free difference signal for FMX broadcasts.

### Compatibility

Compatibility considerations center on two areas: broadcast and reception. As previously shown, the re-entrant compression characteristic avoids the problems of modulation levels for conventional transmission. Because the new quadrature channel falls within the same 53kHz bandwidth as existing transmissions, no transmitter modifications are required. The broadcaster can simply replace a conventional stereo generator with a new one that provides the compressed-quadrature signal. For those stations using exciters with plug-in circuit cards, a simple card replacement may be all that is necessary.

For reception, crosstalk is the major consideration. Because any potential crosstalk will be program-related, it may add to or subtract from the conventional signal components. Crosstalk is both a function of the amount of compression (gain) of the  $S'$  channel and the misalignment of the receiver with respect to proper 38kHz phase.

If the phase error is negative, the crosstalk will be in phase and contribute to a potential narrowing of the apparent stage width. More on the compatibility question next month. [:-?=-)]]

Torick is vice president, audio technology, for CBS, Stamford, CT.



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## How to cure TI

By Elmer Smalling III

Last month we discussed the types of terrestrial interference that may affect the operation of an earth station. This month, we'll consider the cures for most levels and types of C-band TI. Ku-band is virtually TI-free.

### Notch filters

The simplest and most generally applied cure for terrestrial earth-station interference is the use of notch filters, which block or notch out the TI signals, while passing the desired signals. These filters work best when applied at the base frequency of the interference (3.7GHz to 4.2GHz), rather than at second conversion or IF frequencies. The filters must be sharp enough to eliminate the offending signal and not disturb adjacent, desired frequencies.

Variable-frequency sharp-notch filters are usually constructed of high Q waveguide sections and may be tuned over the TVRO band to precise frequencies. The notch filter is inserted in the microwave feed between the LNA and downconverter and is tuned to the frequency of the offending TI signal. If there is more than one interfering signal, multiple filters must be used.

Filter tuning is done while monitoring a spectrum analyzer and adjusting for minimum interference to the desired signal. Because most broadcasters use only one transponder on a particular satellite, rather than many (as do SMATV systems), tuning out interference can be done in large segments of spectrum that might affect more than one satellite channel. Attenuating spectrum segments can be accomplished with high-pass or low-pass filters set just above or below the frequency of the desired signal.

Bandpass notch filters can be used to protect either side of a desired signal from close-in interference. These may be applied to pass the desired signal and sharply attenuate any TI, which may be as close as 10MHz at each side.

A TV monitor should be used along with the spectrum analyzer in tuning any of these filters. In urban areas, there will be many confusing points across the spectrum, making it difficult to assess the degree of interference caused by potential TI source without confirmation on a video monitor.

### Out-of-band TI

Two common ways to cure out-of-band

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

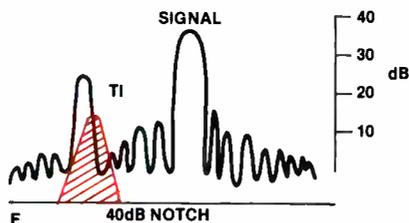


Figure 1. A 40dB notch filter removes unwanted signals in the notch bandwidth.

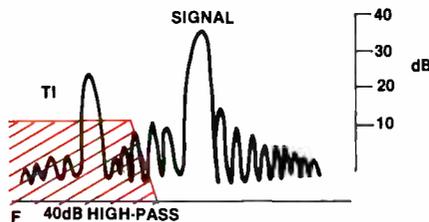


Figure 2. A high-pass filter removes unwanted signals below its cut-off frequency.

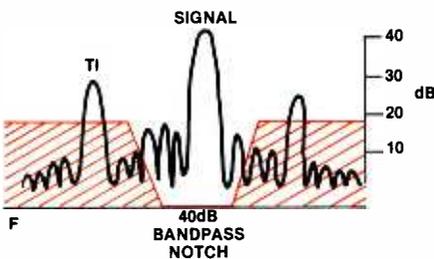


Figure 3. A bandpass filter removes unwanted signals at frequencies less than the low cut-off and greater than the high cut-off frequency.

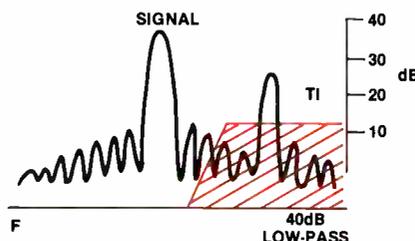


Figure 4. A low-pass filter removes unwanted signals at frequencies higher than the cut-off frequency.

TI involve the use of filters. High-level out-of-band interference, although not in the TVRO band, may be great enough to capture AGC or AFC circuits, rendering a receiver useless for in-band signals. The first remedy consists of locating the offending interfering signal on a spectrum analyzer below or above the TVRO band and tuning a notch filter to eliminate this signal (or to reduce its level to at least 3dB below that of the desired in-band signal). This filtering is done at microwave frequencies and the filter is connected between the LNA and downconverter (as is the in-band notch). Microwave filters may be ordered with varying notch depths (10dB to 45dB) and in a dc-passing configuration, when the LNA is powered through the coax cable from the downconverter.

The second remedy is less effective against large level signals. It consists of inserting a filter on the 70MHz IF output of the downconverter. This filter is usually a notch type with a center frequency at either 60MHz or 80MHz, depending on which end of the TVRO band your interference is located. These filters have a half-power bandwidth of 3MHz to 4MHz, which means that they are rather broad, making close-in TI sources difficult to eliminate without affecting the active TVRO band. Many IF filters are available as tunable units.

### Screening

When filters have little or no effect, or when filter costs become prohibitive, the alternative means of TI reduction involves physically screening out the interference. Because microwaves travel in a straight line similar to light, they can be reflected or stopped by a metallic surface, such as a screen, building, metal fence or earth berm. Placing a microwave shield in the path of interference, yet not in the path of the signal from the satellite, will usually cure the TI problem.

A fence of metallic screen may be built around the dish to prevent infringing interference. The top edge of this screen should be higher than the uppermost exposure of the dish at all angles of elevation or azimuth. Sufficient screening is sometimes accomplished by placing the dish next to the building, which is located between the dish and the interference, or in some cases, the dish is set at the bottom of a pit with a mound of earth on the interference side.

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## Power amplifier neutralization

By Jerry Whitaker, editor

Proper neutralization of a power amplifier stage involves more than casual attention to the transmitter instruction manual procedures. It requires an understanding of the basic principles of vacuum tube neutralization. Each circuit design has its own peculiarities and each must be neutralized using different techniques. Mathematical analysis of an equivalent PA circuit will make the general process easier to understand.

### Basic principles

The elements that come into play during neutralization of a vacuum tube RF amplifier are illustrated in Figure 1. The elements shown apply to operation in the VHF region. The feedback elements include the residual grid-to-plate capacitance ( $C_{gp}$ ), plate-to-screen capacitance ( $C_{ps}$ ), screen-to-grid capacitance ( $C_{sg}$ ), and screen grid lead inductance ( $L_s$ ). As discussed in previous "Circuits" columns, the RF energy developed in the plate circuit ( $E_p$ ) causes a current ( $I$ ) to flow through the plate-to-screen capacitance and the screen lead inductance. The current through the screen inductance develops a voltage ( $-E$ ) with a polarity opposite that of the plate voltage,  $E_p$ . It is  $-E$  that is often used as a method of neutralizing tetrode and pentode tubes operating in the VHF band.

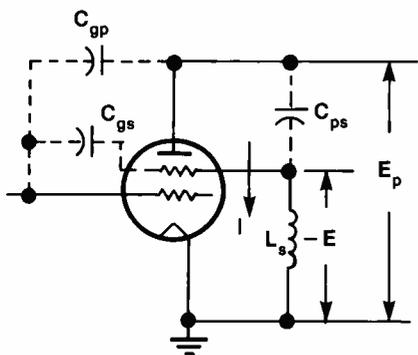
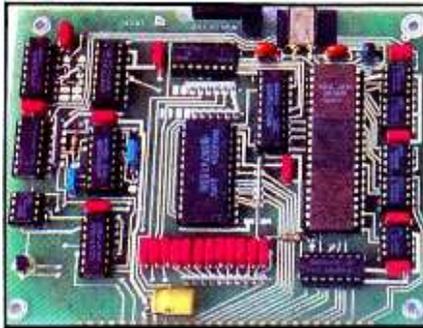


Figure 1. The elements involved in the neutralization of a tetrode PA stage.

Figure 2 graphically illustrates the electrical properties at work. The circuit elements of Figure 1 have been arranged so that the height above or below the zero potential line represents magnitude and polarity of the RF voltage for each part of the circuit with respect to ground (zero). For Figure 2, assume that all of



the circuit elements involved are pure reactances. The voltages represented by each, therefore, are either in phase or out of phase and can be represented as positive or negative with respect to each other.

The voltages plotted in Figure 2 represent those generated as a result of the RF output circuit voltage,  $E_p$ . No attempt is made to illustrate the typical driving current on the grid of the tube. The plate (P) has a high positive potential above the zero line, established at the ground point. Keep in mind that the distance above the baseline represents increasing positive potential. The effect of the out-of-phase screen potential developed as a result of inductance  $L_s$  is shown, resulting in the generation of  $-E$ .

As depicted, Figure 2 constitutes a perfectly neutralized circuit. The grid potential rests at the zero baseline. The grid operates at filament potential insofar as any action of the output circuit on the input circuit is concerned. The stage is said to be neutralized when output voltage  $E_p$  is prevented—through

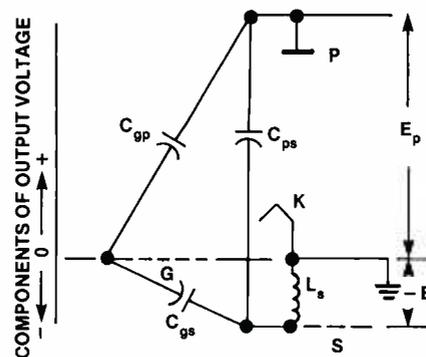


Figure 2. A graphic representation of the elements involved in the neutralization of a tetrode RF stage when neutralized through the use of incidental screen lead inductance.

techniques previously discussed—from developing a component voltage between the grid and filament.

The total RF voltage between plate and screen is made up of the plate potential and screen lead inductance voltage,

$-E$ . This total voltage is applied across a divider circuit that is made up of the grid-to-plate capacitance and grid-to-screen capacitance ( $C_{gp}$  and  $C_{gs}$ ). When this potential divider is properly matched for the values of plate RF voltage ( $E_p$ ) and screen lead inductance voltage ( $-E$ ), the control grid will exhibit zero voltage difference with respect to the filament as a result of  $E_p$ . The stage will then be neutralized.

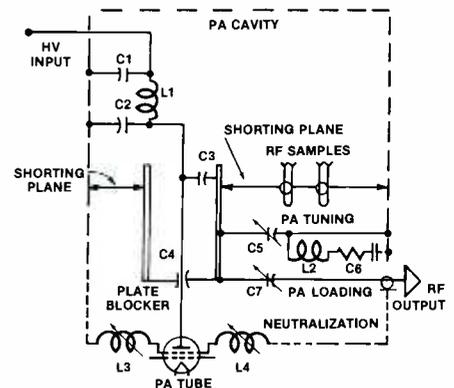
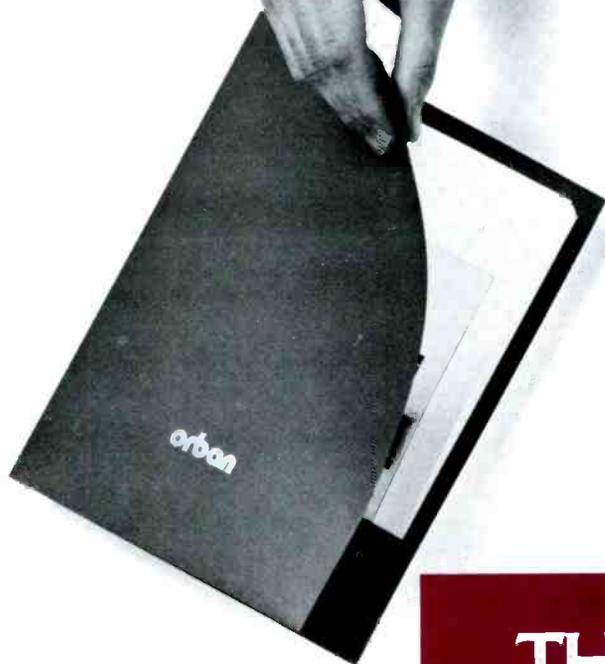


Figure 3. The output circuit of a VHF RF amplifier using incidental screen lead inductance to achieve neutralization.

Figure 3 shows the output circuit of a grounded-screen power amplifier neutralized through the use of incidental inductance of the screen assembly. The inductance, illustrated by  $L_3$  and  $L_4$ , is made adjustable through the positioning of two metal contact straps. This particular configuration does not permit neutralization adjustment while the transmitter is operating. Other arrangements, designed to accomplish the same task, may permit continuously variable neutralization adjustment.

Proper neutralization is vital to stable operation of any transmitter. Improper adjustment of neutralization controls may result in degraded performance of the system or the radiation of spurious signals. Follow the recommendations of the transmitter manufacturer regarding neutralization adjustments for your particular type of unit. Check neutralization each time you change a PA tube or after changing a component in the input or output circuit of the PA stage.

**Acknowledgment:** This column is based on information contained in the publication, "The Care and Feeding of Power Grid Tubes," prepared by the laboratory staff of Varian EIMAC. [:-:~)]]



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## Using power tubes

By Jerry Whitaker, editor

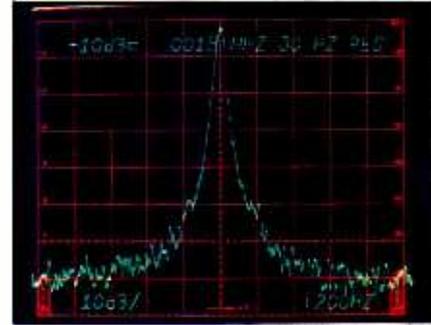
Power tube manufacturers estimate that the greatest single cause of catastrophic failure of a PA tube is excessive dissipation. This significant parameter is, more or less, under direct control of the broadcast engineer. Overdissipation can be caused by any one of the following (or combinations thereof):

- improper plate tuning or loading;
- poor cooling-system design or maintenance; and
- excessive ambient temperature.

The easiest way to detect overdissipation of a PA tube is through accurate observation and charting of exhaust stack temperature rise over ambient. Even a 5% increase in dissipation can raise temperatures as much as 10°C on the tube. For a 4CX20,000 device, a 5% increase in dissipation will cause an additional 1kW of heat to be generated.

### The air-handling system

All modern PA tubes use an air-system socket and matching chimney for cooling. Never operate a PA stage unless the air-handling system provided by the transmitter manufacturer is complete and in place. For example, the chimney for a PA tube in AM applications often can be removed for inspection of other components in the circuit. Operation without the chimney, however, may sig-



nificantly reduce airflow through the tube and result in overdissipation of the device. It also is possible that operation without the proper chimney can result in damage to other components in the circuit because of excessive radiated heat.

Normally the tube socket is mounted in a pressurized compartment so that cooling air passes through the socket and then is guided to the anode cooling fins. Do not defeat any portion of the air-handling system provided by the transmitter manufacturer.

Cooling of the socket assembly is important for proper cooling of the tube base and for cooling of the contact rings of the tube itself. The contact fingers used in the collet assembly of a socket are typically made of beryllium copper. If subjected to temperatures above 150°C for an extended length of time, the beryllium copper will lose its temper (or springy characteristic) and will no longer make good contact with the base rings of the tube. In extreme cases, this socket problem can lead to arcing, which can burn through the metal portion of the tube base ring. Such an occurrence can ultimately lead to catastrophic failure of the device because of a loss of the vacuum envelope.

Other failure modes for tube sockets include arcing between the collet and tube ring that can actually weld a part of the socket and tube together. The end result is failure of both the tube and the socket.

### Ambient temperature

A parameter that is directly under the control of the broadcast engineer is the supply air temperature. The preferred cooling air temperature is no hotter than 75°F and no cooler than the room dew point. The air temperature should not be modulated by oversized air-conditioning systems nor by the operation of other pieces of equipment at the transmission facility.

The dust and dirt content of the supply air can affect the cleanliness of the heat-conductive surfaces in the transmitter and reduce the heat transfer constant of those surfaces. Good engineering practice dictates the installation of effective air-filtering assemblies. Sophisticated air filters are available from many computer industry suppliers and should be considered for any installation where dirt is a problem.

### Maintenance

Maintenance of the air-handling system within the transmitter is a relatively simple, but extremely important, part of routine plant maintenance. Determine the suggested maintenance periods for blowers and motors from the transmitter instruction manual or by contacting the manufacturer.

Typically, blower motors should be oiled with a specific lubricant every six to 12 months. Because the maintenance period is infrequent, it is easy to forget to lubricate the motor. Therefore, document the lubrication requirements of all portions of the air-handling system and place the chart in a prominent location.

Although routine cleaning or replacement of air filters may seem too obvious to mention, it is amazing how many stations fail to service air filters when needed. Keep a supply of spare filters of the proper type and dimensions on hand.

On a regular basis check the condition of all ducts, boots and blower cages inside the transmitter. A unit that has been in operation for a number of years can suffer from reduced air-system efficiency because of the collection of microdust on the blades and cage of a blower or along the sides of a discharge duct or boot. A convenient method for checking the efficiency of a transmitter cooling system over a period of time involves documenting the back pressure that exists within the PA cavity. This measurement should be made with a manometer, a simple device that is available from most HVAC suppliers. (See Figure 1.)

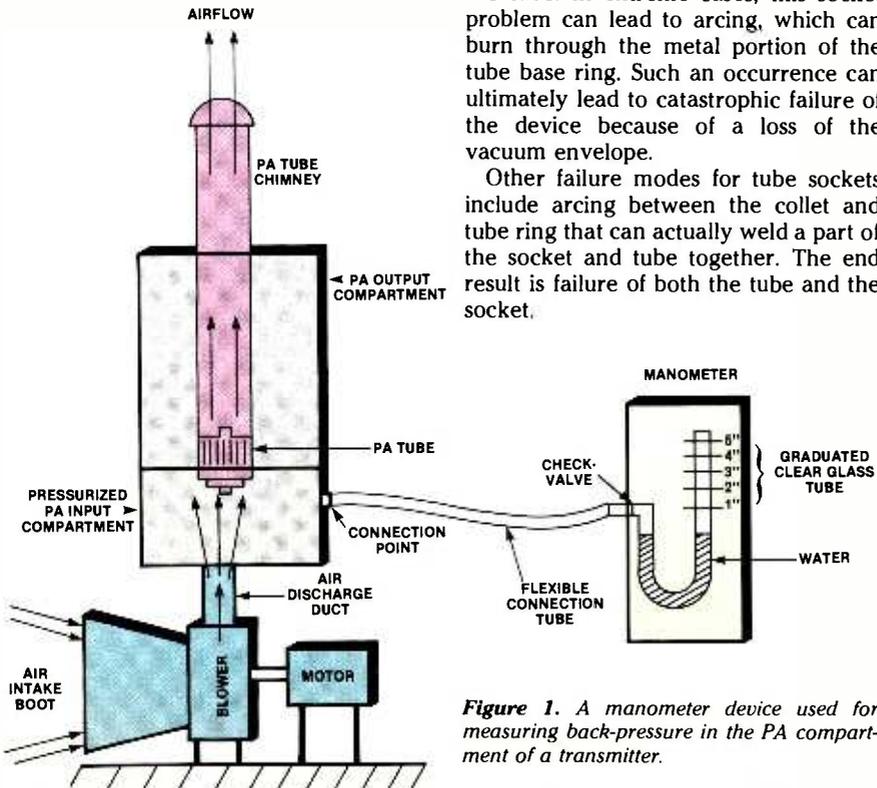


Figure 1. A manometer device used for measuring back-pressure in the PA compartment of a transmitter.

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# Management for engineers

## Three deadly mistakes plus one

By Richard D. Cupka

If you study the trends in turnover and dropout rates for broadcast engineering supervisors and managers over recent years, an interesting fact emerges. You will find that most of those engineering supervisors and managers who either leave the business or move back into technical areas are *victims* of the system.

In many cases, these engineers are innocently led down a primrose path by bosses who unknowingly commit deadly mistakes in judgment. Often, the most technically oriented supervisors and managers find themselves frustrated and discouraged after being rewarded by a promotion into a leadership position.

Basically, the frustration is the product of three innocent but serious mistakes in judgment. They are usually made during the process of promoting a highly qualified technical person into the function of management, with all of its vagueness.

### Mistake No. 1

•Assumption: Technical ability assures success as a leader.

Technicians and engineers who are knowledgeable and effective prove only that they can perform well technically. There is no assurance that competent engineers will do well as people-leaders, or be able to function at minimally acceptable leadership levels.

However, many engineering executives and/or general managers who should know better will continue making this assumption. The result often means the eventual loss of good technicians and leadership people. As the problems of managing and the frustrations of leadership pile up, they often cause the new leaders to ultimately give up or to seek other work elsewhere. If people reach this stage, they only want to get the heck out of management. That's tragic, as well as unnecessary.

### Mistake No. 2

•Assumption: Technically competent people need no training in leadership skills.

Review the history of highly competent broadcast engineers or technicians, and you will find conclusive evidence that their professional growth over the years was founded on a significant amount of training and education. You will find that the root of their com-



petence generally grew from formal education, technical training seminars, involvement in professional and technical societies, and experiences gained from conferences, conventions and trade shows. All of these elements are part of technicians' learning process and career growth. Combined, they help form the *technical professionals* that are so important to the broadcast industry.

Yet, too often, technicians with a background of technical training are expected to be overnight successes and managerial whizzes when assuming leadership positions. They are expected to deal effectively with the sciences of human relationships. Unfortunately, few technicians are equipped to achieve superstar status overnight, and many fail all too early in their leadership careers.

Just as there is no such thing as a *born engineer*, there are no *born leaders*. There are only good, conscientious, hard-working people who learn how to lead and then diligently apply and practice these principles until they become automatic and second nature to them.

### Mistake No. 3

•Assumption: Technically competent people know what is expected of them in a leadership role.

Wrong. The majority of broadcast engineering supervisors and managers who have participated in the NAB management seminars did not know what was expected of them as leaders. However, almost without exception, they always carried their *tweakers* with them. It's symbolic of their trade and of their work. Unfortunately, they seldom brought with them an awareness of leadership science, which was the tool they were being paid to use.

If you ask them what is expected of them, they quickly respond with something about providing technical savvy, knowledge and competence. If you ask them, as broadcast engineering supervisors and managers, what is expected of them, they pause and then respond with the same answer. People taught to think as engineers will continue to think as engineers even if they must

now perform in a different role. To change this thinking requires additional training.

When placed in leadership roles, many of these technically oriented individuals continue to carry the technical tools and do the work rather than delegate it. They continue to do rather than motivate, stimulate and influence others to do for them. They continue to do what they do so well because they're comfortable with it. And, they simply fail to lead, never knowing exactly what is expected of them as a leader of people.

### Mistake No. 4

•Assumption: Mistakes No. 1, No. 2 and No. 3 are not really important.

Some readers of this article just made that mistake. Now, having already forgotten the message, they will comfortably reach for their tweakers and go about the task of doing things as they have always done. Meanwhile, their silent team stands idly by waiting for leadership, which in all likelihood, will never come.

Time, effort, money and opportunity must be made available for the career development of those technicians and engineers tagged for eventual rise into the leadership ranks. The same kind of effort that went into making them good technicians must now be applied to making them good managers and leaders.

Competent and caring technicians pride themselves on their abilities to troubleshoot equipment problems and fine-tune their station's equipment. Now, these same talented individuals must work equally hard at honing their people skills in order to minimize or prevent human trouble, problems and mistakes.

Whether we admit it or not, human relationships are, after all, the root of success or failure in any organization. Leadership is the key. It is the new ball park for used-to-be technicians. Human skills are now the tools of the trade and new career. How new managers/leaders play the game affects the way others view them and their future. Unfortunately, for too many of those promoted into leadership, the game may consist of only three mistakes—and you're out.

**Editor's note:** Many of our readers will recognize the author of this month's column. Richard D. Cupka has probably taught management skills to more broadcast engineers than anyone else. His leadership in the NAB's engineering management seminars is familiar to many engineers. Cupka, along with Tex Landrum and Randy Wagner, will regularly write BE's "Management for Engineers" column. [:-:~)]

Cupka is president of the Center for Management Institutes, Lafayette, IN.

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Everybody's talking about CD's and digital. It's as if all analog tape technology and the cart machine were obsolete. Although CD's are a terrific new program source, it should come as no surprise that carts are still the best way to handle the huge quantity of individual program elements that comprise a typical day in radio broadcasting.

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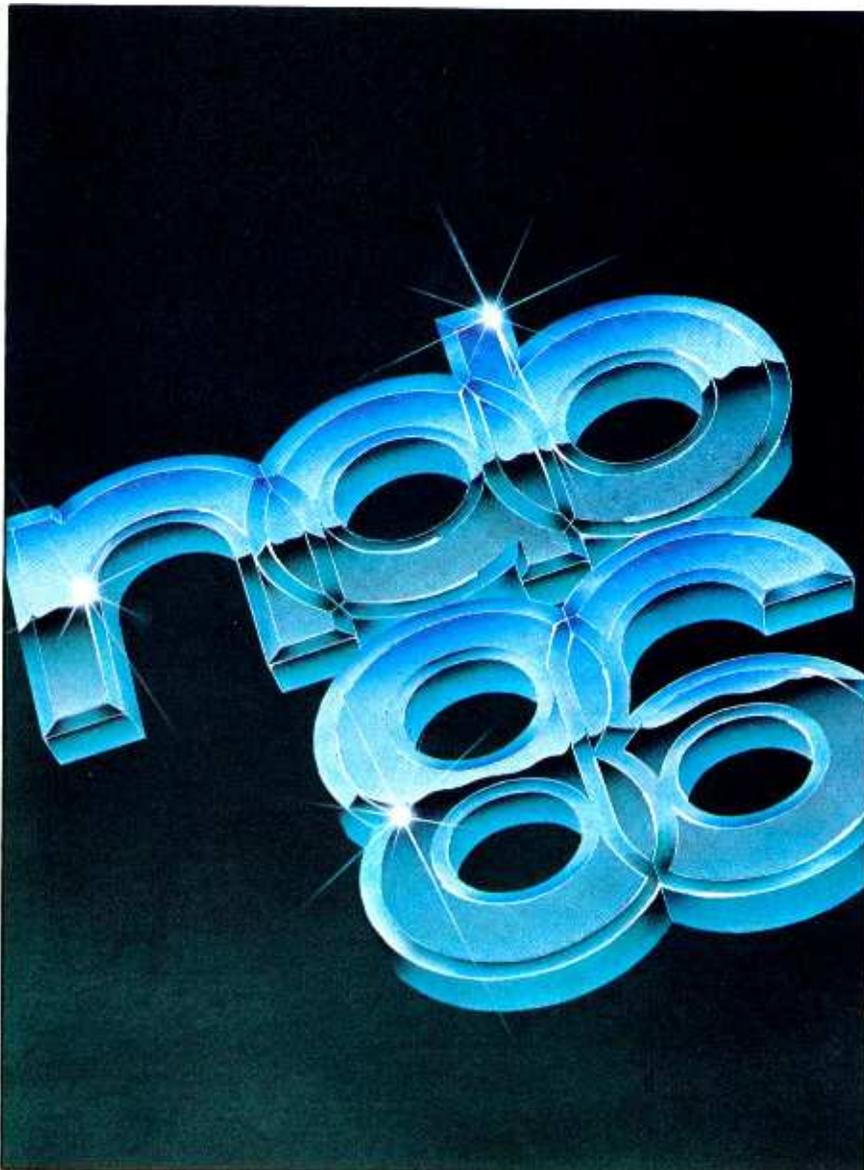
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# NAB '86: new technologies, new directions

By Brad Dick, technical editor  
and Jerry Whitaker, editor



Without a doubt, television stole the show at the 1986 NAB convention in Dallas. It was ironic that the convention coincided with the 30th anniversary of the introduction of the videotape recorder. Before the show even opened, the video recorder had again become the center of controversy and excitement.

As Sony and Ampex demonstrated digital videotape machines, each using incompatible formats, the two companies were riding high on industry interest about an agreement—announced just one week before the convention—to exchange technology licenses. Ampex received the right to manufacture its version of Betacam and Sony picked up a license for the composite digital cart machine.

The second blockbuster of the convention came when Panasonic received the stamp of approval from NBC for its M-II recording format. The stamp was accompanied by a \$50 million equipment order for M-II gear.

The big news in RF technology involved power devices. The Klystron officially made its appearance in a working transmitter while further progress was reported on the depressed collector klystron.

Solid-state technology made new inroads in TV and radio transmission systems. A 30kW VHF TV transmitter was on display, and several radio manufacturers offered medium-power solid-state FM transmitters. Others featured new designs that used a solid-state IPA to drive a tube final amplifier. Any doubt about the feasibility of using solid-state technology in medium-power transmission equipment was put to rest.

New implementations of digital technology were on display everywhere.

**The broadcast industry's main event showered attendees with new products and raised new questions.**

Digital video effects manufacturers offered users expanded capabilities and improved images. Demonstrations showed that the all-digital TV studio is possible and, in some applications, practical.

Computers could be found throughout the exhibit area performing various tasks. The emphasis had shifted from technology to applications, showing that users are demanding—and receiving—more than bells and whistles. With regard to computers, the broadcast industry has grown up.

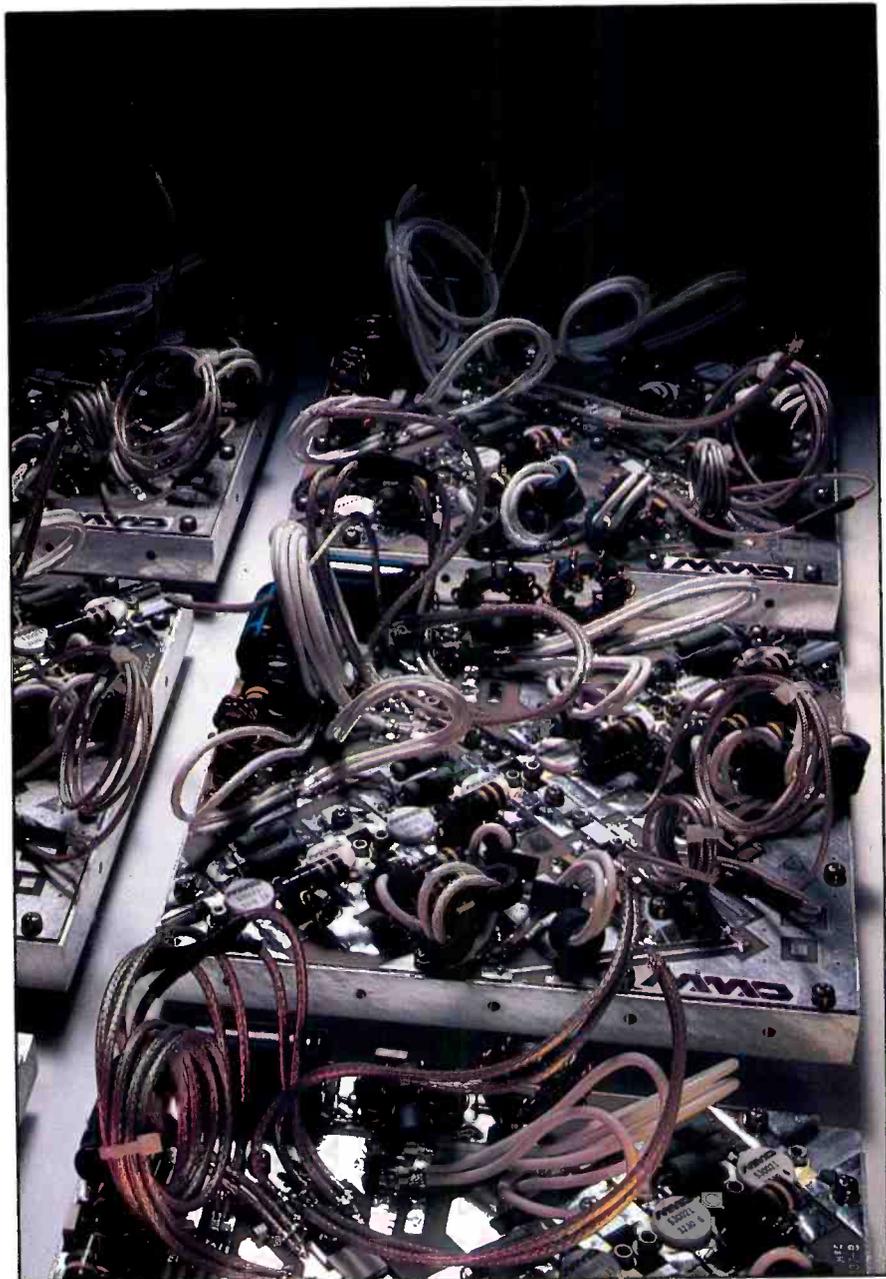
*BE's coverage of the 1986 NAB convention includes the following features:*

- **Looking Toward the Future . . . 24**  
*A review of the engineering sessions.*
- **HDTV: Where is it Going? . . . 38**  
*A report on the future applications for high-definition television.*
- **Pick Hits of NAB '86 . . . . . 46**  
*A selection of 10 hot TV products and 10 hot radio products.*
- **Show of Shows . . . . . 62**  
*A complete listing of new products.*

**Dallas: love it or leave it**

The return to Dallas was a departure from what had become the norm for the NAB, which was held in Las Vegas in 1984 and 1985. The Dallas location was viewed by many as more than just a little inconvenient. Hotels were spaced miles apart and less exhibit space was available than in previous years.

At an early-morning exhibitors' meeting halfway through the show, it was announced that almost 80% of the exhibitors want the convention to be in Las Vegas on a permanent basis. They were also unhappy about the increase of approximately 30% in space costs. Even



*One of the significant developments of the convention was an accelerated move to solid-state technology in broadcast transmitters. Shown above are 600W modules used in several new FM transmitter designs.*

so, the NAB convention is the industry's major gathering, and in some cases, the only show engineers are able to attend.

NAB estimates that attendance was up over last year by about 11%. With approximately 39,000 broadcasters in attendance, the 1986 NAB proved to be exciting in some ways and disappointing in others. Still, the greatest broadcasting show on earth held something for everybody.

**BE's NAB coverage**

Our show coverage attempts to capture the essence of the convention, highlighting those events that attendees believed were important. The cornerstone of our coverage is a comprehensive report on the NAB engineering conference of technical sessions related to radio and television. With in-

put from a panel of radio and TV engineers, we look for future trends within the industry.

HDTV made a big splash at the convention again this year, and we have a special report that puts high definition into perspective. We examine the practical application of HDTV, and speculate on timetables for implementation of this new technology.

Continuing a tradition begun last year, we have compiled the BE "Pick Hits of NAB '86" for radio and television. A panel of independent industry experts toured the show floor to decide on a list of 10 hot TV and 10 hot radio products.

And finally, our "Show of Shows" provides comprehensive coverage of each exhibitor at the convention. The listing highlights the new products unveiled by each manufacturer.

!{:>)))



# Looking toward the future

By Brad Dick, technical editor

The '86 NAB engineering conference provided the focal point for new directions in broadcast technology.

The 1986 NAB, as in previous years, provided an excellent opportunity for engineers to inspect the latest equipment and to be brought up to date on new technology and regulations. The primary difference between the '86 NAB and those of recent years was the emphasis on TV technology and products. Radio was not completely out of the picture, but it did not command center stage as television did.

### Orphan radio

While TV broadcasters were wandering wide-eyed around the convention, radio engineers found little new radio technology exhibited at the 1986 NAB. More emphasis than usual seemed to be given to TV products. The sophistication and numbers of new radio products, which have been typical of past NAB conventions, seemed to be lacking from this year's show.

Perhaps even the title of the convention, *Tuning in America*, somehow meant television. There was the usual push by NAB for stereo AM technical sessions, but the convention floor clearly lacked exciting new products and ideas for the radio broadcaster.

### AM radio

A number of the technical sessions were, again, directed toward the AM broadcast engineer. As in previous years, the first Saturday technical session centered on AM radio and how the service can be improved.

The first presentation centered on the actions taken by the NAB to support AM improvement. During the two years the AM Improvement Subcommittee has

been in existence, several important goals have been reached. The first, development of an AM improvement technical reference center, provides a bibliography on AM technical information for NAB member radio stations. Engineers needing information on any of a number of AM topics can obtain technical resources through the

reference center.

Perhaps the most visible (and audible) work conducted by the committee was evident in the *new technology* demonstration room. There, the committee displayed a number of car radios capable of high-fidelity AM reproduction. The display was meant to emphasize the audible difference in reception quality

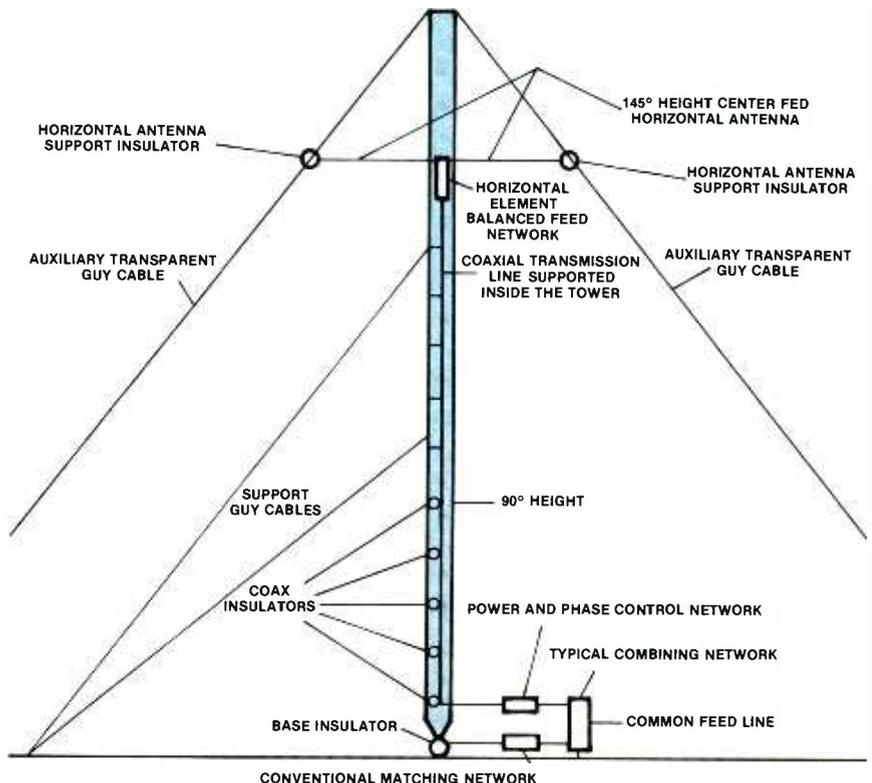


Figure 1. One of the new technology antennas, proposed by Ogden Prestholdt, uses a horizontal antenna mounted at the 140° point on the tower.

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when a wideband AM receiver is used. To continue supporting this effort, the NAB has launched a nationwide campaign promoting quality AM stereo receivers.

One unresolved issue discussed at the session was pre-emphasis/de-emphasis. According to the work conducted by the National Radio Systems Committee, there is no technical advantage to using pre-emphasis on AM except to help overcome the inferior quality on AM receivers. The NRSC is now attempting to develop a voluntary standard for pre-emphasis and de-emphasis for both broadcasters and receiver manufacturers. If such a standard is embraced by both parties, significant improvement could be realized in AM reception.

#### New AM antennas

Another area of real interest centered on new antenna designs. The theory behind current AM broadcast antennas was developed more than 40 years ago. Since that time, little research has been conducted into medium-wave antennas and propagation. With the increase in the number of stations worldwide, skywave remains a significant problem for most AM stations.

Under the auspices of the NAB, two new antenna designs were selected for construction and testing this year. One

design, proposed by Richard Biby, relies on a monopole antenna and a conventional grounding system. Arrayed around the base of this antenna are several short (approximately 1/30-wavelength) base-fed radiators. A circular electric screen (fence) 1/30-wavelength high and 1/4-wavelength from the monopole is then placed around the entire array of monopole and short radiators.

The electric screen acts to impede the illumination of the earth's surface by the short radiators, thus decreasing the amount of surface wave they generate. By an appropriate adjustment of the currents of the short radiators, the skywave radiation helps cancel the skywave radiation of the much taller monopole. The result is curtailed skywave radiation and a strong groundwave.

The second of the new antenna designs was suggested by Ogden Prestholdt. The basic design, shown in Figure 1, relies on a combination of vertical, horizontal and/or diagonal antenna segments to obtain control over groundwave and skywave radiation.

This design uses a typical base-fed vertical antenna tower and support guy system. At a suitable height, a center-fed horizontal antenna supported on guy insulators and transparent guy cable is added. This horizontal element is fed

from a balanced-feed network supported within the tower structure itself. The network is then fed by a coaxial transmission line supported and insulated from inside the tower. A matching network feeds the transmission line for the horizontal antenna and a conventional matching network feeds the vertical antenna. Finally, a combining network is used to provide a common-point feed for the entire system.

Both of these antennas will be built near Washington, DC. After they are completed, engineers across the United States will be invited to participate in field-strength measurements.

#### FM excitement

There was one new hot topic for radio at the convention: FMX. The idea, developed by Emil Torick, CBS, and Tom Keller, NAB, is to extend FM coverage through a companded stereophonic FM signal. It was originally proposed several years ago, but it is only now that technology has finally permitted manufacturers to come up with a cost-effective FMX generator. One receiver manufacturer also displayed a working FMX unit in the new technology booth.

The key to FMX lies in a companded stereophonic sideband transmitted in quadrature with the standard stereophonic sideband. (See Figure 2.) The use



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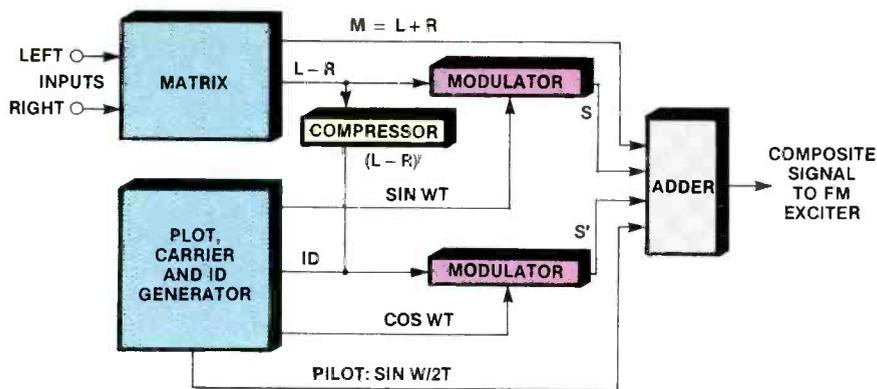


Figure 2. The key to the FMX system lies in a companded  $S'$  subchannel transmitted in quadrature with the normal stereophonic subchannel.

of two stereophonic sidebands provides complete compatibility between encoded and non-encoded signals. For those stations equipped with FMX encoders, an increase of almost three times the stereo coverage area is predicted. The first on-air tests of FMX resulted in an increase of the 60dB signal-to-noise ratio stereo service from approximately 1,200 square miles to 4,800 square miles, or a quadrupled service area.

Based on the comments heard on the floor of the convention, you can expect FMX to become a real hit with broadcasters. (A 4-part series about FMX, which began in our "re:Radio" column in April, continues in this issue.)

#### Remote control

"How little can I get away with?" might best describe the sentiment in the new technology session. Those attending expressed the desire to remotely control their stations from locations ranging from their homes to the corner convenience store to the police department.

With the advent of remote-control systems providing dial-access and synthesized voice responses, engineers can access and control their transmitters from almost anywhere. Some new devices allow anyone with a Touch-Tone-type dial to take readings and even to control transmitters.

The attendees seemed to be concerned primarily with how little control was actually needed. Stations, pressed with mounting personnel expenses, are searching for ways to remain on the air at night without hiring additional personnel. In some cases, AM stations are now being controlled by a sister FM station. Or, as is the case with WKDN-FM, Camden, NY, a fellow network-owned station performs the nighttime monitoring through an inexpensive C64 computer. This approach allows the station to provide cost-effective service to nighttime listeners.

Another station relies on the residents of a home for the handicapped to do its nighttime monitoring. According to the panel, the residents are attentive to their responsibility and appreciate working on a worthwhile task. The cost to the station is minimal.

Despite the ease with which stations can now perform remote-control functions, John Reiser, FCC engineer, warned the audience to be mindful of the responsibility to properly monitor the station's EBS receiver. He also suggested that engineers not rely on dial-up, cellular radio and other *floating point* control systems unless the on-duty operator is informed of the actions taking place. Although it is easy for the engineer to access and control a transmitter through use of these new technology systems, the person signed on the log remains *legally responsible* for the station's operation. Even so, these new devices allow the station engineer

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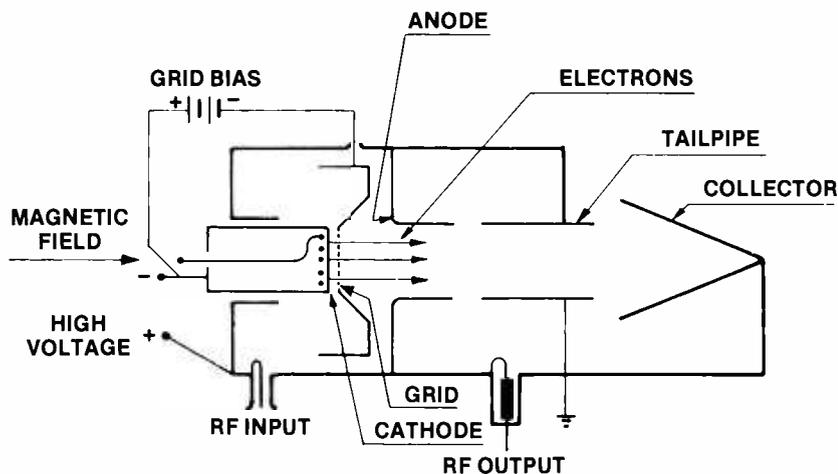
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**Figure 3.** Schematic representation of a Klystrode, which combines the features of a klystron and a tetrode.

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#### TV sessions

The TV sessions led off Saturday with the topic most likely to be on every TV engineer's mind: digital recording. William Nichols, CBS TV, urged TV broadcasters to immediately adopt the D-1 standard. He suggested that, for the near future, any interim steps taken by a station will only cost the facility money. It was suggested that stations that wait for D-1 equipment will be better off than those who adopt what has been called an *interim* digital approach (digital composite recording).

Despite the enthusiasm about digital, questions remain about field equipment. Early projections indicate that portable equipment is possible and may be available in the future. However, many engineers believe that there will be a long wait for a complete line of D-1 standard equipment. More than a few expressed the pessimistic opinion, "I'll believe it when I see it."

#### Small-format tapes

Peter Smith, NBC TV, suggested that D-1-type field equipment would not be available in the near future. He believes that broadcasters will rely on other (non-D-1) technologies and new metal-particle tapes.

There is a production need to be able to maintain excellent video quality for five tape generations, according to Smith. Any interim equipment must also provide three audio channels, single-crew operation capability and inexpensive field stereo capability—all recorded on ½-inch cassettes. Assuming that multiple vendors begin producing metal-particle tape, Smith suggested, equipment such as this would meet the needs of stations through the 1990s.

The views of Smith and Nichols were in contrast. Nichols leaned toward going directly to digital and Smith suggested

that the combination of metal tapes and new equipment (such as M-II) would meet the needs of the broadcaster. It may be no coincidence that the comments of the two speakers appeared to reflect the positions of their respective networks.

One new problem for TV stations—increasing weather information acquisition costs—was addressed by Joel Meyers of Accu-Weather. Because of the explosion of weather information in graphics, which include database, facsimile and graphic information, stations are faced with escalating costs. Meyers said that typical station costs will increase from \$300 per month to perhaps \$2,000 per month in the near future. The only way to reduce these costs while maintaining the same level of service, according to Meyers, is to use satellite transmissions instead of terrestrial services.

#### Video cart decks

There is a great deal of interest in video cart decks. However, many engineers feel that the lack of standards, the multiple vendors and the cart deck's short track record will keep them on the sidelines, for a while at least. Although the Betacart has made certain inroads in a percentage of stations, a number of new machines are appearing on the market. Most engineers believe their stations will simply wait until these complex issues are resolved before making purchases in this area.

#### Klystrodes and klystrons

Although the Klystrode is not a new device, it is the object of renewed interest within the broadcast industry. The Klystrode combines some of the principles of both the tetrode and the klystron. (See Figure 3.)

One of the primary advantages of the Klystrode is its increased operating efficiency. Because the tube can operate Class B, UHF broadcasters can expect to reduce the portion of the power bill attributable to the tube by as much as 50%. At least one new transmitter that was ex-

hibited used the Klystrode.

The klystron has also undergone a number of changes over the past few years. In a continuing effort to obtain the maximum efficiency, manufacturers are applying new techniques and designs to the klystron, such as pulsing and multistage and depressed-collector designs. Another new design, the grid-ded klystron, offers the possibility of increased efficiency while still using full-time modulation. The new design avoids the use of additional collector power supplies and problems associated with liquid cooling at high voltages.

#### Tower maintenance

Two sessions centered on tower maintenance. The first, led by Ramon Upsahl, discussed the importance of proper tower maintenance. Upsahl suggested that stations should have on file all pertinent data on the station's tower. For those stations that do not have original drawings and specifications, there are companies available to develop the data. The information will help ensure that the proper maintenance procedures are being used. It is also required for additional loading.

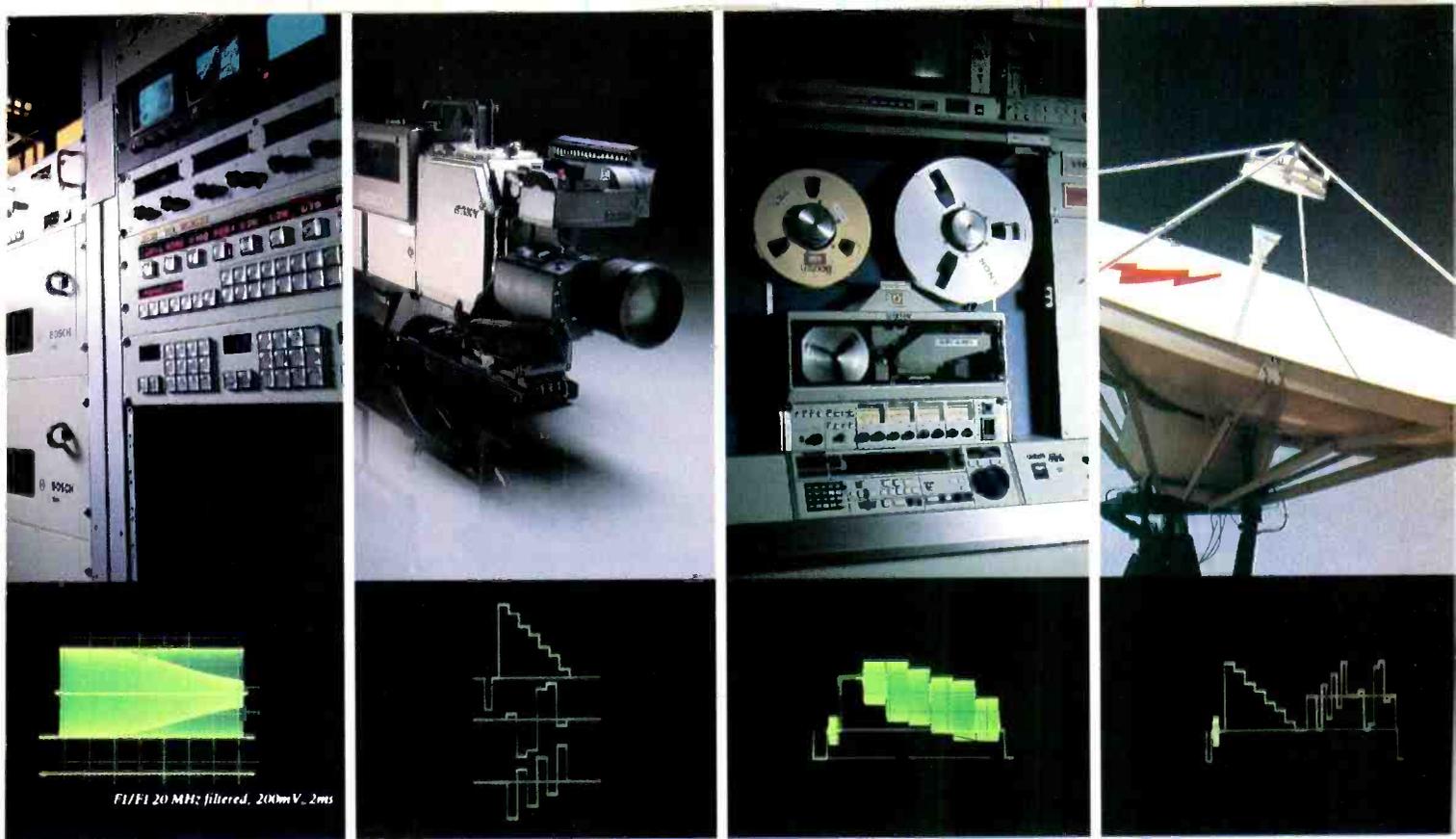
If the tower documentation is old or incomplete, additional loading requires a structural analysis. Any time additional loading is contemplated, a computer analysis should be performed on the tower. Modern techniques make it possible to create an accurate model of the tower. With the results of the computer study, you can determine if it is prudent to add new equipment to your tower. In many cases, the tower will need to be strengthened first. Retrofitting a tower for additional loading can cost from 5% to 58% of the original tower price.

A related session covered an ongoing research project on tower icing. Karl Renwanz, WNEV-TV, Boston, described the research that is being conducted. It includes the recording of detailed information on temperature, wind speed, wind direction and humidity during the winter months at Logan Airport in Boston. Video recordings are also made of ice formation and departure from the airport's tower.

As the information is collected, the Cold Regions Research Laboratories in Hanover, NH, will compile and study the data. Although the research will require a number of years to complete, it may well provide some insight into the exact conditions that cause ice to form and how to best prevent it and its accompanying problems.

#### Auxiliary sessions

As more users try to crowd into less spectrum space, conflicts result. The NAB's awareness of the need for action was reflected in the announcement of an industrywide national frequency-coordinating *council*. The council will establish standardized operating guide-



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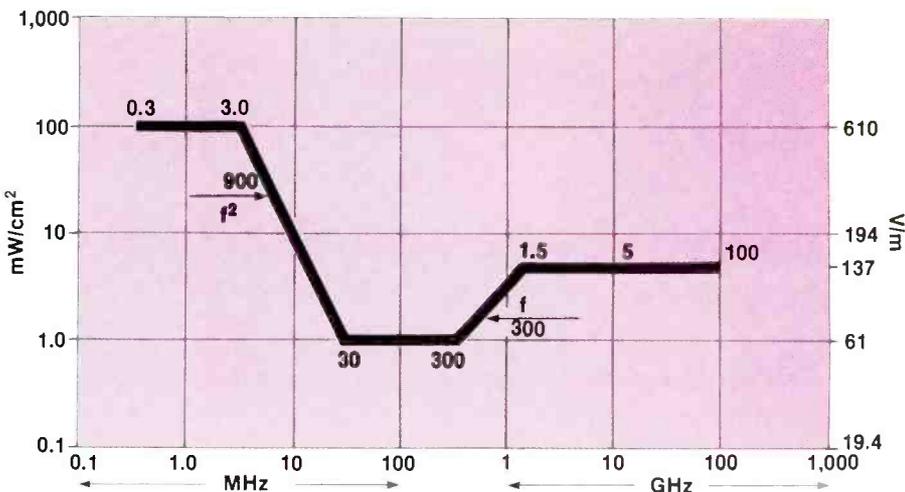
lines for local frequency-coordinating groups and help to develop a standardized frequency-coordination database.

The Society of Broadcast Engineers has been responsible for the growth and development of national frequency coordination for several years. However, as the task of coordination becomes larger, more resources must be brought to bear on the problem, according to the society's president, Richard Rudman. At the session, several critical comments were directed at FCC action in frequency coordination. The commission responded by noting that although some of the criticism may be deserved, someone is always going to be angry about frequency-allocation procedures.

### RF radiation

One of the most highly attended sessions of the convention was that on RF radiation. It was obvious from the sheer number of attendees that the topic was of real concern. Robert Cleveland, physical scientist with the FCC's Office of Engineering and Technology, outlined the commission's concern about RF radiation. He suggested that this was one area the FCC would not be deregulating. The panel encouraged the engineers to become informed and concerned about RF radiation.

One of the concerns expressed by attendees was how to measure non-



**Figure 4.** The FCC non-ionizing radiation limits. For compliance with the regulation, the radiation level must fall below the heavy line at any frequency.

ionizing radiation. The FCC has issued a technical bulletin (OST technical bulletin No. 65) to help ensure compliance with the new regulations. The bulletin contains charts and formulas to help engineers evaluate their stations' transmission facilities. In most cases, the charts will be sufficiently detailed for a station to determine if it meets the compliance rules. (See Figure 4.)

In an evening session on RF radiation, stations were strongly urged to adopt administrative procedures for multiple-antenna installations to ensure protec-

tion for workers. Problems can occur when several stations share a tower and one of the stations needs to perform maintenance on its antenna. In a situation such as this, all stations must cooperate so that workers are not exposed to excessive radiation from *any* of the antennas at the site.

Engineers should immediately become informed about the new regulations. As was clearly pointed out, these rules are not going to go away. In fact, Cleveland suggests in his paper that even more

*Continued on page 36*

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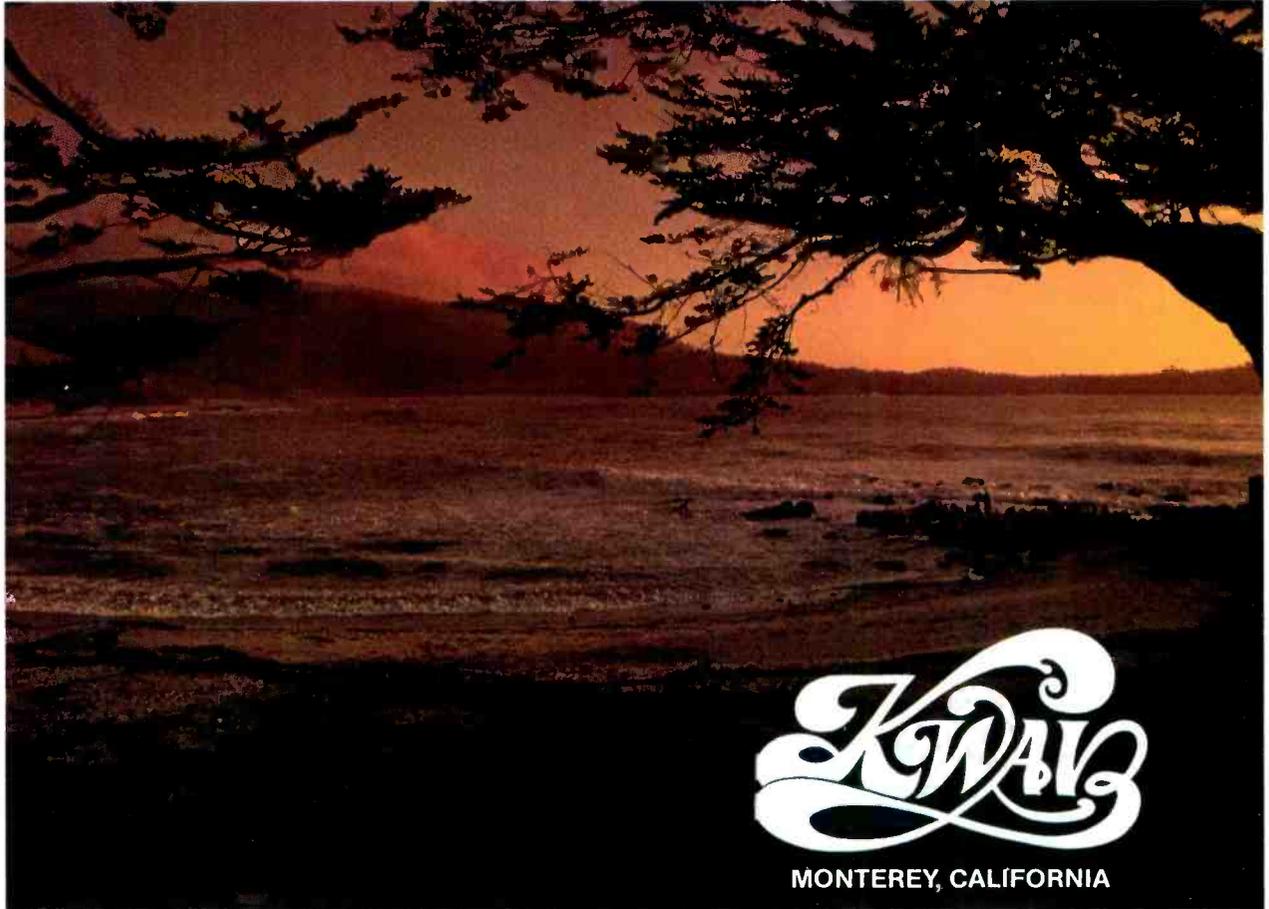


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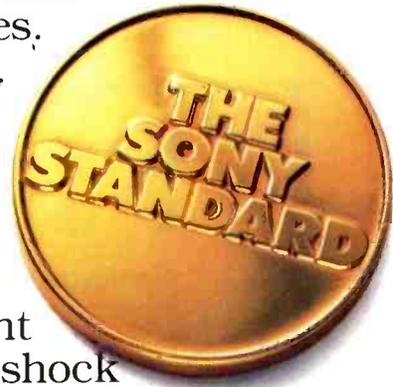
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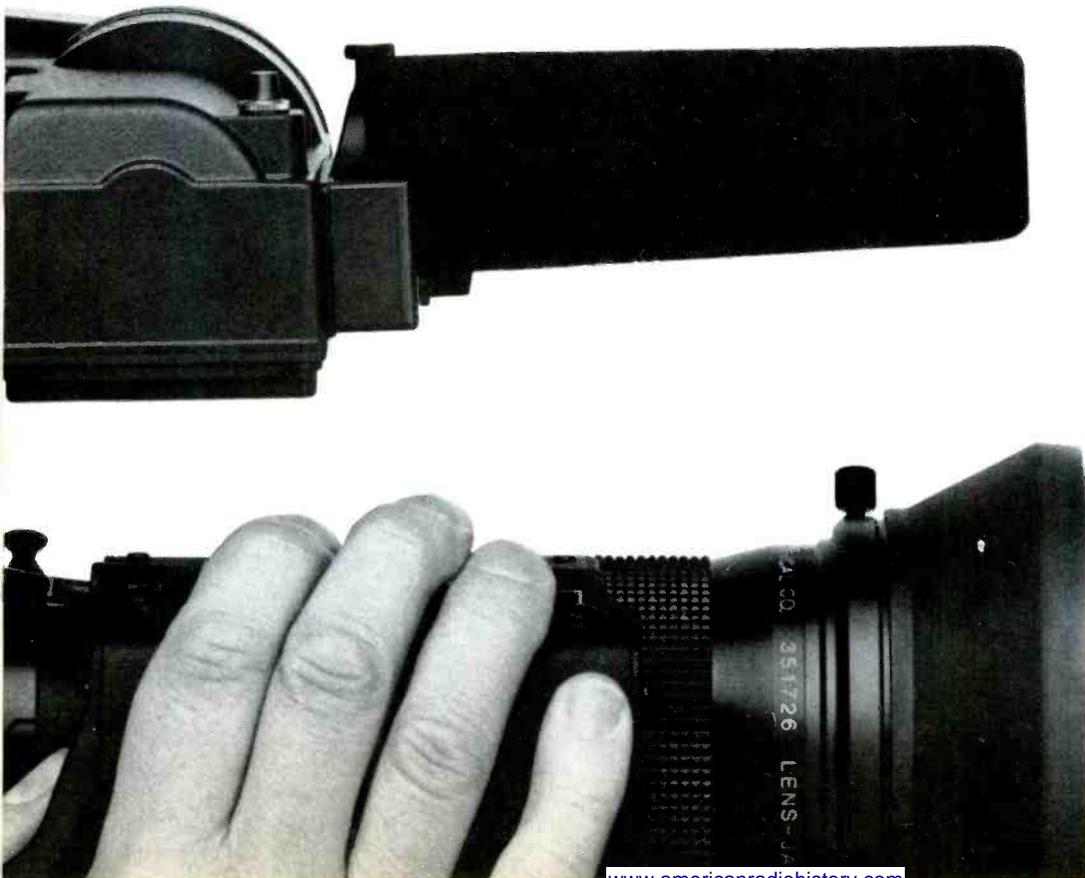
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Continued from page 32

stringent regulations may be in the offing. He noted that even local governments are attempting to adopt local standards. In one case cited by Cleveland, the proposed regulations are at least five times more restrictive than the ANSI limits.

#### Other FCC issues

The FCC representatives discussed several issues that may impact on the broadcast engineer. The first, *must-carry*, may see action this month. The National Independent Television Committee (NITC) distributed to an NAB

panel its own must-carry proposal.

Under the proposal, cable systems would be required to set aside a fixed number or percentage of channel capacity based on their size. A separate industry compromise agreement would exempt from must-carry requirements all cable systems with 20 or fewer channels; the NITC proposal would not. Even a 12-channel cable system would have to provide five must-carry channels. The largest systems, with 37 or more channels, would have to set aside 40% of their channel capacity for must-carry signals.

The distribution of the NITC plan was met with applause from audience

members critical of the joint industry compromise. Some broadcasters have accused the joint industry compromise of *selling out* specialty and small local stations. Both Democratic and Republican members of Congress on the NAB panel predicted that if the FCC does not adopt the industry compromise must-carry agreement, Congress may.

FCC media chief, James McKinney, announced that he expected the new United States-Mexico AM agreement to be signed soon. Under the agreement, 2,300 U.S. stations would be given authority to operate two hours past sunset, and 350 Mexican clear-channel stations would obtain nighttime authorizations. These Mexican stations would be authorized higher powers than the Canadian clears because of their distance from the U.S. border. As soon as the agreement is signed, the FCC is ready to process "orders to show cause" modifying station licenses to allow nighttime operation. Stations can begin nighttime operation immediately upon receiving and signing their "show cause orders."

The NAB announced that it will request an extension of the 80-90 upgrade deadline. Unless the extension is granted, FM stations have less than a year (until March 1, 1987) to meet their class of minimum height and power requirements.

#### The future

It will be Dallas again next year for a repeat performance of NAB '86. From the groundwork laid this year, you can expect to see FMX well on its way to an established standard. Will the marketplace battle between Motorola and Kahn maybe even be over? No one knows for sure. Stereo television will be a fact of life for more than 500 stations and new test equipment will be available for MTS maintenance. Don't expect the battle between Betacam and M-II to be settled by then. However, you should see a lot of new equipment using both technologies. The controversy between composite and component digital videotape recording is likely to remain unanswered at that time. Chances are, by the time the 1987 NAB rolls around, both composite and component digital equipment will be available from several sources.

As one engineer remarked, just when you think you've finally figured out how your station's equipment works, something new, more complex and more costly comes along. This fact alone is sufficient reason for the broadcast engineer to attend such events as the NAB convention. Tune in again next year to see how accurate these predictions are.

**Acknowledgments:** The following persons contributed information for this report: John Battison, Battison & Associates; Cheryl A. Kenny, Reddy, Begley & Martin; Karl Renwanz, vice president of engineering and operations, WNEV-TV; Richard A. Rudman, chief engineer, KFVB-AM; and Elmer Smalling III, Jenel Systems and Design.

[:(-:))]]]

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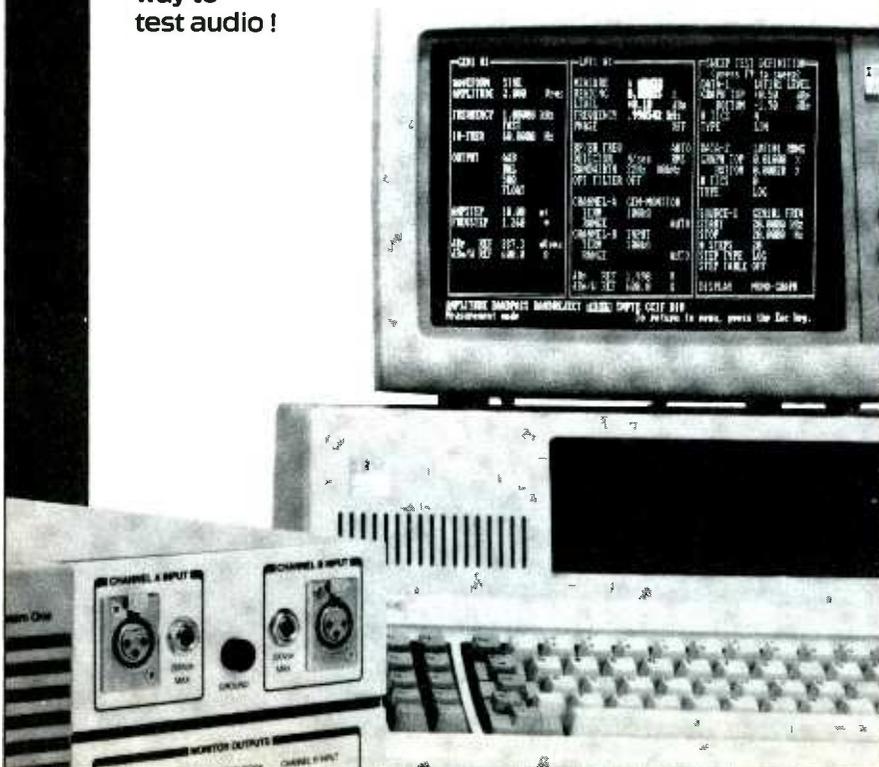
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# HDTV: Where is it going?

By Arthur Schneider

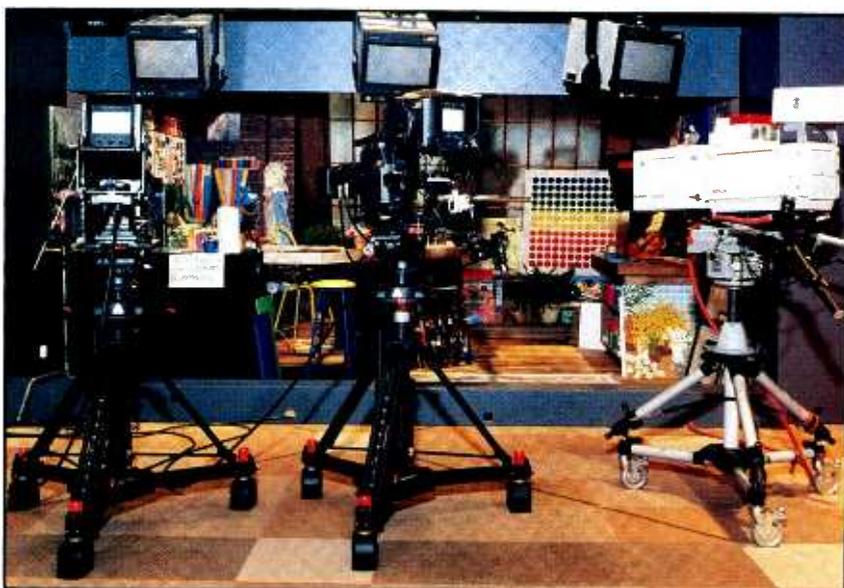
**HDTV is here, but its practical applications remain to be decided.**

The NAB convention proved to be a showplace for the new breed of digital and high-definition hardware. The West Ballroom of the Dallas Convention Center was set aside to display only HDTV technology. There, 22 different manufacturers joined in a display of switchers; test, production and editing equipment; projection systems; cameras and compatible-transmission hardware.

Although the display of HDTV imaging was impressive, a number of questions remain to be answered. Primary among them is standardization. As this issue of *BE* was being prepared, international meetings were in progress to try to determine a single world standard. Recommendations at those meetings were that a 1,125/30 frame format be selected.

The HDTV technology that has received the greatest attention in the United States is an evolution of work conducted at the NHK Technical Research Labs in Japan during the 1970s. After many refinements, a set of tentative parameters was developed and finally recommended to the world standards coordination organization in the fall of 1985. Essentially, the NHK system, which is backed by the Advanced Television Systems Committee (ATSC) of the United States and seems to be the most promising HDTV format, embraces the following parameters: 1,125 lines per frame of which 1,035 are active; a field rate of 60Hz with 2:1 interlace; and an image aspect ratio of 16:9.

Schneider, *BE*'s consultant on post-production, is a member of the technical staff of Teledyne Camera Systems, Arcadia, CA.



Photos courtesy of Sony Broadcast

*The HDTV demonstration room provided convention attendees an opportunity to view the latest in high-definition equipment. Color, contrast and detail exemplified test scenes for HDTV cameras.*

Arriving at a world standard has proved difficult. PAL users would favor doubling the current PAL line rate to form a 1,250/25 system. The resulting signals would be incompatible with the proposed 1,125/30 standard. PAL followers contend that the 50Hz rate of ac power in Europe would create serious compatibility problems with a 60Hz approach. Could it be that national pride and economics are at stake?

Still others feel that doubling the 525-line NTSC standard would be preferable. 1,125/30 seems to be moving forward regardless of what format, if

any, eventually becomes standardized for the world.

## Applications

There are questions regarding HDTV that may be difficult to answer. For example, is HDTV cost-effective? Is it reliable? Is it flexible? Is the quality as good as or better than film? What about transmission worldwide?

These questions are best answered by engineers who deal with high-definition systems on a daily basis. A number of people involved with HDTV were

*Continued on page 42*

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Video-Pac Systems, Ltd.  
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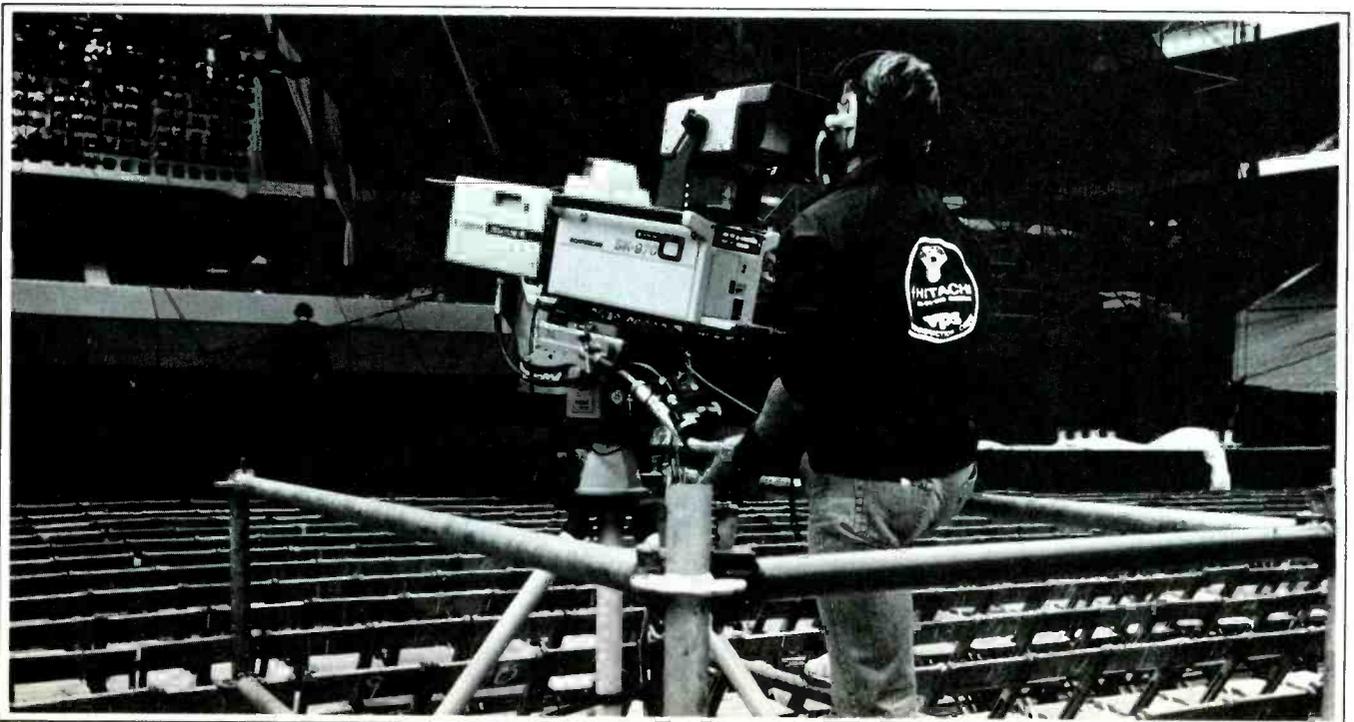
The largest producer of live concert videos in the U.S., VPS requires lightweight, low-maintenance broadcast cameras it can put on the road for long stretches.

Azimzadeh considers the SK-970 the only studio camera with 2/3-inch mobility and EFP handling. So it can meet the demands of often makeshift stadium facilities, while delivering the broadcast images that are needed for larger-screen multiple projection.

Since each of the four SK-970s and two SK-97s in the

travelling package has complete self-contained auto setup, a separate box isn't needed. And any potential problems are confined to one head.

Although VPS earmarks two SK-97s and SK-970s for studio use, the ability to use both wherever they are needed is a welcome economy. Still, the greatest asset of the SK-97 and SK-970 is rockbottom reliability. To Azimzadeh, concerts are just like live TV—no one can afford any slip-ups, or an equipment failure.



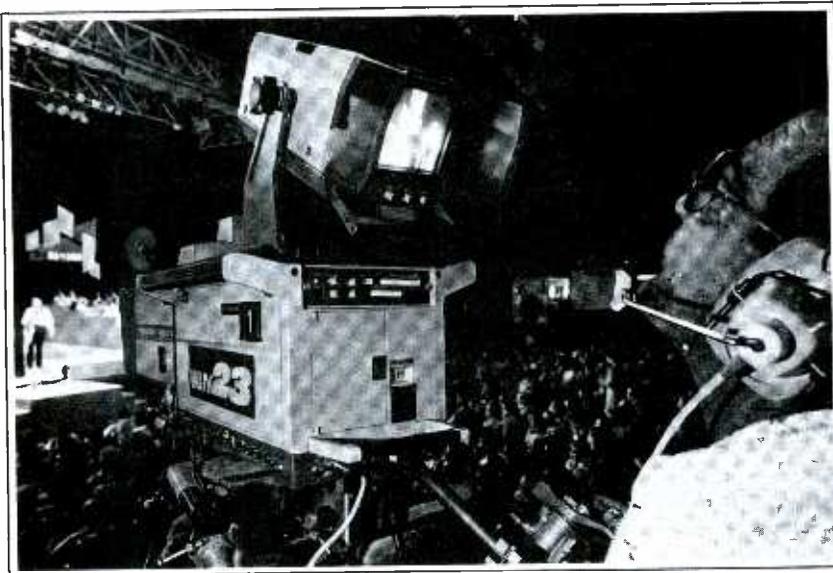
## **"Since each SK-97 and SK-970 has its own on-board computer, I can set everything up at the same time automatically."**

Terry McIntyre, Remote Supervisor  
F&F Productions, Inc.  
St. Petersburg, FL

As a mobile production facility covering sports and large outdoor events for local and network TV, F&F needs broadcast quality on location.

They also need fast, independent setup. So they keep three handheld SK-97s and four compact studio SK-970s

permanently stowed on one of their trucks. And with complete computerized auto setup on-board each camera, the crew can set all of them up at the same time from parameters stored in memory without having to worry about drift or last minute adjustments.



The SK-97 and SK-970 also perform superbly under low-light conditions. As a result, notes Chief Engineer Dennis Lusk, both can use very large lenses. And with real-time registration compensation automatically correcting for any changes throughout the travel of zoom lenses, the cameras are ideal for the demands of sports coverage. Resolution and colorimetry are also unsurpassed, according to Bill McKechnie, another Remote Supervisor. In fact, the SK-97 is often run by F&F as a "hard" camera, in place of the SK-970. Location recording is done on two Hitachi HR-230 1-inch VTRs.

Most important, however, is the almost complete interchangeability of both cameras. Not only are they easy to work with, but they are also easy to link up. And so similar electronically, a single set of spares can cover any potential emergency.

## **"The SK-97 is a real mini-cam that can be completely integrated into a total studiowide auto setup system."**

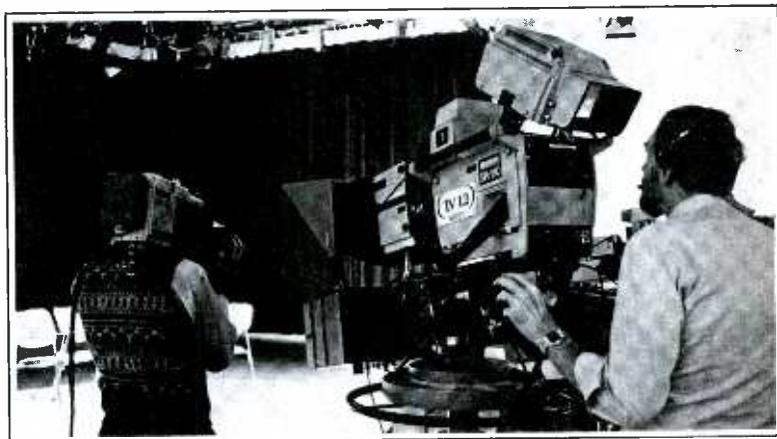
Bill Weber  
Vice President for Engineering  
WHYY Television  
Philadelphia, PA

WHYY has extensive production facilities at Independence Mall and more studios on the drawing board. To plan for this rapid growth, WHYY sought a family of broadcast cameras that was as flexibly integrated as it was advanced.

While evaluating computerized camera systems, Bill Weber and his staff found that the Hitachi SK-110 studio unit and the portable SK-97—with the same basic complete auto setup—were so perfectly matched in colorimetry and resolution that pedestal and handheld work could be combined without a hitch. And because the SK-97's auto setup is also completely self-contained, both cameras are as electronically independent as they are geared toward common console control.

Staffers like Senior Video Engineer Bob Miller consider the SK-97's auto setup easy-to-use, as well as accurate and reliable. And the on-board lens and scene files give operators instant-filter and color correction at each camera head, in addition to the console. So the staff looks upon the Hitachi SK-97 as a studio camera that they can shoulder.

As facilities grow, WHYY's Weber knows that he will have the flexibility to configure and reconfigure SK-110s, SK-970s, and SK-97s to meet production requirements of most any complexity without encountering technical snags. In fact,



with Hitachi cameras at other sister stations in the Eastern Educational Network, joint productions can even be assured of a common look.

For a demonstration of the SK-97 and SK-970 in your studio, contact Hitachi Denshi America Ltd., Broadcast and Professional Division, 175 Crossways Park West, Woodbury, NY 11797; (516) 921-7200, or (800) 645-7510. Canada: Hitachi Denshi Ltd. (Canada), 65 Melford Drive, Scarborough, Ontario M1B 2G6; (416) 299-5900.

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 **HITACHI**

surveyed at the NAB convention to determine the likely short- and long-term applications of this technology. (See "In the Know," page 44.) This article is based upon their observations.

One of the larger HDTV-user groups will likely be the motion picture industry. The film community is concerned about these and other factors because portability, ease of movement and reliability are fundamental considerations that will determine if, and when, HDTV will replace film as the primary medium for feature films and movies of the week. Examples seen at NAB showed that the TV industry is capable of producing high-quality material in HDTV, post-producing it on tape and converting it to film for theatrical or TV release.

It is interesting to note that after 15 years the number of prime-time film-originated programs remains the same. Approximately 80% of prime-time programming continues to be produced on film. The reason is that film is reliable, economical and has the *look* that audiences are used to. The challenge to the TV industry is to make a product that is economically competitive and so much better than film that it would be impractical to continue to use film.

#### Coming to terms

A number of organizations have worked toward arriving at a single world standard. Among them are SMPTE, EBU and ATSC. Within SMPTE, a working group for electronic production in HDTV has received a mandate to attempt to establish standards for production and post-production, particularly as they relate to high-definition television.

If such a standard for production is achieved, the need for standards conversion would eventually be eliminated. Logically, a standardized transmission system would also develop, allowing the broadcast of pictures from virtually anywhere in the world.

At nearly every turn, the working groups have found a hesitancy to accept HDTV. The reasons are numerous and varied. Film producers, for example, cannot agree to luminance transfer characteristics and colorimetry of the electronic system when compared to film. Film media allow a far wider gamma range than television, although there are ways that electronic photography can be made to look more like its film counterpart.

HDTV will find a limited acceptance unless receiving equipment becomes accessible to the general public at a reasonable cost. This situation is complicated because of the wideband nature of HDTV signals. The luminance portion of the signal alone requires five to six times the frequency spectrum of a conventional RF TV channel. This fact suggests that transmission of HDTV signals

will require the use of satellites.

MUSE (Multiple Sub-Nyquist Sampling Encoding), a technique pioneered by NHK, uses a 3-dimensional bandwidth compression technique that can reduce the HDTV signal requirement to an 8MHz bandwidth. For transmission of 1,125-line pictures, MUSE would require a single 24MHz to 27MHz channel. A demonstration of the feasibility of the technology is scheduled to be shown in Washington, DC, in September under the auspices of Maximum Service Telecasters (MST) and NAB.

The fact remains—and was reconfirmed at NAB—that to receive such wideband signals, whether through a terrestrial or satellite system, will require different receiving electronics on downlink earth stations. Current receiver designs will not meet the wide signal bandwidth or the Ku-band frequency of operation of proposed HDTV systems.

#### Hollywood hesitations

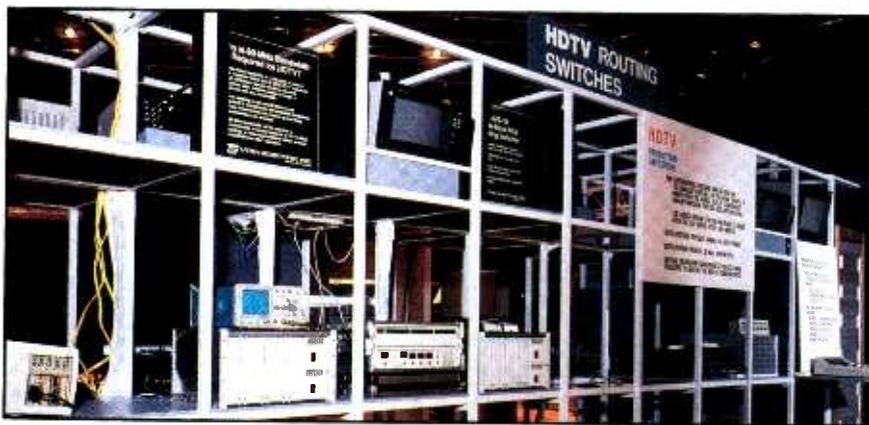
Filmmakers question the transfer characteristics and gamma of television along with problems of creative use of lighting. Can HDTV allow the same type of production that film now enjoys? Besides emulating film, HDTV must be noticeably better than film if it is to make an impact on the motion picture industry. Simply put, why should procedures be changed if they work well?

Equipment portability is also questioned. If solid-state image sensors can be developed to support HDTV requirements, even smaller cameras could be produced. However, current CCD technology suggests that such devices are several years away. Meanwhile, most HDTV cameras at the high-definition display were large and required cabling to the control and recording equipment. Film cameras must sometimes be operated on horseback, attached to sky divers or be subjected to other unusual and adverse conditions.

The *instant replay* capability of television has been considered a selling feature for the film-user converts. The so-called video assist feature can save time and avoid retakes on the set if used carefully. Such production aspects of lighting, framing, focus and performance can be quickly checked with a replay of the tape. Also, the image through the TV viewfinder may be valuable in realizing how a scene will look on the TV screen.

Many applications of video assist have resulted in lost production time, however. Instead of increasing the number of pages of script handled each day, too much time was spent by the cast and crew reviewing their takes.

Post-production also raises questions. Many surprising and desirable effects may result from the film-processing labs. With video signals on tape, however,



Distribution of HDTV signals in a production facility requires wideband routing switchers.



Post-production will be the first application of HDTV, if the predictions of industry observers are correct. A complete set of edit suite products were on display at the demo room.

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various types of processing may also be accomplished, as demonstrated at the convention.

Optical effects have, in fact, become an area in which video methods may be preferred. In many cases the look of HDTV video, transferred to 35mm film, nearly matches that of direct optical photography. As a result, some film producers have shown a preference for using electronic optical effects in their work. The complexities of traveling mattes and image positioning are much more cost-effective when accomplished with blue-screen compositing or chroma keying equipment.

Editing of production material is another area in which electronic methods have taken a significant step forward. Working directly with film is highly labor-intensive. Through the use of video work prints, however, the time needed to edit material to a final program can be cut by as much as two and one-half times. The application of laser disc technology promises to increase the time savings.

Analog video editing does have some limitations, however. One major concern is image degradation with increasing numbers of generations. As digital techniques in recording become more commonplace, the problems of analog recording and many other concerns of

filmmakers may become less critical.

### Perhaps tomorrow

It has taken HDTV several long years to arrive at the state of development seen in Dallas at NAB. Several more

## In the know

The following persons provided input for this article:

- Larry Thorpe, director of studio product management for Sony Broadcast Products. The NAB HDTV display was coordinated by Thorpe.
- Dick Stumph, vice president of engineering and development for Universal City Studios. Stumph heads one of the SMPTE working groups for electronic production in HDTV.
- Paul Vlahos, president of Ultimatte.
- John Lynch, manager of engineering and technical services for Ikegami.
- Eric Zipse, president of Robert Bosch Video Division, U.S.
- Dr. Michael Hausdorfer, head of Bosch's advanced development group in Germany.

years will pass before widespread use of the medium is found. Although there are a few total-HDTV production companies in existence—one in the United States

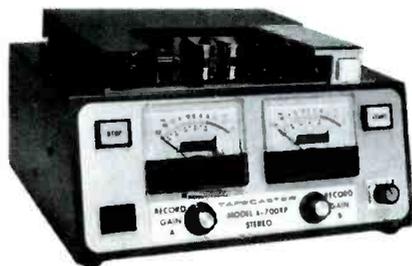
and one in France—commercials, TV movies and music videos are projected to be their major products for the foreseeable future.

With eventual distribution methods yet to be decided, there has not been a major demand for production equipment for the general entertainment producer. Most manufacturers suggest that HDTV will become more prevalent in areas other than entertainment. Such markets as publishing, printing, teleconferencing, medical education and flight simulation are promising applications for the improved-definition products.

With a limited demand for production equipment, manufacturers are taking different approaches to this developing technology. One company can provide an entire system of cameras, recorders, monitors and processing equipment. Others have produced various parts of the HDTV system, but have retained much of the results of their research work for future product development.

Questions about the future of HDTV do not bring sharp, definitive answers. A sort of haze lies between the questions and answers—the result of the continuing work on improving composite and component video equipment, the arguments for and against a world standard and the multiplicity of possible users of this improved video capability. |:(=))!!!

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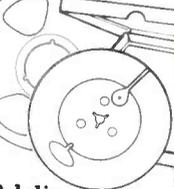
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|  <p><b>Polysette</b><br/>Blank-Loaded<br/>AUDIO CASSETTES</p>   |  <p><b>TAPES</b><br/>• CASSETTES<br/>from MAXELL<br/>AMPEX • FUJI • 3M<br/>BASF • AGFA • TDK</p> |
|  <p><b>CASSETTE BOXES</b><br/>LABELS • ALBUMS</p>   |  <p><b>Polyline Empty</b><br/>REELS &amp; BOXES</p>  |
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## Polyline Corp.

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# NEW FROM ARRAKIS SYSTEMS

## 5000 SERIES

The First No-Compromise  
Modular Radio Console...



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#### THE FEATURES YOU WANT —

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- Telephone Mix-Minus Buss.
- Full Monitoring Facilities.
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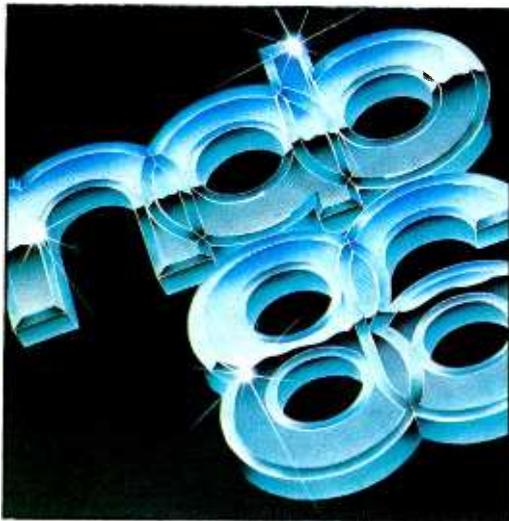
For features, performance, price and reliability,  
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# Pick hits of NAB '86

By Carl Bentz, TV technical editor  
and Brad Dick, radio technical editor

**Here's a look at some of the hot new items that caught the attention of our panel of industry experts at NAB.**

As anyone who has attended an NAB convention knows, the number of exhibits is staggering. Faced with almost 700 exhibits, most of which include displays of new products and improved established products, convention-goers are simply unable to find the time and energy to see all of the new equipment in only three and one-half days. Likewise, it is impossible for us to discuss in detail all of the new and improved products displayed at the NAB, because it would fill several issues.

Following the tradition begun last year, BE again assembled a panel of industry experts to review new products from NAB. The panel of 10 judges—five for radio products and five for TV products—was charged with touring the exhibition floor to look for new and exciting products. The panel of independent industry experts then selected 10 radio and 10 TV products. The judges looked for products that were exciting, useful and designed to offer unique solutions to common broadcast problems or needs. Although these products may not be your "top products" for the convention, they represent what the panel believes are unique and interesting items.

The following five basic guidelines were established for the panel:

1. **The items must be new products** (not shown at a previous NAB convention). In some cases, distinguishing a "new product" from a modified old product was difficult. For our purposes, we defined a new product as one with a new model number or new designation.

2. **The products must have some positive impact on the everyday work of the user.** We were looking for

equipment that would be used on a regular basis at radio and TV stations.

3. **The products must offer an improvement in current technology.** The equipment did not have to include unique circuit architecture, but it was expected to include some new ideas on applying new technology.

4. **The prices of products must be within reach of their intended users.** We were looking for products manufactured for a wide spectrum of broadcasters.

5. **The products must be available for purchase.** The equipment must have been on display on the convention floor and in production (or soon to be in production). Products demonstrated in a private showing off the floor were not considered.

The products selected by our panel of judges follow in alphabetical order.

## • **Aphex Studio Dominator**

*A 3-band peak processor that increases the perception of transients while maintaining absolute peak limiting.* Through the use of an intelligent 3-band peak processor, the limiting threshold is varied as required by the audio. The processor prevents signal dropout (known as hole punching) caused by limiter gain reduction. Tunable crossover frequencies, plus high- and low-frequency drive controls allow the user to create specific effects.



## Pick hits-Radio

### • **Allied/Sonomag (SMC) Audio-Metrics CD player**

*A totally automatic CD player with 100-disk storage, random access and audio cuing.* The operator simply selects the desired cut and the CD player automatically cues up to the beginning of the audio. When combined in an automation system, the unit offers up to several-thousand-event walk-away operation. It can also be used manually, providing secure CD storage and rapid playback availability.





# BRIDGING THE GAP

The HD-12 Switcher neatly bridges the gap between our small and large switchers.

The HD-12 Switcher is available with 12x12 video and 12x12 stereo audio in 4-rack units complete with serial control for \$9995. Call HEDCO now for ordering information.

Hughes Electronic Devices Corporation  
A Subsidiary of Leitch Video

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**HEDCO**<sup>TM</sup>

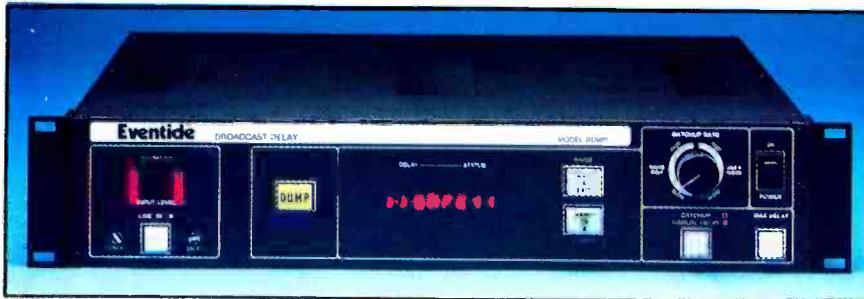
... simply better



• **Comrex Basic Extender**

A basic frequency extender designed to operate using a single telephone line. The system provides smaller-market stations with the advantages of telephone line

frequency extension for short- and medium-haul applications. The encoder and decoder are fully compatible with other Comrex 1-line frequency extenders.



• **Eventide BD980 Broadcast Delay**

A delay line system that provides advanced, de-glitched stereo catch-up operation. The delay line provides up to 10 seconds of delay with manual setting resolution to 1ms. The system provides

ramp-on and ramp-to-zero operation for automatic entry and exit of delay modes. The delay line can also automatically join preset timed events, such as newscasts and network programs, with the wait and exit features.

• **Gentner VRC-1000 remote control**  
Dial-up telephone control for 16 metered and 32 command channels. The remote control operates on a dial-up telephone line, allowing remote transmitter control from virtually anywhere. The VRC-1000 provides ATS capability and can automatically correct alarm conditions or call station personnel. Synthesized voice reporting allows transmitter parameters to be monitored through any standard dial telephone.



• **Kahn LPGP-1 Lines Plus frequency extender**

A frequency extender system designed to provide gap-proof frequency response over two dial telephone lines. The LPGP-1 prevents the audio frequency gap common to some frequency extenders through the use of pilot tones and PLL circuits. The LPGP-1 also prevents line disconnects from extraneous 2,600Hz noise components by switching a filter in the circuit as needed. With the extender, a full 50Hz to 5,000Hz frequency response is possible over two dial telephone lines.

*Continued on page 52*

# This new QuantAural™ QA-100 Audio Program Analyzer gives you the advantage in competitive broadcasting

Simply put, the QA-100 quantifies what you hear. Your station sound can now be electronically monitored the way you hear it. Exactly. And, you can monitor the competition too!

Real time analysis of any audio signal. From a receiver, tape recorder, or processing equipment. You see the measurements as you hear the sound. Changes in processing or variations in system performance are immediately shown on the QA-100 panel meter or bargraph display—using program material as the signal source.

The QA-100 hears like a program director and talks like an engineer. With it you can monitor maximum peak level (relative peak modulation), overall

processing effectiveness (average level), tightness of sound and processing control (peak density), tonal balance, consistency and preemphasis (four band real time analyzer), stereo image width (L + R to L - R ratio) and "punch" (special "aural intensity" measurement).

Interested? To learn more about how the QA-100 will help your station compete, call Potomac Instruments today.

QuantAural is a registered trademark.



## POTOMAC INSTRUMENTS

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# The Go Anywhere Aural STL



Go around corners... leap tall buildings... do creative path diversion...  
without affecting the purity of your sound.

TFT's 8300 Series Aural STL with its unique, innovative IF Repeater approach keeps your on-air audio sounding as it does at the studio...several hops later.

The TFT IF Repeater technique is unique. At relay points, we don't take your aural signal down to audio baseband. We use the 63 MHz IF instead.

Results? How about 55 dB stereo separation even after a few 10, 20, or 25 mile hops? Or  $\pm 0.1$  dB frequency response from 30 to 15,000 Hz?

Plus, we offer a selectable IF bandwidth (SAW Filter) to minimize adjacent channel interference.

The 8300 Series is available in Composite, or Dual "Hot Standby" Composite configurations.

AM Stereo? Go FM composite to your transmitter and our Stereo Decoder Option will give you left and right signals to drive your AM Stereo Exciter.

If your frequency is one of those listed by the FCC,\* we guarantee delivery within 2 weeks after we accept our dealer's order.

All of this backed by a 2 Year Warranty.

Get to the top of the hill, cleanly. Go TFT. Contact your favorite TFT dealer for more details.

\*§ 74.502 of the Rules.



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... Where new things are happening!

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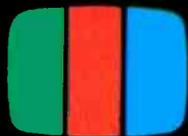


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Hi-matic MADE IN USA

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**One Tape for a True Picture.**

If digging for oil is the story, digging for news will take you there. And the tape you take is the 3M 3/4" MBR™ Videocassette—created to exceed even our widely acclaimed MBU Videocassette. Designed with our exclusive Anti-Stat™ System—to reduce its static charge and help prevent the dust buildup that causes dropouts. To give you a true picture.

# TO THOSE WHO GIVE A CLEAR PICTURE OF THE NEWS, ONE TAPE IS TRUE.



## One Tape Stands True.

We see our job as being the same as yours—to give a clear picture of the news. And that's been our job since we invented videotape 30 years ago.

That's why we stand by you—with the largest support force in the field.

And we stand behind you—with some of the most advanced research in the industry. All to keep our standing—as number one in the world of the pro.

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MAGNETIC MEDIA

**NUMBER ONE IN THE WORLD OF THE PRO**

**3M**

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• **M/A COM MA-23 aural STL**

A point-to-point microwave radio system for enhanced audio performance in the 23GHz band. The STL provides up to 110dB of dynamic range with a choice

of PCM or CPDM, or analog technology. For stations in crowded markets, the availability of 23GHz operation may make STL operation possible where the 950MHz band was closed.



• **Modulation Sciences Data Sidekick**

An SCA generator designed exclusively for data transmission. The SCA generator provides both asynchronous and synchronous operation at speeds up

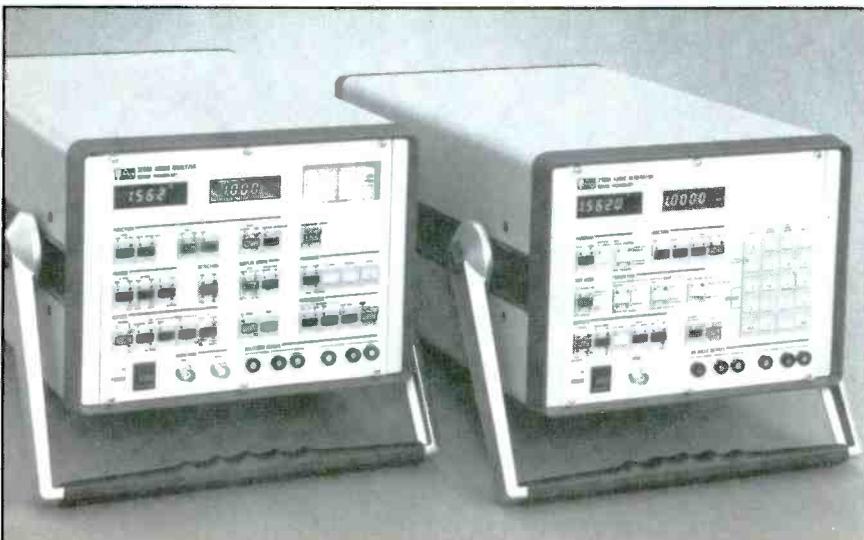
to 4,800b/s. The error rate is lower than 1 in 10<sup>7</sup> with internal error checking for asynchronous data. The Sidekick provides a built-in peak deviation meter and transmitter tuning aid.



• **Sound Technology 3000 series audio test system**

Programmable audio generator and analyzer for local and split-site operation. Two-channel operation is provided with front-panel programmability. Completely self-contained, the analyzer requires no external controller. THD

measurements can be made in as little as 500ms, level measurements as fast as 30ms. Selectable filters and print driver software make the system adaptable to varied measuring requirements. Through the addition of modems, the generator and analyzer can be separated during tests and measurements.



• **Straight Wire Audio CDQue**  
*Easy-to-cue, remote-controllable variable speed CD player with professional features.* The CD player can be supplied with an upspeed crystal permitting faster song playing. A vari-speed controller is also available for production uses. The audio circuits provide digital filtering of the four times oversampling rate. The high-current output circuits provide sufficient power to drive more than 1,000 feet of cable.



## The Judges

We selected a group of 10 well-known and respected independent industry experts for our NAB '86 Pick Hits panel of judges. Five persons participated in the selection of radio products and five participated in the selection of TV products. The panel consisted of the following persons:

### For television

**Bob Hess**  
 Chief engineer, KOVR-TV, Sacramento, CA.

**Rich Lehtinen**  
 Video engineer, KLS-TV, Denver.

**Karl Renwanz**  
 Vice president, engineering and operations, WNEV-TV, Boston.

**Elmer Smalling**  
 President, Jenel Systems and Design, and BE's consultant on cable/satellite systems.

**Doyle Thompson**  
 Director of engineering, The Weather Channel.

### For radio

**John Battison**  
 Owner, Battison & Associates, and BE's consultant on antennas/radiation.

**Sam Caputa**  
 Chief engineer, KEZK-FM/WRTH-AM, St. Louis.

**Andy Laird**  
 Chief engineer, KDAY-AM, Los Angeles.

**Don Markley**  
 President, Markley & Associates, and BE's consultant on transmission facilities.

**Dave Obergöenner**  
 Chief engineer, KUSA-AM/KSD-FM, St. Louis.

# CONTROL

*That A Ballerina Would Appreciate.....*

Is by way of introducing a new era in video switching *control*. Like the ballerina whose quality of dance expression demands absolute control, broadcasters can now achieve new levels of *control* over their video switching matrix.

To become a "video choreographer", start with just 21 buttons. Add our Series 1 Control Computer. Select from a library of firmware. Put it all in a 1 3/4" package and call it the PCA-904A. Now you've got a switcher *control* tailored for today's job . . . reprogrammable for tomorrow's. Choice of functions is limitless, and most features are available for EVERY Series 10, Series 25 and System 21 matrix **EVER BUILT!**

- **Simple Operation**—downloadable input assignments, one per button
- **More Inputs**—reprogrammable as 100 input, downloadable alpha-numeric controller
- **Compact**—a multi-bus controller in a 1 3/4" package
- **Rearrange Matrix**—stores up to 20 salvos, one per button
- **Sequential Control**—individual dwell adjustment with random order sequencing
- **Restricted Access**—downloaded from system controller

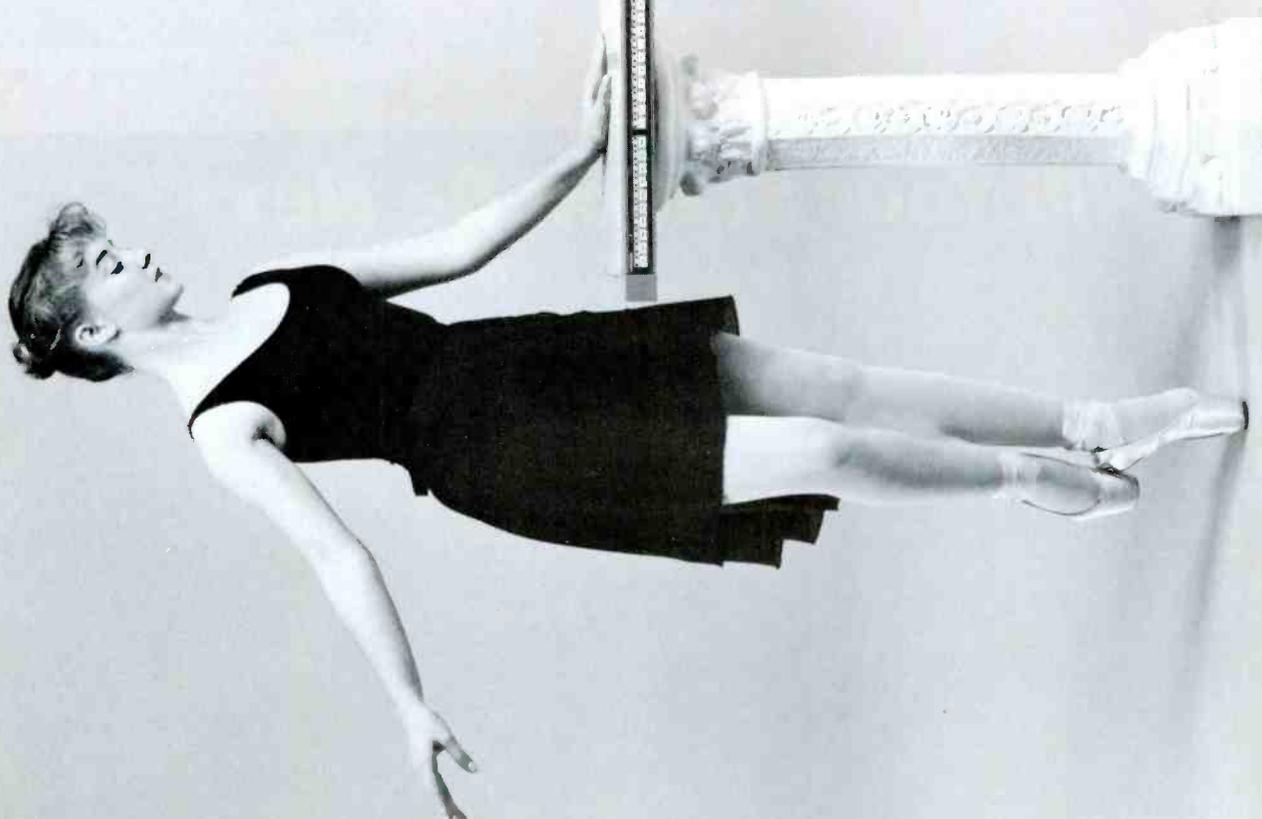
Try **THAT** in any other 1 3/4" rack-mounted panel!

And that's only a sample of what the powerful Series 1 Control Computer can do in just one configuration. Multi-level control, alpha displays and VDT interfaces are offered in other packages. The Series 1 can also give **YOUR** custom *control* panel all these features plus others you program yourself.

Isn't it time you assumed absolute control!

# DYNAIR

5275 Market Street, San Diego, California 92114 • (619) 263-7711



Leaders in  Signal Switching and Control

# Pick hits-Television

## • Ampex Video Systems Division ZEUS

A digital video processor that serves as a TBC but includes a number of other capabilities, such as Z-freeze, which freezes a video frame, but allows audio to continue. Pixel-level interpolation creates a transparent environment for image reproduction from variable VTR speeds with added digital velocity compensation. Processing by pixels removes image-degrading movement between fields that can otherwise create motion smear.



## • Barco CVS Color Video Scope

This color video monitor has a micro-processor controlling all functions and settings, yet adapts to various modes of operation. Automatic setup with a calibrated instrument handles the alignment, while a series of menus allows the operator to make non-standard settings and store them for later use through the push-button control panel. Decoding of NTSC-3.58/-4.43, PAL and SECAM video can be automatically handled. Integral test generators aid in alignment to the desired color temperature.

## • Dielectric Communications Switchless Combiner

The switchless combiner uses a phase-shifting technique to keep VHF TV or FM stations on the air during transmitter switching. A coaxial switching system usually requires transmitters to be shut down momentarily for feedline switching. This system requires two seconds to switch from a combined transmitter to single-transmitter operation. The power output from the single transmitter is one-half, rather than one-fourth, the output of combined rating.



Continued on page 58

## Will Your Station Be Next?

One violent strike and you're fried—downtime and lost revenue. Only our unique surge protection truly handles the big hits without exposing your equipment. Competitive systems can't. Before you get hit... call us.



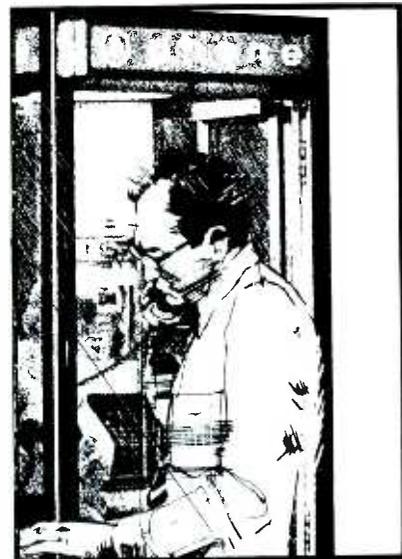
**L.E.A. Dynatech**

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*The Original*

# Dial-up Transmitter Remote Control



CHECK PARAMETERS ANYWHERE

**GENTNER**  
RF PRODUCTS DIVISION

## **VRC-1000 - REMOTE CONTROL/ATS FROM ANYWHERE!\***

With the adoption of FCC Docket 84-110, remote control of broadcast transmitters has been freed from the previous cumbersome requirements. Transmitters may now be remotely controlled from any location, \* using standard dial-up telephone lines.

The VRC-1000 Voice Remote Control operates on the dial-up telephone system to allow you the freedom of remote control from anywhere. You can communicate with the VRC-1000 by listening to its synthesized voice and commanding it with a Touch Tone® (DTMF) key pad or portable automatic dialer.

Serial data outputs are available as an option for CRT, logging, or personal computer use.

- 16 Metering Channels
- 16 Status Channels
- 32 Command Outputs
- VDT/Printer

*BASIC OPERATIONAL SYSTEM  
STARTS AT*  
**\$2795.**



- **Full Automatic Transmission System (ATS) Capability.** All 32 command outputs can be set to automatically be activated from any of three sources. The four tolerance levels on each metering channel can be set to cause an automatic output, such as power control. Changes in status channels can cause a command to be activated. Twenty time of day functions are also possible. In total there are **116 Automatic Command possibilities!**
- **Synthesized voice reporting.** The VRC-1000 literally talks to you to report conditions. With over 700 words in memory, it can be set up (using a simple set-up procedure) to say **what you need it to say in reporting conditions at your transmitter.**

\*FCC Authorized & Notified for Broadcast applications.

CAN BE USED WITH ANY VIDEO  
DISPLAY TERMINAL OR PERSONAL COMPUTER.

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RF PRODUCTS DIVISION

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With low key lighting, differential lag can be a problem. Amperex Plumbicon tubes with built in bias light increase the speed of response of the layer, and lag is virtually eliminated.



Comet tailing and loss of detail in highlights are minimized by using the Amperex patented Diode Gun or anti-comet tail (ACT) tube. Both solve this problem by providing high beam current to stabilize highlights.



High audio levels can produce the annoying problem of microphonics. Amperex attacked this at its source, and all Amperex Plumbicon tubes have a unique mesh designed to prevent the build-up of mesh vibrations—not just to dampen them.



## Six of TV's toughest shots and how

the problem of image retention. By examining layer physics and semiconductor properties Amperex developed a new extended red layer. Now you can include brilliant reds in your scene without concern for image retention.

Low output capacitance Amperex Plumbicon tubes help maintain high signal to noise performance. This helps prevent loss of detail and increased video noise in low light areas of high contrast scenes.

Because of special photoconductive layers for each color and an optimized electron optics design, the Amperex Plumbicon tubes provide the highest resolution for each image format. This resolution is measurably higher than earlier tubes.



## Amperex Plumbicon® camera tubes handle them.

Ordinary pick up tubes can handle ordinary TV shots. But when you have to contend with low light levels and bright highlights... the glare of reds and the glare of trumpets... you need the extended performance of Amperex Plumbicon® TV Camera Tubes.

Amperex invented and refined the pick up tube technology that makes it possible to handle the 6 toughest shots in TV. Since the original Plumbicon cameras were introduced, your business has become more competitive, more demanding. Camera designs have become more complex. That's why we continued to invest in improving the performance of the Plumbicon tubes. That's why we offer today's range of extended performance Plumbicon tubes.

Today, virtually every TV camera system — domestic or imported — is designed to use the Plumbicon tube. And that makes the handling of the toughest shots in TV very easy. Simply specify Amperex Plumbicon TV camera tubes.

Made in Rhode Island, U.S.A. Delivered to you in twenty-four hours or less.

For more information call or write Imaging Products Group, Amperex Electronic Corporation, Slatersville, Rhode Island 02876. (401) 762-3800. A North American Philips Company. Outside the U.S.A. contact: Philips Electronic Components and Materials Division, 5600 MD Eindhoven, The Netherlands.

### **Amperex®**

*Amperex Imaging Products  
... we see things your way.*

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Continued from page 54

• **Faroudja Laboratories CTE-N video encoder**

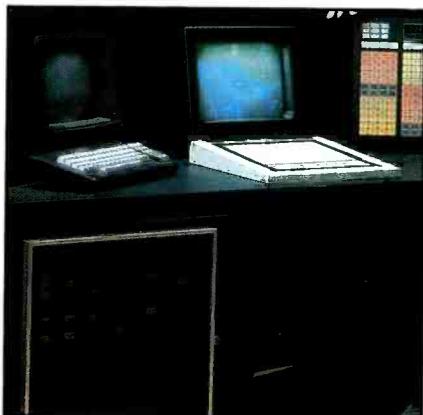
A different concept in circuit design allows this video encoder to produce NTSC signals with improved clarity and definition. An NTSC signal, free of cross-color and cross-luminance, results from

true I/Q modulation and prefiltering of luminance and chrominance. Spectral overlap is reduced by the filtering process. If decoded by a complementary decoder unit, the signal is nearly equivalent to RGB components. Quality on home receivers is also improved.



• **Kavouras Triton weather graphics system**

Enhanced graphic display software for this weather graphics system clarifies weather information for TV viewers. Smooth animation features of the updated system allow viewers to see how weather systems move.



• **Panasonic Industrial Company M-II format**

The latest 1/2-inch videocassette format approaches the quality of the 1-inch C with a reduction in equipment size and cost. Metal-particle cassettes, up to 90 minutes in length, allow high-frequency components to be recorded, increasing the overall signal bandwidth. The R-Y/B-Y component format includes equipment for studio and ENG production as well as editing and on-air playback. Variable-speed playback with an appropriate TBC is possible.



• **Tektronix 1720/1730 vector and waveform monitor**

The vectorscope and waveform monitor pair provide necessary utility signal monitoring with additional measurement capabilities. Complete line

select on the WFM unit is tracked by the vector display. Simultaneous A and B input and dual vertical-filter displays aid signal comparisons. A front-panel recall button retrieves a programmed instrument setting.



• **Magni Systems 2015 PCATS PC-aided TV signal synthesizer**

A computer controls this test generator for standard RS-170A, 525/60 test signals or other specialized patterns. The system can, for example, produce signals

with a horizontal period ranging from 10 to 200µs to accommodate test and measurement requirements from NTSC to HDTV. A 30MHz bandwidth, 10-bit D/A conversion and floppy disc library of signals serve any studio.

**New products**

Hundreds of new products were introduced at the NAB convention in Dallas. The BE Show of Shows feature (see page 62) provides a comprehensive summary of all the new products unveiled at the convention. Reader service numbers are provided so that you may receive additional information on the products of a particular company.

Because the NAB convention is the major new product showcase for the broadcast industry, keep this reference issue on hand as a guide to the latest information on new equipment and engineering trends. Whether or not you attended the convention, the BE Show of Shows summary should be an important element in any new product purchase decision.

With a show as large as the NAB, you can't tell the players without a scorecard. Use ours.

# The ITC "Component System" Listeners Will Love It!



Provide impressive on-air sound for even the most discriminating listener at an unbelievable price/performance relationship.

## The Best of Both Worlds

The ITC "Component System" combines the quality of digital source material with *all* the operational flexibilities of an all-cart format. Simply record from a compact disc onto a ScotchCart®II broadcast cartridge using a 99B master recorder with ELSA, then play back on a DELTA reproducer!

## Separately, These ITC Components are Impressive, Together They're Awesome!

Cartridge, tape and machines have been designed by a single manufacturer to compliment each other like never before and produce uncompromising audio quality.

1. 99B Master Recorder—Loaded with features
2. ELSA—A patented automatic cartridge preparation system
3. DELTA Reproducer—Outstanding audio performance in a reliable, mid-priced cartridge machine

4. ScotchCart®II Broadcast Cartridge—Capable of frequency response equalling professional reel-to-reel performance

Allow ITC's "Component System" to provide your facility with the operational flexibilities of an all-cart format while you offer your listeners impressive on-air sound they are sure to love.

When newer technology emerges, it will come from International Tapetronics Corporation/3M, "The Leader in Reliability and Service."

Call today to discuss financial options and the unbelievable price/performance benefits of the ITC "Component System." In the U.S., call toll-free **800-447-0414**, or collect from Alaska or Illinois **309-828-1381**. In Canada, call Maruno Electronics, Ltd. **416-255-9108**. In most countries outside the U.S. and Canada, information on ITC equipment can be obtained through local distributors.

**International Tapetronics Corporation/3M**

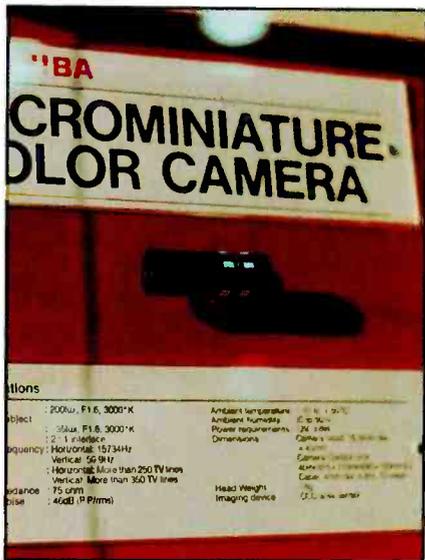
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P.O. Box 241  
Bloomington, Illinois 61702-0241

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# 3M

• **Toshiba Microcam CCD camera**

This CCD camera suggests applications for investigative reporting. Its small size (½-inch diameter and 2-inch length) is easily disguised in surveillance applications. A single CCD includes a spatial striped filter on the face of the device to sample the image color and, with the control unit, to produce a respectable, interlaced color image. Connected to the control unit through a single, thin cable, the camera can be submerged in water with no ill effects.



• **Varian EIMAC/X-2252 Klystron**

The Klystron combines the characteristics of a tetrode power tube with those of a klystron for more efficient UHF transmissions. Beam creation and input circuitry use tetrode concepts, while the output stage of the device in-

corporates the resonant cavity of the klystron. Operating in a Class B mode, the device may reach efficiencies between 50% and 63% at UHF frequencies. Power-handling capabilities reach 60kW, while equipment size, replacement cost and operating cost are reduced. [:-?-)]]]]]]

# Whose new AGC makes your Optimod® sound even better?



Only the new Harris Ulti-Mate 91 Tri Band AGC! Here's more subtle signal control than you'll get from anything else on the market.

**110 dB dynamic range improves any audio source**

You'll hear the difference immediately. Put Ulti-Mate in front of your Optimod® or other audio processing system for remarkable sound enhancement. With its unprecedented 110 dB dynamic range, not even digital source material is degraded.

**Beef up your audio chain**

Ulti-Mate's phase coherent design insures waveform fidelity and minimizes distortion as signals are processed and amplified. The linear VCA allows extraordi-

nary processing capability to enhance even the purest system.

**Stereo ready**

When you're ready for stereo—whether it's AM, FM or TV—so is Ulti-Mate 91. It's totally compatible with all broadcast stereo systems. And it can drive your STL, too.

**Takes only 1¼" of rack space**

The Harris Ulti-Mate 91 Tri Band AGC slips neatly into 1¼" of vertical rack space (3½" for stereo version). Adjustments are deftly concealed but easily accessed through a slide-out drawer. And if unauthorized adjustments are a concern, secure tamper proofing is easily achieved.

**First-rate equipment for first-place ratings**

Good sound is the currency of Radio; it buys audience. Ulti-Mate gives you better dynamic equalization through the phase coherent Tri Band AGC, for markedly improved signal transmission. At a surprisingly low cost.

The Harris Ulti-Mate 91 Tri Band AGC. Audio processing has never been this good. For more information, contact Harris Corporation, Studio Division, P. O. Box 4290, Quincy, Illinois 62305. 217/222-8200.



**For your information, our name is Harris.**

Optimod® is a trade name of Urban Associates Inc.

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# YOU TALKED AND WE LISTENED

The Centro SNG Networker is the result of extensive research into your network news requirements.

- Vehicle chassis and suspension engineered to carry heavy SNG components.
- Unparalleled Centro quality in an attractive affordable package.
- Available in a rugged standard package with many options for your specific requirements.
- 2.3 meter dish with 49.5 Dbi gain and selectable-adjustable vertical and horizontal polarization from inside the vehicle.
- Three year unlimited mileage, limited chassis warranty and serviceable in over 4,500 locations throughout the United States.
- Engineered, designed and constructed to meet your most demanding SNG requirements.

Call us today and compare our services and prices.

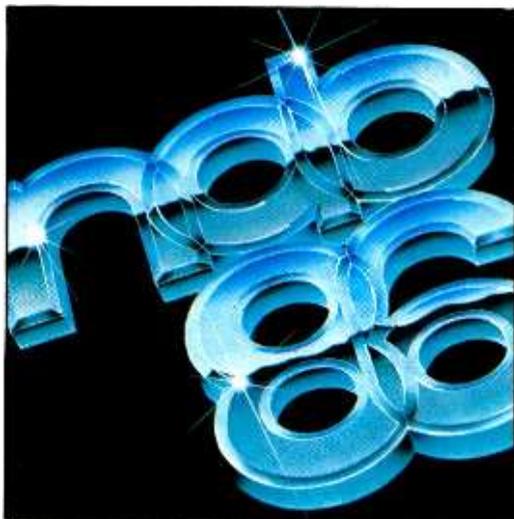


**CENTRO CORPORATION**  
9516 CHESAPEAKE DRIVE  
SAN DIEGO, CALIFORNIA 92123

(619) 560-1578

See the Networker at RTNDA Booth #319

Circle (41) on Reply Card



# Show of shows

**The 1986 NAB convention brought together nearly 700 exhibitors, 39,000 attendees and thousands of new products.**

**T**he BE "Show of Shows" feature provides coverage of each exhibitor at the convention. Our presentation highlights the new products from all broadcast equipment manufacturers. If a company had no new products at the convention, we detailed its existing line of products that were on display.

Each exhibitor listing is accompanied by a reader service number. If you missed a particular booth or were not able to attend the show, circle this number on the reader service card in the back of this issue to obtain more information from the manufacturer.

#### **ADC Telecommunications**

- PATCH kit: complete do-it-yourself patchbay kit.
- S.A.I.L.S. kit: self-adhesive identification labels for patchbays.
- V.A.M.P.: modular A/V patchbay; audio features tip, ring, sleeve and normals to QCP termination; 20 modules per chassis.

Circle (301)

#### **ADM Technology**

- BCS3243-PC: PC interface to mixing console; computer stores, recalls mixer setups or setup sequences.

Circle (302)

See ad on page 19

#### **AEG Telefunken**

- M-20 series: ¼-inch, ½-inch 2-track and in-center time-code track models; 4-speed,  $\mu$ P-deck and circuit control; 3-formulation alignment memories.
- TRS-9100: phono turntable; direct constant speed, reverse drive; 3-speed crystal-control; 250ms start/stop; 0.04%DIN wow/flutter.

Circle (303)

See ad on page 103

#### **A.F. Associates**

- Pegasus 5100: commercial compilation system.

- Pegasus 5150: commercial presentation system with VTR interface; single spot or composite reel playback.
- Audix assignable audio consoles.
- Access: Audix digital intercom.
- AVS 6500: standards converter and video processor.

Circle (304)

#### **AKG Acoustics**

- C4600: mic housing with integral pre-amp module.
- CK3X capsule: hypercardioid element.
- CK61: ULS series of cardioid and omni capsules for C460B assembly.
- Q-34: headset with boom.
- K-240DF: studio monitor headphones.

Circle (305)

#### **ALTA Group**

- Cygnus: video production system; infinite window TBC, video effects, image enhancement, DOC, 4x1 A/V routing switcher, picture freeze.
- PAL PYXIS: video production system for PAL standard; work station for production without switchers.

Circle (306)

See ad on page 144

#### **AMCO Engineering**

- Equipment consoles, EMI racks, computer desks; aluminum structural systems; blowers, fans.

Circle (307)

#### **AMEK Consoles**

- APC 1000: soft console; centralized redundant switching and control functions from logic-driven key entry pad; to 128 inputs and 64 buses.
- BC II: open-architecture audio console; user-configurable with audio-follow.

Circle (308)

See ad on inside back cover

#### **AMP Products**

- Connectors, installation tools.

Circle (309)

#### **ART/Applied Research & Technology**

- 173 equalizer: dual ⅓-octave graphic EQ; 15-band control on ISO frequencies; active-

balanced inputs; transformer-balanced outputs.

- 174 equalizer: ⅓-octave graphic EQ; 31-band control on ISO frequencies; balanced inputs, outputs.
- DR1 software: includes Performance MIDI, extended MIDI and Flanger/Chorus algorithm.

Circle (310)

#### **AT&T**

- Skynet: Ku-band SNG satellite service.
- Targa 16: TrueVision advanced raster graphics adapter; combination frame grabber/buffer for AT&T and compatible PCs.
- TrueVision: image generation, processing, manipulation software.

Circle (311)

#### **AVS**

- AVS 6500: digital TV standards converter; NTSC-3.58/-4.43, PAL, SECAM, optional PAL-M frame freeze, multigrab, TBC, noise reduction, synchronizer functions; RGB outputs.

Circle (312)

#### **AVSC**

- McCurdy 2200: full duplex audio teleconferencing system.

Circle (313)

#### **Abbott & Company**

- Safety Lock: connector interlock; high-power type; assures ground connection is first in, last out.

Circle (314)

#### **Abekas Video**

- A53-D: 3-D effects of perspective, rotation and variable rotation axis; a total of 36 on-line, programmable and protected effects; operation from up to four control panels; interfaces to A62 digital disk recorder to create unlimited layers of video.
- Component A52: full bandwidth, 2-D component digital special effects system; A and B inputs of RGB or Y/R-Y/B-Y signals; uses same control panel as the original A52 system as well as the DataKey

16 input

THE FINEST COMPACT SWITCHER AVAILABLE



Introducing the RVS 216 — the compact production switcher for situations when ten inputs just are not enough. Along with sixteen inputs, the 216 provides all the production power of the Ross Multi-Level Effects system, and features that include built-in memory, analog key border generator and serial interface to editing systems. The Ross 216 is the best switcher value you'll find. And best of all, it comes with the Ross Video reputation for dependability and customer service.

# RVS 216



Circle (43) on Reply Card

Ross Video Limited, PO Box 220, 500 John St., Iroquois, Ont. Canada K0E 1K0 613-652-4886 Telex 05-811579  
Ross Video Inc., PO Box 880, Ogdensburg, New York, USA 13669-0880



# Back to the Future

- A complete line of TV and FM Broadcast Antennas
- Modern 7,000 ft. test range facilities
- Innovative Engineering Careful construction
- Two Year Warranty on Product and Workmanship



Still the same fine Products, Staff, Address, Telephone & Telex, with Fast Service Too!

**JAMPRO ANTENNAS, Inc.**  
*formerly Cetec Antennas*  
**6939 Power Inn Road**  
**Sacramento, CA 95828**

*Excellence in Antennas*  
**JAMPRO ANTENNAS, INC.**  
**(916) 383-1177**    **TELEX 377321**

Circle (44) on Reply Card

#### *Abekas Video, continued* effort memory device.

- A62 digital disk recorder: production models; real time record and playback of 50- or 100-second segments; random access; internal digital matting; sequence editor.
- A42 video slide projector: Winchester storage of 1,050 frames/2,100 fields; adaptive digital signal processing; library system file management.

Circle (315)    **See ads on pages 5, 7**

#### **Accu-Weather**

- WeatherMate 350: allows DIFAX charts to be produced with inexpensive printer.
- Data delivery: satellite relay of FAA 604, NAFAX, DIFAX through SISCORP satellite system.

Circle (316)

#### **Acoustic Systems**

- Prebuilt studios: for broadcast, recording and production; soundproofed.

Circle (317)

#### **Acquis Ltd.**

- ECS-225: 8-machine PAL edit control; fully assignable for VTR format mix.
- ECS-195: 2-machine A/B edit control; time-code-based, full EDL management.
- ECS-1000: 6-machine, multiformat edit control, assignable multirecorder capability, EDL, auto assemble, time-code features.

Circle (318)

#### **Acrian**

- UHF TV final amps: TV30U, 30W; VF60U, 60W; TV120U, 120W; for UHF translators, transposers; soft-failure feature gives redundancy reduced power.

Circle (319)

#### **Acrodyne Industries**

- TRL series: lowband VHF TV transmitters, 20kW to 60kW.
- TRH series: highband VHF TV transmitters, 20kW to 60kW.

Circle (320)

#### **Adams-Smith**

- 2600 A/V: editing system keyboard, display and computer; for audio/video editing with audio sweetening, audio-for-video track building; multitransport control.

Circle (321)

#### **Advanced Designs**

- DOPRAD II: weather radar graphics; Doppler technology with 8-plane display; 256 of 16.8 million colors per screen; range height vertical storm cross sections; auto sequences; 5-320 nautical mile range.

Circle (322)

#### **Advanced Micro-dynamics**

- TC-8: remote-control system; 8-channel system, metering, status, raise and lower functions; optional computer interface; radio or wire link.

Circle (323)

#### **Advanced Music Systems**

- AudioFile: digital audio record/play system; hard disk medium; linear 16-bit sampling.

Circle (324)

#### **Agfa-Gevaert**

- PEM 297D: digital audio mastering tape.
- PE 616/618: bulk audiocassette tape.
- PEM 649: standard bias mastering tape; 5,000-foot length.
- Studio Performance: improved formulation VHS tape.

Circle (325)

#### **Alamar Electronics**

- ALA-CART: machine control system; single event channel; ESBUS controls three VTRs and switcher; optional as-aired log.
- Media Manager: film, videotape library catalogue system; search by description, length, program type.

Circle (326)    **See ad on page 150**

#### **Alden Electronics**

C2000R dial-up radar updates:

- 2-color backgrounds: brown earth, blue water.
- Four ranges: 25, 50, 100, 200 nautical miles.
- Full cue mode; programmed sequences available to on-air meteorologist through remote cue button.
- Picture memory increased to 16 minimum, 64 maximum images.
- Programmable autodialer accesses radar source to receive images.

Circle (327)    **See ad on page 177**

#### **Alexander Manufacturing**

- Tri-Analyzer: battery maintenance, charger system.

Circle (328)

#### **Alias Research**

- Alias/1: graphics design system; 3-D images; paint, animation, rendering, text and business graphics software; photographic and printer outputs.

Circle (329)

#### **Allen Avionics**

- VNE-75: noise eliminator for high-resolution wideband TV video.
- VES series: equalized delay lines, 5.5MHz and 11MHz bandwidths.
- VW series: variable video, pulse delays; 317ns, 635ns, 1,270ns, 2,075ns maximums.
- VRM1100: pulse, video delay line, adjustable to 1,100ns.

Circle (330)    **See ad on page 116**

#### **Allied Radio Equipment**

- AMCDX-1000A: Audio-Metrics programmable CD player for random access to 100 CDs.
- CompuSonic 1500: digital audio storage system.

Circle (331)

#### **Allied Tower**

- Towers, tower products for communications facilities.

Circle (332)

#### **Alpha Audio**

- SONEX: acoustic absorbing material.
- Noise barriers, sound absorbers.

Circle (333)    **See ad on page 112**

#### **Alpha Automation**

- BOSS 8400: audio and audio-for-video editing control system with 16-bit  $\mu$ P.

Circle (334)

*Continued on page 74*

# The Ones to Watch!

## KEGAMI'S BROADCAST & INDUSTRIAL MONITORS: WE HAVE WHAT YOU'RE LOOKING FOR

Whether you're looking for broadcast or industrial color or B&W monitors, one look at an Ikegami 9, 10, or 3H series monitor and you'll look no more.

And now everyone can afford to own an Ikegami monitor with prices starting at under \$400 for our new PM9-5, 9" monochrome model.

Ikegami's 9 series high resolution broadcast television monitors utilize In-Line Gun self converging cathode ray tubes with American Standard matched phosphors and are available in a 20, 14 and 10 inch models.

The 10 series resolution broadcast television monitors utilize Delta-Gun tubes to achieve maximum brightness and exceptional convergence and are available in 20 and 14 inch versions.

The 3H series high resolution broadcast television monitors feature high quality monochrome displays suitable for sophisticated broadcast studio applications. Available in 9, 14, single and dual 9 inch monitors.

For a complete demonstration of Ikegami monitors and cameras, contact us or visit your local Ikegami dealer.



**Prices Start At Under \$400**

# Ikegami

Ikegami Electronics (USA), Inc. 37 Brook Avenue Maywood, NJ 07607

East Coast: (201) 368-9171 West Coast: (213) 534-0050 Southeast: (813) 884-2045 Southwest: (214) 233-2844 Midwest: (312) 834-9774

[www.americanradiohistory.com](http://www.americanradiohistory.com)

# The Breakthrough!

## IKEGAMI'S HK-323 1" FIELD/STUDIO BROADCAST CAMERA BEGINS A NEW ERA

Ikegami's newest field/studio broadcast camera achievement has arrived—engineered and designed to provide the user with features beyond expectations.

The HK-323 1" features self-contained operation, numerous auto set-ups in any mode, a built-in encoder and sync generator, high performance prism optics, self-diagnostic functions, a control panel that connects directly to the camera head, a S/N ratio of 59dB and more—all in a camera weighing only 55 lbs.

In addition, the HK-323 1" is equipped with a 7" viewfinder featuring pan and tilt, and special functions that include Chroma Aperture for sharpest picture quality regardless of color or lighting; Highlight Compression Circuitry for broadcast contrast range; Soft Detail to eliminate harsh or overwhelming presence; Auto Beam Control, and more.

A companion hand-held camera is also available and is operational off the same base station.

Optional remote control is available in: triax, multicore and fiber optics.

Compare the HK-323 1" to any camera in its class and find out why the lightest field/studio camera is also the biggest value.

For a complete demonstration of the HK-323 1" and other Ikegami cameras and monitors, contact us or visit your local Ikegami dealer.



# Ikegami

Ikegami Electronics (USA), Inc. 37 Brook Avenue Maywood, NJ 07607  
East Coast: (201) 368-9171 West Coast: (213) 534-0150 Southeast: (813) 884-2046  
Southwest: (214) 233-2944 Midwest: (312) 834-9774

# The Wait is Over!

## IKEGAMI UNVEILS THE 2/3" FIELD/STUDIO CAMERA STANDARD

When Ikegami engineered the all new HK-323 field/studio camera, their first priority was to make this advanced technology camera available to all preferences.

The result: the HK-323 1" and the HK-323 2/3"—two tube sizes to meet the broadest range of preference, application or budget.

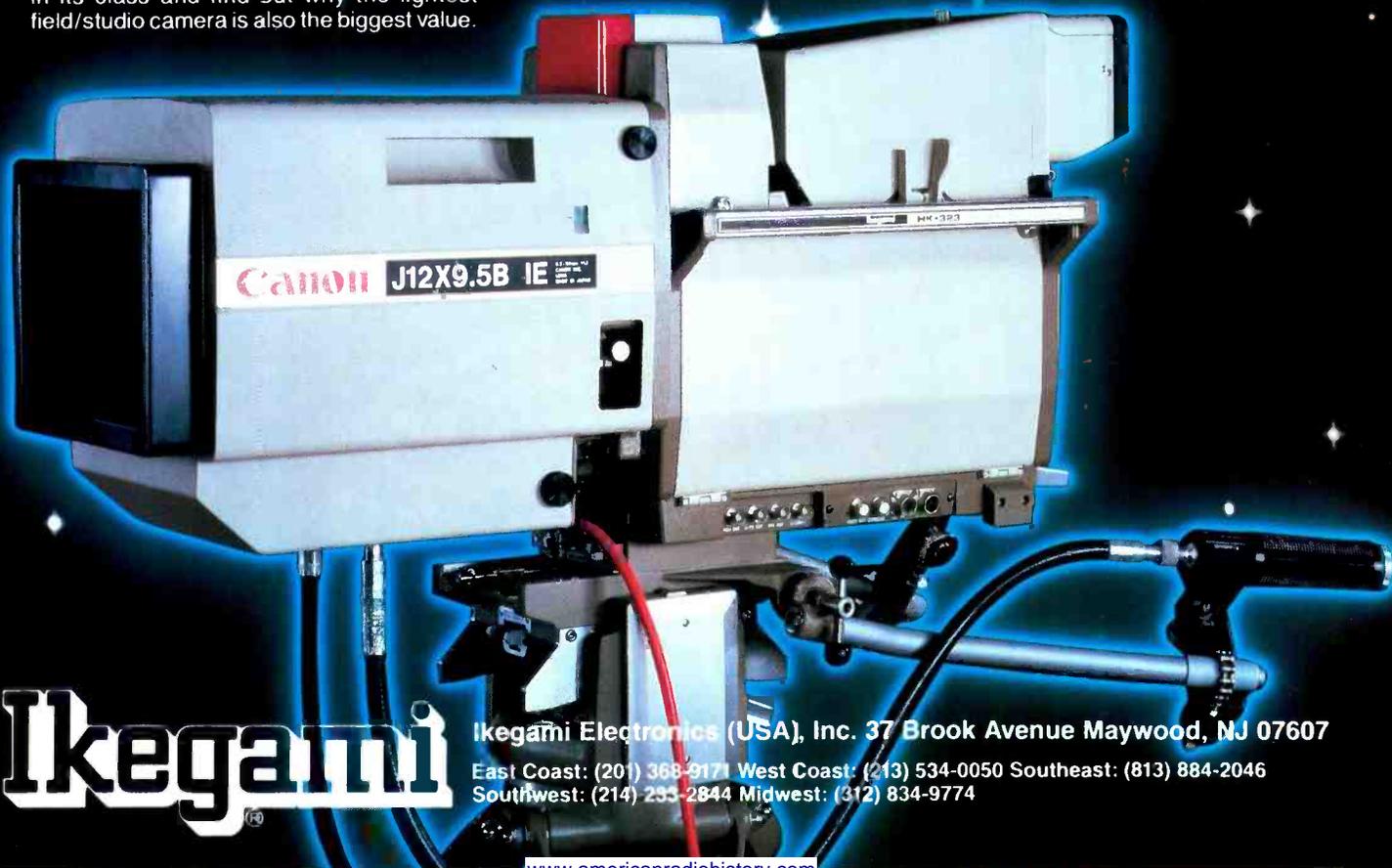
Like the 1", the HK-323 2/3" features self-contained operation, numerous auto set-ups in any mode, a built-in encoder and sync generator, high performance prism optics, self-diagnostic functions, a control panel that connects directly to the camera head, a S/N ratio of 60dB and more—all in a camera weighing only 55 lbs.

The HK-323 2/3" is equipped with a 7" viewfinder featuring pan and tilt, and special functions that include Chroma Aperture for sharpest picture quality regardless of color or lighting; Highlight Compression Circuitry for broadest contrast range; Soft Detail to eliminate harsh or overwhelming presence; Auto Beam Control, and more.

A companion hand-held camera is also available, and is operational off the same base station.

Optional remote control is available in: triax, multicore and fiber optics.

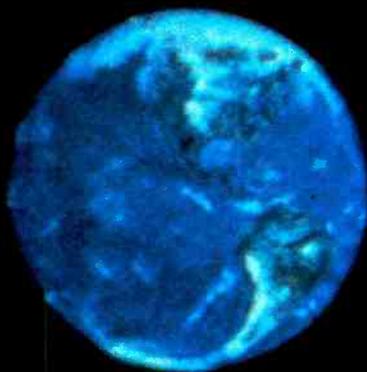
Compare the HK-323 2/3" to any camera in its class and find out why the lightest field/studio camera is also the biggest value.



# Ikegami

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Southwest: (214) 255-2844 Midwest: (312) 834-9774



# ENGenius!

IKEGAMI HL-95 IS  
THE CROWNING ACHIEVEMENT OF THE 80's.

The engineers at Ikegami have just enhanced the finest ENG component camera in the industry, by making it the most versatile.

Now the Ikegami HL-95 camera head can be the crown jewel of your 1/2" Beta ENG system, as well as three other configurations including 3/4", 1/4" and MII formats.

Considered by many as the most impressive and important hand-held camera breakthrough of the 80's, the HL-95 achieves total operational flexibility without compromising strict performance, sensitivity, resolution and registration.

Featuring registration stability without adjustment (proven over many weeks); better shoulder balance; better low light level sensitivity (1.5 ft. candles); better S/N for given low light levels (proven in exhaustive comparison tests); plus minimum maintenance, weight and power consumption. The Ikegami HL-95 far outdistances any camera in its class. It's pure ENGenius.

For a demonstration of the HL-95 and other Ikegami cameras and monitors, contact us or visit your local Ikegami dealer.





# The Outperformer!

IKEGAMI'S HL-79E IS MORE VERSATILE THAN EVER

Ikegami's HL-79E has lived up to its billing as the greatest achievement in hand-held camera technology, a claim supported by an increasing number of 79 series purchasers, presently in excess of 5000.

And yet, today, the engineers at Ikegami have found a way to improve the camera. Now, when equipped with the new VBA-1 adapter, the HL-79E is totally compatible with the Sony Beta recorder.

On your shoulder, the HL-79E is still unmatched in performance with features that include Dynamic Detail Correction, Chroma Aperture Correction, Highlight Aperture Correction and Auto Contrast Compression. Plus the HL-79E offers superior contrast range, S/N ratio, registration accuracy, resolution and more.

On a tripod, the HL-79E becomes the premier EFP camera which can be used in various systems configurations and controlled remotely by the MA-79 Multicore Adapter, through multi-core cable (up to 300 meters) or by the TA-79E triax adapter through triax cable (up to 2000 meters).

The camera can be set up using conventional manual techniques or an optional microprocessor assist.

For a complete demonstration of the HL-79E and other Ikegami cameras and monitors, contact us or visit your local Ikegami dealer.

## Adapts to Sony Beta Recorder



# Ikegami®

Ikegami Electronics (USA) Inc. 37 Brook Avenue Maywood, NJ 07607  
East Coast: (201) 368-9171 West Coast: (213) 534-0050 Southeast: (813) 884-2046 Southwest: (214) 233-2844 Midwest: (312) 834-9774

# Still The One!

## IKEGAMI'S HK-322 STUDIO CAMERA REMAINS AHEAD OF ITS TIME

Years after its introduction, the HK-322 is still the choice of many for solid studio camera performance.

We think it's because people don't like to tamper with a winner. And the HK-322 is certainly that—a winner.

The Ikegami HK-322 broadcast studio camera, equipped with 30mm or 25mm Plumbicon® tubes, features: standard diode gun or ACT pick-up tubes, advanced operational automatics including auto pedestal control and auto highlight compression, complete auto set up, diagnostics and a wide range of special features.

The HK-322 can be furnished with mini camera cable (up to 600 meters) or optional triax for lengths up to 1500 meters. Two types of camera control systems are available with an optional control panel configuration to suit user preference.

For a top-of-the-line broadcast studio camera, the HK-322 is still the one.

For a complete demonstration of the HK-322 and other Ikegami cameras and monitors, contact us or visit your local Ikegami dealer.

A detailed photograph of the Ikegami HK-322 broadcast studio camera system. The camera is mounted on a pedestal and is connected to a control console. The console features a large monitor screen and various control panels. A prominent label on the console reads "Canon P18x15B IE". The camera and console are set against a dark background with a blue glow and a red starburst light effect in the upper right corner.

# Ikegami

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# Alone At The Top!

IKEGAMI'S TELECINE SYSTEM  
STANDS ALONE AS THE BEST



The one and only name in Telecine Camera Systems is Ikegami. And now Ikegami offers complete Telecine systems including two photoconductive telecine cameras, optical multiplexer, 35mm slide projector, 16mm motion picture projector as well as audio/tally interface panels and machine controls.

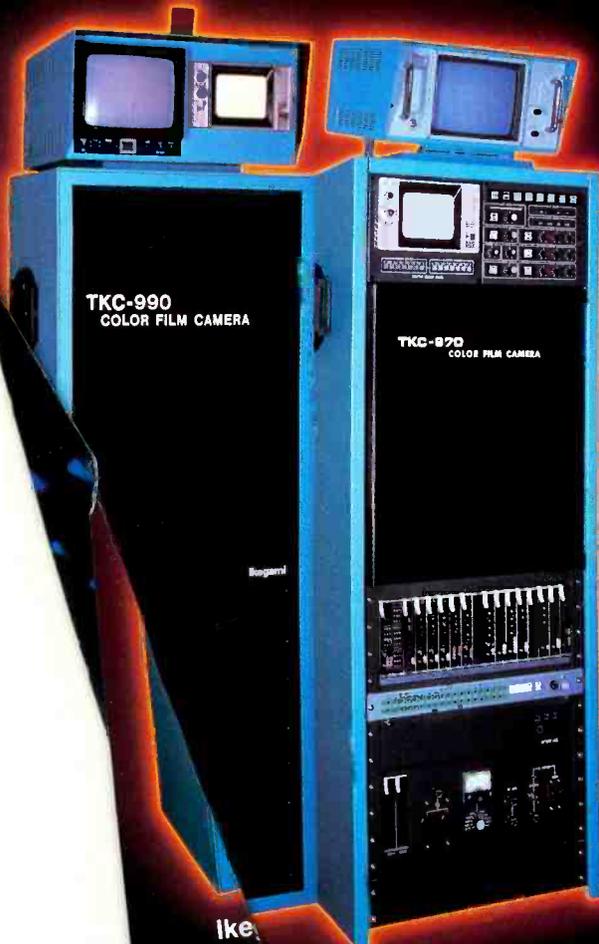
Both cameras, the TK-970 and TKC-990 utilize photoconductive 1 inch Vidicon tubes (Salicon® are optional) and provide consistent highest quality performance and reliability in on-line applications such as local viewing or direct on-air broadcast and off-line where the vidicon signal is recorded.

The TKC-990 features computer-controlled automatic set-up of the camera operating parameters, as well as automatic set-up of registration level, shading and detail correction for up to three input projectors.

Both cameras utilize a built-in large image field lens, neutral density disc for automatic light control and automatic color balance circuitry.

The FPH-16 16mm telecine projector, SPR-35 35mm slide projector and MPK-3V optical multiplexer round out a system that stands alone in the industry.

For a complete demonstration of Ikegami Telecine Systems as well as our cameras and controls, contact us or visit your local Ikegami dealer.



Ikegami

Ikegami Electronics (USA), Inc. 37 Brook Avenue Maywood, NJ 07607  
800-451-4668 West Coast: (213) 534-0050 Southeast: (813) 384-2146  
Southwest: (214) 233-2844 Midwest: (312) 834-3774

# Ikegami®

To find out more about Ikegami's cameras, monitors, or telecine system, please fill out this postage-paid card today.

NAME \_\_\_\_\_

TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

PHONE ( \_\_\_\_\_ ) \_\_\_\_\_ ext. \_\_\_\_\_

I am interested in finding out more about the following product(s) :

- HK-323 1" Field/Studio Broadcast Camera
- HK-323 3/4" Field/Studio Broadcast Camera
- HK-322 Studio Broadcast Camera
- HL-95 Unicam ENG broadcast camera system
- HL-79E ENG/EFP broadcast camera
- ITC-730A ENG/EFP broadcast quality camera
- SC-500 Studio broadcast quality camera
- Monitors  Color  B&W
- Telecine Systems

To assist us in serving you, please fill out the following:  
My purchasing interest in the above Ikegami product(s) is:

- Immediate  Call to arrange for a demo
- 3 months  6 months  1 year

My budget for the product categories above is:

- Under 20,000  100,000-250,000
- 20,000-50,000  Over 250,000
- 50,000-100,000

I presently own the following cameras, monitors and/or telecine systems. Please list manufacturer, model and amount.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If you present \_\_\_\_\_ wn Ikegami equipment, which dealer was it \_\_\_\_\_ chased from?

\_\_\_\_\_

*Thank you for ,our interest in Ikegami products.*

# Ikegami



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NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

**BUSINESS REPLY MAIL**

FIRST CLASS

PERMIT NO. 2486

MAYWOOD, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

**Ikegami**

IKEGAMI ELECTRONICS (USA), Inc.  
37 Brook Avenue  
Maywood, NJ 07607



# When You Have to Get it Right the First Time—Reach for HME.

There are very sound reasons why professionals reach for HME when the show goes on.

**Dependability.** HME knows the vital need in your business for reliable equipment. We think we build the best wireless microphones, as well as the best wireless intercoms and cabled intercoms available anywhere. They're rugged, built from top quality components, and assembled with HME's Pride in Excellence.

**Performance.** You'll please the most demanding performers with an audio quality that's second to

none. Dynamic range and immunity to interference are unsurpassed.

**Service after the sale.** No one reacts like HME in the event you need assistance. Now we have direct telephone lines to Customer Service—the people with the answers. Should your system ever require repair we'll turn it around faster than anyone in the business.

Call us today for all the details. See why more professional sound engineers rely on HME when performance is on the line.



**HME manufactures:**  
Wireless microphones  
Wireless Intercoms  
Cabled Intercoms

**h m e**  
HM ELECTRONICS, INC.

9675 Business Park Avenue, San Diego, CA 92131, U.S.A.  
Phone (619) 578-8300 Telex: 350-771

Circle (45) on Reply Card

### Alpha Electro

- Stabilizer/enhancer: video processor, modulator, power supply.
- Video channel remote-control center.
- Connectors.

Circle (335)

### Alpha Video & Electronics

- VO-6800: modification increases video bandwidth to NTSC; integral SMPTE time-code generator; balanced audio; for type 5 VCRs.
- Direct 3/4: direct color playback of color-under and SP tapes; noise reduction; integral TBC; for type 5 and BVU-800 VCRs.

Circle (336)

See ad on page 188

### Altronic Research

- 5708B: Omegaline single-resistor, water-cooled, 80kW dummy load.

Circle (337)

### Amber Electro Design

- System 5500: software enhancements for stereo phase, distortion and noise measurements and dcV metering.

Circle (338)

### Amherst Electronic Instruments

- Digital video image processor.
- Edit control system.
- Machine automation system.

Circle (339)

### Amperex Electronic

- NXA1030 CCD: frame transfer device for B/W NTSC cameras; 604x576 matrix, NXA1010 for PAL.
- NXA1040 CCD: with striped filter for single-chip NTSC color camera; 604x576 pixel resolution, NXA1020 for PAL.
- XQ1430: 30mm high-resolution, triode gun Plumbicon without bias light; XQ1433/1435 extended red versions.
- XQ3410: 30mm tube for 1-inch scan; LOC DG design; bias light for high sensitivity; XQ3415 extended red type.
- XQ3430: 30mm full-scan LOC DG Plumbicon.
- XQ1520: high-resolution ACT gun Plumbicon with bias light; XQ1523/1525 extended red types.
- YL1660: high-power amplifier tube for AM.
- 9014, YL630: broadband VHF power amplifiers.

Circle (340)

See ads on pages 56-57,155

### Ampex/AVSD

- ACR-225 prototype: digital cartridge VTR; composite video and four audio channels; on-line storage of 256 D-1 cassettes and library database for 10,000 cassettes.
- Zeus: digital video processor; TBC, synchronizer functions, tracks variable-speed VTR playback; noise reduction, image enhancement; Z-freeze.
- ADO-1000: economical 2-D optical special effects system; upgradable to ADO-2000/-3000 system.
- VPR-2 upgrade: adds stereo 1-inch VTR; by Kudelski, kit is user-installed.
- PictureMaker: 3-D graphics system by Cubicomp.

Circle (341)

See ads on pages 29,96

### Ampex/MTD

- Ampex 198: BC-20 Beta videocassettes.

- Ampex 199: M-format/VHS videocassettes.
- Shippers/hangers for 3/4-inch videocassettes.
- Package/label system: for Ampex 196 1-inch tape.

Circle (342)

See ad on page 37

### Amtel Systems

- Soundmaster editor: audio editing system.
- Soundmaster Syncro: tape deck machine control module; 32-line, communicates with IBM PC.
- TCR-500: time-code reader, character inserter.

Circle (343)

### Anchor Audio

- AN-1000: powered speaker; 50W MOSFET output; 5.25-inch height.
- AN-1400: shielded, powered speaker system; fits in 1/2-rack mount.

Circle (344)

### Andrew

- VHF transmission antennas: production models.
- Circular waveguide enhancements: improved 90° elbows.
- Improved feedline hangers: constant tension spring fixtures with Teflon lining to allow required movement.

Circle (345)

### Angenieux

- 14x7 lens: for 2/3-inch cameras, 64° wide angle; f/1.6, 7-98mm and 2X extender; macro to 0mm minimum.
- 15x9 lens: for 2/3-inch cameras, f/1.2 aperture, 9-135mm, 1.7X extender, 0.88X wide-angle attachment; diaspocope.
- 40x9.5 lens: for 2/3-inch cameras, f/1.3 with 1.8m MOD; studio and OB use.
- 40x14 lens: for 1-inch cameras, f/1.9 aperture with 1.8m for studio and OB use.

Circle (346)

### Anton/Bauer

- LTF-4 power supply: 13Vdc, 4A with 115Vac/230Vac input; snap-on mount.
- PowerStrap: 12V, 4Ah battery strap; for camera, VCR or lighting.
- UltraLight: portable lighting equipment; operates on 12Vdc from camera battery or UltraLight power adapter.

Circle (347)

See ad on page 149

### Anvil Cases

- Equipment transport cases.

Circle (348)

### Apert-Herzog

- SatSync: 32-frame solid-state memory for 1-second delay.
- VDA 1x4: video DA series; fixed gain and chroma level, adjustable gain and chroma level or dual 1x2 configuration.
- AVS16: Chentel stereo audio-follow switcher; 16-channel RS-232 datalink remote control.
- VRS16: Chentel video 16x1 video switch; RS-232 control; synchronous for composite or non-composite video.
- AVS4: Chentel 4-channel RS-232-controlled synchronous stereo audio-follow switcher.

Circle (349)

### Aphex Systems

- AVM-8000: audio vector matrix 8-channel surround sound decoder; cinema, SQ-8 and enhance modes for dimensional audio imaging.

- 103 Exciter: type C aural acoustic and spectral enhancer.
- 700 Dominator: audio peak processor; 3-band limiting control.

Circle (350)

See ad on page 100

### Apollo Audio-Video

- Studio and stage lamps.

Circle (351)

### Arben Design

- Cyc-Wedge: hard cyc mounting brackets.
- Set design catalogs.

Circle (352)

### Arrakis Systems

- 600SC: 8-channel audio mixer; VCA control; 28-input; telephone mix-minus.
- 5000 series: 16-channel audio mixer; telephone mix-minus; program, audition, mono buses.
- MODULUX: modular, custom-built studio cabinetry.

Circle (353)

See ad on page 45

### Arriflex

- ARRI HMI light ballast: 12kW rating, on pneumatic tires for transport and shock protection.
- HOTDOG: dolly for CineJib crane, floor or track; works as crab dolly.
- 35BL-4: 35mm film camera; larger exit pupil diameter viewfinder; selectable optical axis for silent or Super 35 aspect ratios; integral ARRI SMPTE optical time code simultaneous film/tape recorder.
- Lightflex: allows film gamma change by two steps in camera during shooting.
- VAFE: production model of optical time-code system for film, burns 80-bit SMPTE time code into film edge.

Circle (354)

### Artel Communications

- SL3000: laser video, data and audio transmission system options.
- T134 link: duplex T1/T2 fiber-optic data system; range to more than two miles.

Circle (355)

### Artronics

- VGA-3D: 3-D video graphics and animation; composite, component and RGB outputs; anti-aliased, smooth shading, texture mapping, fractal surfaces, multiple light-source features.
- VPL: video paint library system for image generation; 1,200-frame storage; 230,400 colors per image; menu operation; NTSC composite, component, RGB inputs, outputs.
- VGS: video graphic system; 3-D animation and/or 24-plane video paint system.

Circle (356)

### Asaca/Shibasoku

- ACL-6000C: automatic cartridge system, 600 random-access cart library; with Betacam, M or M-II decks; Dubner Computer software.
- TA70A: stereo TV sound demod; mono, stereo, SAP and pro channel outputs; for precise measurement of isolation, crosstalk, S/N.
- CB54A1 generator: Y/R-Y/B-Y component color-bar analog or R/G/B and sync TTL outputs.
- WV24A0: VTR measuring system for 525/625 signals; checks electromagnetic con-

# Canon Quality. Canon Value.

Now available in a full line of camera support products.

## MC-200/MC-300 PEDESTALS



Featuring Canon's sophisticated Modular Cassette Counterbalance (MCC) system that makes them far lighter and more mobile, Canon pedestals also feature a very short mounting height, making them ideal for low-angle shooting.

**MC-200**  
Maximum Mounting Weight:  
286 lbs.  
Elevation: 24-49 inches  
**MC-300**  
Maximum Mounting Weight:  
242 lbs.  
Elevation: 23-60 inches

## TR-60/TR-90 TRIPODS



Featuring collapsible tubular leg construction, integral spreaders, flip-tip legs with spikes and rubber padding.  
**TR-60**  
Maximum Mounting Weight:  
132 lbs.  
Elevation: 20-45 inches

**TR-90**  
Maximum Mounting Weight:  
198 lbs.  
Elevation: 26-48 inches

## SC-15 CAM HEAD

Designed for use with all pedestals and tripods, it features a convenient "V" wedge mounting system and center-of-gravity adjustment control. The modular panning rod may be used on both sides.

Maximum Mounting Weight:  
330 lbs.  
Tilting:  $\pm 50^\circ$ ; Panning:  $360^\circ$



## CD-10 DOLLY

Designed for use with both Canon tripods, features a tricycle caster undercarriage that enables both free and single-direction movement.  
Maximum Mounting Weight:  
198 lbs.



For years, broadcasters have made Canon lenses a top choice for studio, field and news production because they know and trust Canon's proven commitment to quality and value.

Now Canon is proud to introduce a complete, full-featured, high-quality camera support system, built to the same high standards and backed by the Canon service network.

# Canon<sup>®</sup>

Optics Division

Canon USA, Inc., Head Office: One Canon Plaza, Lake Success, NY 11042 (516) 488-6700  
Dallas Office: 3200 Regent Blvd., Irving, TX 75063 (214) 830-9600. Chicago Office: 100 Park Blvd., Itasca, IL 60143 (312) 250-6200  
West Coast Office: 123 Paularino Avenue East, Costa Mesa, CA 92626 (714) 979-6000  
Canon Canada, Inc., 6380 Dixie Road, Mississauga, Ontario L5T1P7, Canada (416) 678-2730

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Circle (46) on Reply Card

*Asaca/Shibasoku, continued*

version characteristics of tape-to-head; printer and X-Y plotter outputs.  
Circle (357) See ad on page 143

**Aston Electronics**

• A-4 character generator: anti-aliased typography includes 1,500 typefaces; complete manipulation of characters in dual-plane configuration; 4,096-color palette.  
Circle (358)

**Auburn Instruments**

• MC/1-RUCC: interfaces MC/1 remote machine-control unit and computer.  
Circle (359)

**Audico**

• Model 609 cyler: provides fast-forward and auto-rewind of U-matic, Beta and VHS cassettes for checks on broken or damaged tape.  
• Spine labels for videocassettes.  
• 8mm videocassette loader.  
Circle (360)

**Audi-Cord**

• Audio cartridge recorders, players; twin-deck players.  
Circle (361)

**Audio Broadcast Group**

• Studio systems: turnkey designs; on-air audio system with mixer, CD player, audio cart and reel decks, phono turntables.  
• Consulting service.  
Circle (362)

**Audio Developments**

• AD160: ENG mixer; 3-input, transformer-balanced; lineup tone; 20dB 20:1 BBC PPM limiter.  
• AD260: ENG mixer; 4-input mic/line; stereo auxiliary input; dual 20dB 20:1 limiters; optional talkback circuit.  
Circle (363)

**Audio Design Calrec**

• M series: portable mixers; to 24 inputs; providing left, right and mono outputs.  
• AD-MIX: digital fader for use with Sony PCM 701 system.  
Circle (364)

**Audio Digital**

• Digital broadcast profanity delays; audio delay, reverb, effects systems.  
Circle (365)

**Audio Engineering Associates**

• MS38 series: matrix stereo audio products include line-level active matrix; integral mic pre-amps; 3-input mixer with mic power.  
Circle (365)

**Audio Kinetics**

• Eclipse: audio editing control; interfaces to 410 Q-lock 4-machine synchronizer.  
• 410 upgraded Q-lock synchronizer.  
• TimeLink electronic gearbox.  
• Pacer synchronizer.  
Circle (366)

**Audio Precision**

• System One options: wow, flutter,

IMD measurements; split site software; audio routing.

Circle (367) See ad on page 36

**Audio-Technica**

• ATM33R: unidirectional condenser mic; 150Ω for recording; 30Hz-20kHz, phantom-powered.  
• ATM55R: miniature unidirectional fixed-charge condenser mic: 200Ω vocal use.  
Circle (368) See ad on page 181

**Audio Technologies, Inc.**

• BC8DSR: Vanguard series audio console; eight mixers; two stereo outputs, each with mono sum; rotary faders; 12 inputs with optional expander.  
• BC8DSL: Vanguard mixer with linear slider faders.  
Circle (369) See ad on page 90

**Audio-Video Engineering**

• HSC-2: video hum stop coil; 3.5-inch rack-mount contains seven units.  
Circle (370) See ad on page 114

**Auditronics**

• Series 310: audio console; 4- or 8-output channels; VCA level, grouping, stereo, mono submasters; multiple mono, stereo input selection; complete monitoring; side-chain sends, receives; redundant power.  
Circle (371) See ads on pages 44,89

**Aurora System**

• Aurora/220: graphics system based on IBM PC/AT, includes CPU, 40Mb hard and 1.2Mb floppy disks, frame buffer, CRT terminal, tablet, stylus.



# COMPACT 10X ROUTING SWITCHERS

10 x 1, 10 x 5 and 10 x 10 Complimentary Series of Video/Audio, Vertical Interval Switchers . . . .

Starting with 10 x 1 Routing Switcher, easily expandable with matching 10 x 5, 10 x 10 Series. Component video and RGB versions are also available.

Remote control up to 5,000 feet with a twisted pair allows for easy and flexible installation and any later changes, accomplished by using RS-422/232C serial data which also lends itself to computer/modem usage.

Individual audio connectors allow changing any single input without power shutdown, as encountered in switchers that use multi-pin connectors.

Typically, a 10 x 10 Routing Switcher including stereo audio and power supply occupies only 5-1/4" of your valuable rack space.

**ALWAYS FAST DELIVERY  
COMPETENT ENGINEERING  
DEPENDABLE SERVICE BACKUP . . . for nearly two decades!**

**KAITRONICS CORPORATION**  
Broadcast Products since 1967

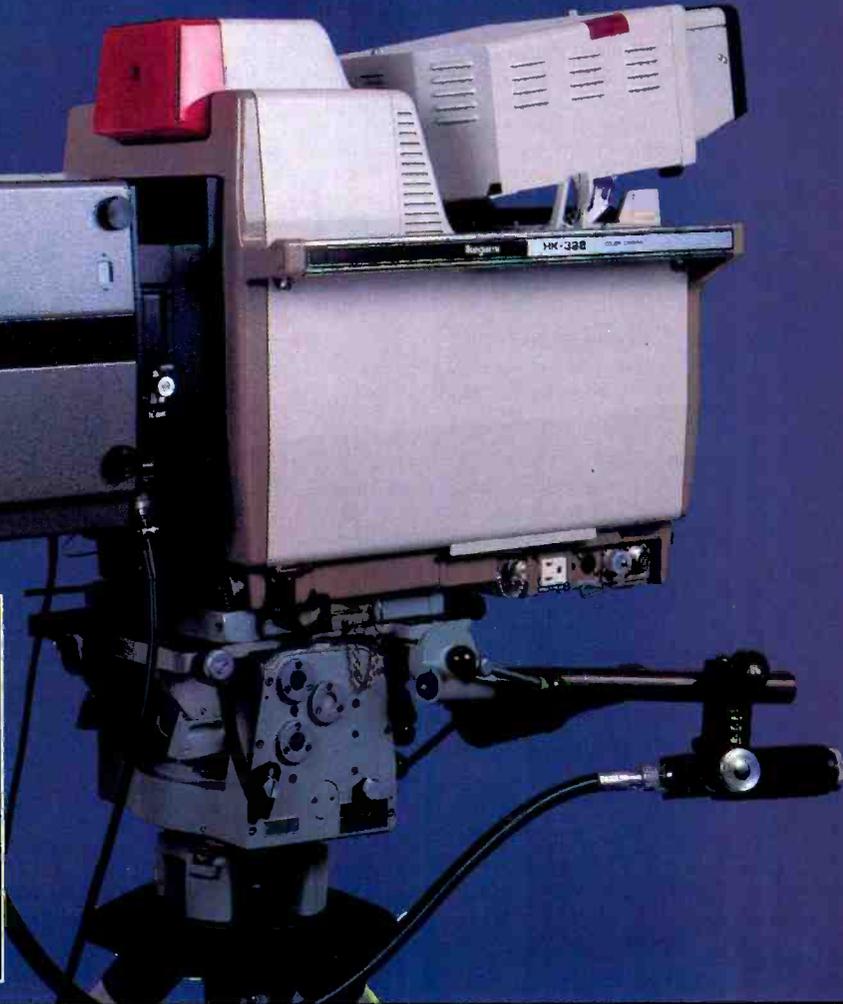
890 Cowan Rd., Burlingame, Ca. 94010  
Phone: (415) 697-9102  
Telex: WUI 671-1616

Circle (47) on Reply Card

[www.americanradiohistory.com](http://www.americanradiohistory.com)

# EXCELLENCE IN THE AMERICAN TRADITION

Ikegami **GRAY**



American business tradition is characterized by unsurpassed excellence in service, reliability and quality. True to this tradition, Gray does it the old-fashioned American way—we do it right the first time!

Teamed with quality cameras from Ikegami, Gray offers the finest equipment and over a decade of video engineering expertise. Call your local Gray office for excellence in service, reliability and quality.

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N. LITTLE ROCK, AR (501) 758-3234  
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MIAMI, FL (305) 591-3637  
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NEW ORLEANS, LA (504) 733-7265  
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TAMPA, FL (813) 885-1411

## GRAY COMMUNICATIONS

C O N S U L T A N T S I N C

404 SANDS DR. ALBANY, GA 31705 (912) 883-2121 TWX # 810-781-5110

Circle (48) on Reply Card

June 1986 *Broadcast Engineering* 77

*Aurora System, continued*

- Aurora/280: graphics system based on Motorola 68020, Unix OS with VME bus; animation, field/frame grab features, 160Mb fixed, 80Mb removable disks.
  - Series 200 enhancements: Ethernet LAN connection; Wavefront interface; URW and Lucida typefaces.
- Circle (372)

**Autogram**

- LC-10: IC-10 console with linear faders, push-button switching and true VU metering.
  - 20R/TV: radio/TV stereo audio console; 20 linear slide faders, VCA control; dual stereo outputs, mix-minus for telephone feeds, selectable mono output.
- Circle (373)

**Automation Associates**

- HOBNOB: serial adapter module, converts Sony VP-5000/VO-5600 control port to pseudo VO-5800/5850 remote-control port.
- Circle (374)

**BAF Communications**

- 340T: SNG vehicle; Ku-band system.
  - Ku-band SNG uplink, flyaway systems.
- Circle (375)

**B&B Systems**

- AM-1B Phasescope: stereo audio phase and level monitor; 5.25-inch CRT, illuminated VU, LED peak displays; tracks L, R and SMPTE time code.
- AM-2B Phasescope: monitors stereo audio phase, separation and peak levels; CRT and VU meter displays.

- IM-1 Imagescope: CRT display shows stereo separation, balance, image perspective; mono compatibility; image levels.
- Circle (376)

**BGW Systems**

- Model 2242: audio DA.
- Circle (377)

**BHP**

- EnVision: edit control for 3/4-inch VCRs; touch-screen control; FineCut and Scratch-Pad preview features; VITC synchronizer system for 24 separate sound/picture tracks.
- Circle (378)

**BIW Cable Systems**

- TV camera cable assemblies: multicore, triax, fiber-optic types.
- Circle (379)

**BSM/Broadcast Systems**

- Modula remote control: single-bus, dual-bus, multibus and computer-controlled configurations; RS-232 and collision detection.
  - Mini Modula routing switcher: audio and video systems with eight, 16 or 24 inputs, eight or 16 outputs; based on 8x8 matrices.
- Circle (380) See ad on page 28

**BW Lighting Systems**

- 10.180/20.180: baby softlight kits, 1kW rating.
  - 20.170: softlight instrument, 12kW rating.
- Circle (381)

**Barcus-Berry Electronics**

- 202-CP/204-CP: 2-/4-channel cinema audio processors.
  - 201MI: musical instrument processor.
  - 202: load reactance compensator.
- Circle (382)

**Barco Industries**

- CVS37/51: 14-/19-inch color video monitors; self-aligning with photometer attachment; menu-driven from front or remote-control panel; non-volatile memory allows return to preset or storage of current settings.
  - HDTV76: 30-inch diagonal color monitor for HDTV.
- Circle (383)

**Bardwell & McAlister**

- Modulight: convertible lighting products.
  - Flight Mac: portable lighting system; two focusing, two broad instruments with lamps, stands, scrims, gel frames.
  - Hydralift: lighting stand.
  - Baby spot: pole-operated, 1kW with improved socket.
  - Turtle/Century stands.
- Circle (384)

**Barrett Associates**

- Solar-powered radio transmitter, receiver for mountainous terrain.
- Circle (385)

**Basys**

- MicroVax II: newsroom system; DEC VAX Unix-based computer; 32-bit architecture; 9Mb memory with various disk-type stor-

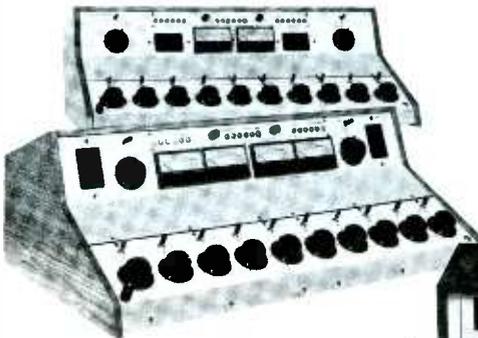
*Continued on page 82*

**Simply  
Reliable**

# We Have Your Console!

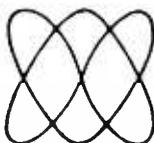
the  
Sound  
Solution

**Expandable**  
... at any time



## 7000

Our premier consoles are designed for simplicity and reliability. The 7012 and 7012A consoles continue to be today's choice, allowing broadcasters excellent sound quality with efficient VCA control, all at a cost well below what others charge for less. 12 channels, 22 inputs, full stereo, with your choice of metering functions. Clearly an excellent console for today's broadcast needs



## 7512A

This console continues the **Howe** tradition of simple-to-operate, reliable products, but adds features to make the operator's job even easier. These include: remote control for machines, a clock and timer, 2 talkback circuits, and much more. Comprehensive operator control and superior sound quality make the 7512A an exceptional choice.

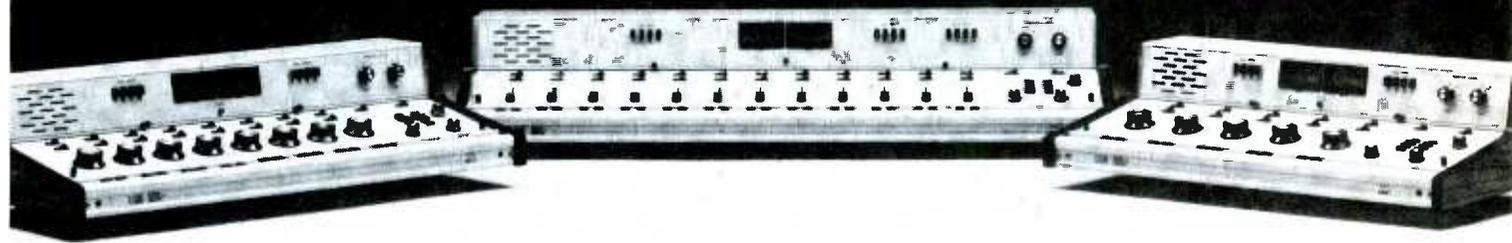
## 9000

The latest in the legacy of quality consoles from **Howe**, the 9000 is available from 8 to 22 channels tailored to your needs. There is no costly mainframe, but full modular capability is built in. 3 inputs per channel, mix-minus on all channels, sealed membrane switches for channel and machine control, and unmatched audio performance. These features and more combine to give the broadcaster outstanding flexibility.

Circle (49) on Reply Card

# howe audio productions, inc.

2300 Central Avenue • Suite E • Boulder, CO 80301 (303) 444-4693 • For more information (800) 525-7520



## THE DESIGN WILL INSPIRE YOU. THE NAME WILL IMPRESS YOU. THE PRICE WILL CONSOLE YOU.

UREI has some consoling news for stations with ideas that are bigger than their budgets: our superior line of broadcast consoles put a better on-air board within your reach.

All nine of our 5, 8 or 12 mixer consoles offer the design and performance features your on-air staff and engineers are after. At a price general managers only dreamed of before.

Working jocks and announcers helped us lay out a control panel that puts you instantly at ease. Phone jacks are logically placed. Recessed push buttons and gold-contact rocker switches operate surely, quietly. Cueing and monitoring are simple, yet versatile. Plus, you choose the attenuators—Penny and Giles faders, Shallco or conductive plastic pots.

We consulted station engineers to bring you consoles that perform reliably, adapt easily and install quickly, without special tools or accessories. Hinged panels allow fast access to plug-in cards and circuitry. And no other consoles in this class can deliver greater head room, lower noise or less distortion.

Built-in flexibility plus optional accessories such as our copy stand and turntable preamp mean any UREI console can adapt to your station's special on-air needs. Standard features include monitor, cue, headphone amp and cue speaker. Reliability is built-in too. Because UREI has been researching and advancing broadcast products for over 25 years.

UREI Broadcast Consoles. Why make do with less when you can afford to move up to more? Learn more about our 1650, 1680 and 1690 Series by contacting your UREI dealer today.

JBL Professional  
8500 Balboa Boulevard  
Northridge CA 91329

**UREI**

Circle (50) on Reply Card



These broadcasters are **on-the-air** with Orban. They chose Orban over all other makes because Orban is:

- #1 in providing *natural sound* to your viewers—whether they're viewing on tiny portables or the highest quality component sets.
- #1 in optimizing the stereo generator's *audible performance*—through superior audio filtering.
- #1 in operational and service *documentation*.
- #1 in providing *Customer Service*, before and after the sale.

To learn more, ask for our new *Orban Stereo Television brochure*: Contact your Orban Television Products Dealer, or call us direct.

**orban**

**Orban Associates Inc.**, 645 Bryant St., San Francisco, CA 94107

Toll Free: (800) 227-4498, or (415) 957-1067, Telex: 17-1480



# 150 REASONS WHY ORBAN IS #1 IN STEREO TV.

Circle (51) on Reply Card

# Total Radio Recall.



The Dictaphone 5600 Veritrac™ voice communication recording system is a complete broadcast recording-retrieval system that lets your radio station keep its entire broadcast day on the record. In one dependable unit you get around-the-clock verification that you're running your advertiser's spots on schedule and meeting all your FCC requirements. So if they ask for proof, you've got it all there on tape, ready for quick retrieval and replay.

Tune into the Dictaphone 5600 Veritrac logger. And never get your signals crossed again.

For more information, fill in the coupon or call toll-free:

**1-800-431-1708** (Except in Hawaii and Alaska) In New York call **1-914-967-2249**  
**Or mail to: Dictaphone Corporation,**  
**120 Old Post Road, Rye, NY 10580**

Name \_\_\_\_\_  
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 **Dictaphone**

A Pitney Bowes Company

Circle (52) on Reply Card

82 **Broadcast Engineering** June 1986

## Basys, continued

- age media.
- BASYS AT: IBM PC/AT-compatible newsroom system; supports 85Mb Winchester disk or 400Mb optical disk memory.
- CCU upgrade: 8-port communications control unit with Intel 80286 8MHz  $\mu$ P, 1Mb on-board memory; eight RS-232 ports via D-25 connectors and RS-232/422 host link for networking.
- Archiving system: relational database with integrated management tools; various storage media include 400Mb optical memory.

Circle (386)

## Beaveronics

- DSK-4DLB: downstream keyer; key borders, shadows, lines; audio fade in/out, fade-to-black; key selection from video or titler.
- HSC-2: AV&E hum stop coil.
- Energy-Onix FM transmitters.

Circle (387)

## Belar Electronics Laboratory

- TVM-210: BTSC aural reference monitor; use with TVM-100 TV aural monitor or precision wideband demod; for setup, test and measurement of BTSC systems; L and R audio outputs.
- TVM-220 aural program monitor; full-time monitoring of L+R and composite signal modulation levels; peaks of frequency recurrence indications within moving 1-minute window.

Circle (388)

See ad on page 102

## Belden Communications

- Lee color filters: additional optical filters in pink, amber, orange and blue range.
- Quarter Tough Spun: Lee diffusion polyester material.
- Fluorescent filters: Lee color-correction filters for fluorescent lighting.

Circle (389)

## Belden Electronic Wire & Cable

- 9307/9308: conformable coaxial cable.
- 9213/9214: satellite control system cables.

Circle (390)

## Bencher

- M3 vertical camera stand.

Circle (391)

## Benchmark Media Systems

- DA-102 stereo audio DA.
- MIA-4: mic pre-amp module.

Circle (392)

## Beyer Dynamics

- MC736PV: short shotgun condenser mic; operates from 12Vdc to 48Vdc. (MC737PV: long shotgun mic.)
- MCE6: high SPL MCE5 mini-electret lavalier mic.
- MCE10: MCE5 with cardioid response.
- MSB48N(C).1: portable power supply; 48Vdc from five 9V batteries.
- MC740: large diaphragm condenser mic; five response patterns.
- DT109-BK: black finish DT109 headset mic.

Circle (393)

## Bird Electronic

- Wattmeter elements: Thruline relative field-strength plug-in units.
- FM filters, filter couplers.

- STL RF test equipment.
- Load resistors: 15kW, 25kW dry, forced-air cooling.
- Reject loads: field replaceable, multi-element resistors; for dual transmitters to 96kW peak; redundant element design.

Circle (394)

## Bogen Photo

- Model 3156: folding dolly.
- Model 3170: 3001 tripod with micro fluid head.
- Model 3142: black anodized 3140 tripod with mini fluid head.
- Model 3361/3165: black anodized 8-/13-foot light stands.

Circle (395)

## Bogner Broadcast Equipment

- BMR/BCR/BBR-10/12: high-gain base station antennas; directional or omni; paging, mobile, cellular 450MHz and 800/900MHz; constant beam tilt, heavy null fill.

Circle (396)

## Boonton Electronics

- 1200 analyzer: measures frequency, distortion, SINAD or S/N ratio and acV/dcV; 5Hz-200kHz range; IEEE-488 interface.

Circle (397)

See ad on page 99

## Robert Bosch

- 3D Illustrator: paint system with 3-D features; palette mode wash capability; graphics mode; stencil mode masking and automatte; library.
- Off-line modeling system: expansion for FGS-4000; based on SUN 3/52 computer; interfaces through Ethernet to FGS-4000; 2-D, 3-D editors.
- TAS-2000: audio-distribution switcher with improved specifications.
- Automation system: H-P 9000 series 300 computer under Unix operates distribution and master-control switcher.
- Programmable control panels: downloadable mnemonics, reprogrammable from Apple II or IBM PC; retrofits to older control panels.
- KCM-125: studio and OB camera;  $\mu$ P control with triax, coax or KA-64 cables; 25mm PbO tubes; auto fault diagnostics at CCU, viewfinder or PC service terminal; dynamic lens error correction LEC.
- RME series: video production or on-air switchers; CFM control function memory sequences to 100 takes.
- KCF-1B: production model ENG/EFP camera; 1/2-inch LOC DG PbO tubes; interface for field VCRs; connects through KA-64 cable to base station.
- BCN-52: B-format VTR; slow-motion feature uses buffer stores; separate video monitoring heads.
- BC/PC-921: TBC/processor for BCN-21 VTR.
- Audio/video DAs.
- Programmable sync generator.
- 20x1 video-routing switcher.
- Switcher control panels: CP-1410 10-bus category number system; CP-1600 7-level X-Y matrix with status displays.
- X-Y zoom: for FDL film-tape transfer; 800-event frame-by-frame programmability.

Circle (399)

## Bowen Broadcast Service

- TCR-100 kits: infrared replacements for incandescent tape-sensing lamps;

# NEW FROM SACHTLER

**F**rom now on, including parts and labor, (except for damage due to physical abuse), our Warranty is extended from one-year to...

3 Full Years on everything in the system\*, except the fluid modules, which are leakproof by design and continue to be guaranteed against malfunction for 5 years.



Sachtler quality starts in the factory and is guaranteed to keep working for you in the studio or on location.

Quality is our top priority! Ask anyone who is already using a Sachtler camera supporting system.



\*Applies to new systems delivered from Sachtler in the U.S. For more details, call or write:

**sachtler**  
Sachtler Corporation of America

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Phone: (516) 231-0033  
Telex: 140107 SACHAUP TWX: 510-221-1884  
3316 W. Victory Blvd., Suite A, Burbank, CA 91505  
Phone: (818) 845-4446

Circle (53) on Reply Card

*Bowen Broadcast Service, continued*

- LED optical isolator positioning switches.
  - Teleho: computer system to aid in broadcast equipment maintenance.
- Circle (400)

**Bradley Broadcast Sales**

- TELOS Echo: digital audio storage and retrieval unit; for listener telephone line application.
- Circle (401)

**Walter S. Brewer**

- 0270-WB: Surlok hangers; lowers lighting instrument from grid.
- Circle (402)

**Broadcast Audio**

- System 6: 6-mixer modular audio console; for news editing, production; 6-mixer extender available.
  - BA 10T/10R: STL, intercity relay; covers 110-500MHz; PLL FM oscillator without multiplication.
- Circle (403) See ad on page 98

**Broadcast Automation**

- Automation equipment remanufacturing.
  - Remanufactured and new studio equipment.
- Circle (404)

**Broadcast Electronics**

- AS-10: C-Quam AM stereo modulation

- monitor; companion to AX-10 stereo exciter.
  - DV-2 Digital: solid-state digital audio record/play system; 5-minute 15-second memory; sequentially or randomly addressing any of 32 messages.
  - FM-10A: FM transmitter; single 4CX7500A tetrode 10kW power amp; broadband, solid-state IPA; folded half-wave output cavity.
  - FM-30A: single-tube FM transmitter; 30kW grid-driven 4CX20,000A tetrode circuit.
  - FM-35A: 35kW FM transmitter; 4CX20,000C tetrode in folded half-wave output cavity; optional  $\mu$ P video diagnostic system.
  - PC-1 interface: telephone-to-audio cart machine link for prerecorded answer-only messages; modular telephone connections.
- Circle (405)

**Broadcast Microwave Services**

- BSM-KU: Ku-band transportable uplink vehicle.
  - BMT-13 GP: frequency-agile microwave transmitter; 13GHz, 1W.
  - BPA-702: microwave power amplifier; 7GHz, 10W.
  - NewsCar: microwave system for ENG vehicle.
- Circle (406)

**Broadcast Supply West**

- Prodecor furniture: single- and double-bay; console table.
- Circle (407)

**Broadcast Systems**

- APS program system: auto record/play; delayed play; to 24 play transports for timed events.
  - DC-80: auto video cartridge player; 24-transport capability; anti-clog heads, stereo audio.
  - BJ-800: stereo audio DAs; all in/out prewired normally through two jack panels.
  - DC-8/EP: cart system; 2-second pre-roll, anti-clog head; auto eject;  $\pm 4$ dBm balanced audio in/out.
- Circle (408) See ad on page 118

**Broadcast Video Systems**

- BAL miniature video filters; electronically variable.
  - BVS component color-bar generator.
  - CK-950: component keyer.
  - CDK-1100: component DSK, fade-to-black.
  - CS-1100: color-correction scene store.
  - EV4041: line select waveform monitor.
  - 732/733: RGB component converters.
- Circle (409) See ad on page 122

**Bryston**

- Model 6B: 500W/100W mono amplifier.
  - Model BP-1: broadcast phono pre-amp.
  - Model BP-5: studio pre-amp; 4-input.
- Circle (410)

**CAT Systems**

- 9000 controller: multisite cable monitoring for any control system; 40 sites and multiple controllers possible.
  - V4.10 software: speed up V3 control system by factor of 2; light pen and communications software.
- Circle (411)

**CMC Technology**

- Replacement video heads for type C

**split equalizer design for  
flawless stereo performance**



## HARRIS PX-91 PHONO PREAMP

- Split equalizer meets stringent dynamic requirements not addressed by common static specifications.
- Polypropylene equalization components insure impeccable transient response.
- Unmatched immunity to RFI and other extraneous signals.
- Adjustable cartridge loading and high accuracy equalization of +0.25 dB from ideal RIAA curve provide optimum dynamic performance.
- Performance commensurate with Technics SP-10MKII turntable.

- Unmeasurable transient intermod and dynamic distortions assure faithful reproduction of demanding cuts, such as the cannon shot in Telarc's special recording of the 1812 Overture.

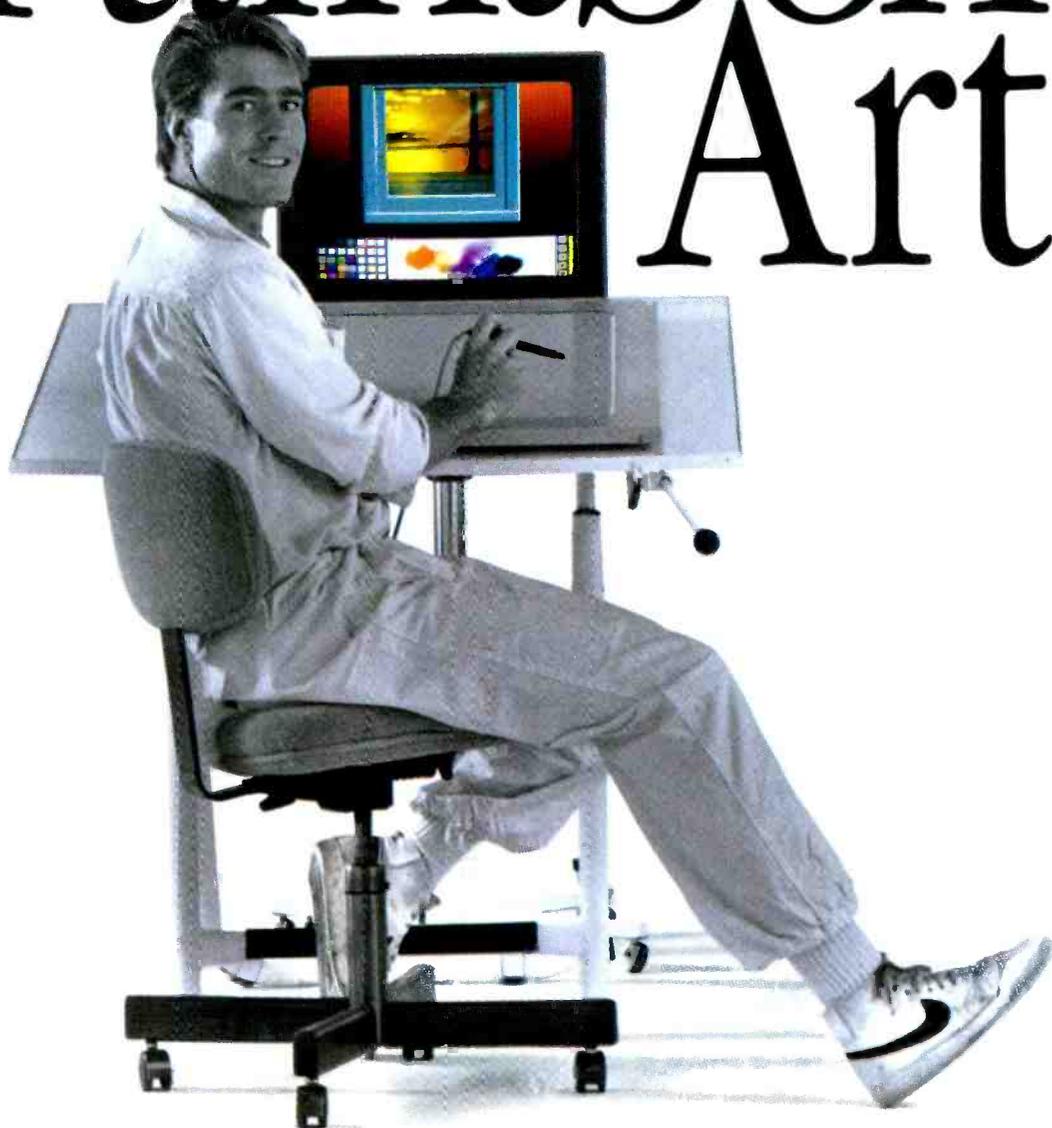
Buy the best—the Harris PX-91 "Mastering Quality" Phono Preamps...for your "best shot".

Contact Harris for the rest of the facts. Harris Corporation, Studio Division, P.O. Box 4290, Quincy, Illinois 62305-4290. 217-222-8200.



Circle (54) on Reply Card

# Paintbox Art



For the designer and the art director the satisfaction of producing an original television graphic *perfectly* is everything. With the Quantel Paintbox™ you can create images with smoothly rounded curves and natural color mixing—at the same time choosing from a large selection of mediums and brush sizes. You'll never have to live with the “computer” look.

Artists love the response time of the Paintbox. Its easy-to-follow menu helps produce lively, original images with extraordinary speed. And management loves it for its fast payback.

Stimulate your creativity with these special features:

- Stencil and paste-up functions.
- Paste over live video.

By adding Quantel's new Harry Animation/Editing System, the already extensive animation capabilities of Paintbox can now include full cel animation.

**The Paintbox has become the world standard** for creativity in television graphics. All three major U.S. networks as well as most broadcast and post-production facilities design with the Paintbox.

Quantel's worldwide sales and service has been expanded to ensure prompt, friendly and expert support. It's always there if you need it.

To put the Paintbox creative art system to work for you, write today to Quantel, 3290 W. Bayshore Rd., Palo Alto, CA 94303. For the phone number of your nearest sales office call 415 856-6226.

*Step closer to the digital studio*

**QUANTEL**

Circle (55) on Reply Card

[www.americanradiohistory.com](http://www.americanradiohistory.com)

*"We  
don't have  
time for  
down-time"*



*"I run a small studio. But to me, it's a big operation. Everything has to work right all the time. One thing we can't afford is to waste time fooling around with our intercom system.*

*That's why we chose the*

*Series 17 Intercom System. We like the way it works—all the time. We get uncomplicated, smooth performance in a system that's easy to use. And it fits our budget!"*

*The Series 17 Intercom System is simple and basic,*

*yet it provides the same great proven performance as its big brother—the TW Intercom System.*

*We think you'll be impressed no matter how big your operation is. Call or write for descriptive literature.*

**RTS SYSTEMS**

INCORPORATED

THE FIRST NAME IN  
INTERCOMMUNICATIONS

Circle (56) on Reply Card

Professional Intercommunications • Professional Audio Products • 1100 West Chestnut Street • Burbank, California 91506 • Telephone 818 843-7022 • Telex 194855 • TWX 910-498-4987

[www.americanradiohistory.com](http://www.americanradiohistory.com)

*CMC Technology, continued*

VTRs; dynamic tracking heads; tape degaussers.

**Circle (412)**

**CMX Systems**

- CMX336XL: midrange video editing control; 6-port system handles five VTRs; 700-line EDL; enhanced switcher memory.
- EDL Optimizer: software; list cleaning, sorting, text editing, auto assembly.
- CASS I: computer-aided sound sweetener; audio editing and console automation.
- Audio console interface: option for Multi-I<sup>2</sup> switcher interface; cross-point and transition control.

**Circle (413)**

**COMSAT General**

- Skybridge: Ku-band satellite uplink vehicle and communication service.

**Circle (414)**

**CSI Electronics**

- T-200-F1: FM transmitters; zero-bias grid 3CX15,000A7 triode develops 22kW.
- Solid-state FM transmitter.

**Circle (415)**

**Cablewave Systems/Celwave**

- Type FLC114-50J: low-loss cable; 1¼-inch OD corrugated copper, foam dielectric.

**Circle (416)**

**Calaway Engineering**

- CED+: editing control; 6-machine system.
- GPI+: general-purpose interface and motion controller.
- ST225: BR-8600 translator and interface.

**Circle (417)**

**Calvert Electronics**

- Camera tubes.
- RF power tubes.
- Weather radar klystrons.

**Circle (418)**

**Calzone Case**

- Electronic equipment transport cases.
- Custom production consoles.
- Duplication racks.

**Circle (419)**

**Cambridge Products**

- TNC connectors: field-installable, crimp types.

**Circle (420)**

**The Camera Mart**

- Rental, sales; TV cameras; audio, video recorders; lighting; processing equipment; post-production systems.

**Circle (421)**

*See ad on page 147*

**Canare Cable**

- BVC series: pre-assembled BVC-BVC cables.
- MR-202: multichannel audio cable; individual insulation, 100% shielding.
- L-4E4: multichannel audio mic cable; star quad-configured; 100% foil shield with individual insulation.

**Circle (422)**

**Canon USA**

- J14x8BIE: high-resolution ⅜-inch f/1.7 lens; 60° angle; integral 2X extender.
- J45x9.5BIE: ⅜-inch sports/OB/EFP f/1.7 lens; 45X; integral 2X extender.

- J8x6B: 72.5° angle with 11-inch MOD; f/1.7.

**Circle (423)**

*See ad on page 75*

**Capitol Magnetic Products**

- AA-4 Audiopak audio cartridges.

**Circle (424)**

*See ad on page 148*

**Dwight Cavendish**

- Copymaster 250: videocassette duplicator; modular, expandable; complete monitoring functions to detect defective cassettes.
- Modular routing system: 6x1 format for audio and video.
- Audio DA: 1x10 high-fidelity.
- Audio/video DA: 1x10 stereo audio.
- VCR switcher; changeover, RF dub signal switcher.
- VCR remote controls.

**Circle (425)**

**Ceco Communications**

- EIMAC, RCA, Amperex distributor.

**Circle (426)**

**Celco**

- Series 2 Gold: lighting-control system; 90-channel memory.

**Circle (427)**

**Central Dynamics**

- APC2000: true-time master control automation.
- 80ICK: iso-key system; RGB and encoded chroma keyers.
- ELFS: serial editor interface to control switcher.

**Circle (428)**

**Central Tower**

- Guyed and self-supporting towers and antenna support poles.

**Circle (429)**

**Centro**

- Facility design: for mobile production vehicles, fixed facilities, ENG vehicles.

**Circle (430)**

*See ads on pages 61,91*

**Century Precision**

- LAP 3500: high-density prism for video, film cameras in low-angle photography; superwide angle.

**Circle (431)**

**Cetec Gauss**

- Model 6258 monitor: single point source design without time compensation; 200W coaxial speaker with both drivers located within Blauert-Laws criteria; response from 35Hz to 18kHz with 30°Hx30°V pattern at 2kHz.

**Circle (433)**

**Cetec Vega**

- Q Plus: wireless intercom; six belt-pack remotes operate full duplex or push-to-talk; QTR-1 remotes, QX-6 base station.
- 66B receiver: GaAsFET RF wireless mic receiver; portable with 9Vdc batteries, Dynex II processing.

**Circle (434)**

*See ad on page 101*

**Channematic**

- ALS-4A Logmatic Jr: redesigned 4-channel automatic logging system; 2.25-inch thermal printer.
- Li'l Moneymaker: single-channel, single-VCR commercial insertion system.

- ALS-5A Logmatic: 4-channel automatic ad-insert logging system; 80-column printer; IBM-PC interface.

- Complete System: random-access automated commercial break system; 6-channel capability.

- ATS-1A: automatic tone switcher; DTMF tone decoder and vertical interval A/V switcher.

**Circle (435)**

**Christie Electric**

- CASP: battery charger, analyzer, charging sequencer and substitute power supply for cameras, VCRs.

**Circle (436)**

**Chyron**

- Scribe: anti-aliased text generator; high resolution; character coloring, shading, manipulations.
- Chameleon: high-resolution graphics, paint system.
- 4200 with motion: graphics generator with digital motion effects.

**Circle (437)**

**Cine 60**

- On-board battery.
- Battery analyzer.

**Circle (438)**

**Cinema Products**

- Mini-Worrall head: cable-driven, geared continuous pan; two lockdown systems.
- Mini-Worrall Super: Worrall head with Sachtler-type quick release.
- FX35: 35mm film camera; 6-120fps forward/reverse; RS-232-compatible.
- Steadigate film stabilizer for Rank Cintel telecine.
- Steadigate TC: magnetic head for Kodak Datacode system.
- Insight Vision: B/W broadcast camera, image intensifier for low-light levels.

**Circle (439)**

**Cinemills**

- Lighting equipment, accessories.

**Circle (440)**

**Cipher Digital**

- No. 750: time-code reader, generator, coincidence detection.
- Software enhancements for 710A, 716A.
- Shadow: machine synchronizer for audio, video and film decks.

**Circle (441)**

**Circuit Research Labs**

- TV signal generator, including multiband stereo processing and loudness control.

**Circle (442)**

*See ad on page 13*

**Clear-Com Intercom Systems**

- IFB: wired and wireless models; up to 96 talent locations possible.
- TR62: dual-channel talent-type belt-pack intercom unit.
- Redesigns: panels with Hewlett-Packard gray for improved aesthetics of control room.

**Circle (443)**

*See ad on page 32*

**Coaxial Dynamics**

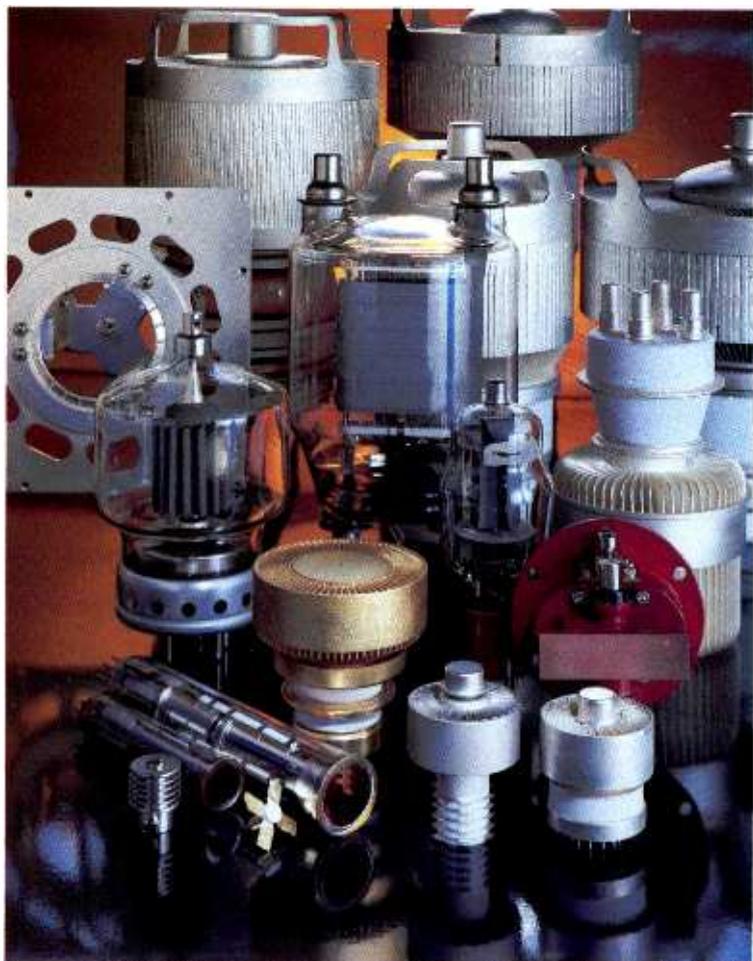
- 83000A: portable peak, CW reading wattmeter.

**Circle (444)**

**Coherent Communications**

- KS-70: SMPTE time-code reader, generator,

# A component for every camera. A tube for every transmitter.



Our purpose is clear: to provide the ultimate source for all broadcast related tubes and components.

We've geared our entire distribution system to ship virtually every order the same day.

Our highly personalized service and technical knowledge is legendary in the industry.



**Richardson Electronics, Ltd.**  
**800-323-1770**

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Circle (57) on Reply Card

#### *Coherent Communications, continued*

- LED display, keyboard.
- YAM-7: miniature portable SMPTE generator, reader.
- YAM-3: miniature reader.
- KVID-8062: code reader, inserter; large LED display.
- SE8062: reader with 0.55-inch green display.

Circle (445)

#### **Colorado Video**

- Model 240: vertical blanking transmission sends NTSC-like image in 8s at one line/field; addressable.
- Video multiplexer: four synchronous signals carried on single video channel.

Circle (446)

#### **ColorGraphics Systems**

- ARTSTAR III-D: digital paint/3-D graphics; 24-bit, anti-aliased; model construction, textures, smooth shading, multilight sources; animation VTR controls; 4,000x 4,000 film output resolution.
- LiveLine P/C: color weather animation/display; 5-projection map database; access weather services, dial-up radar; optional Doppler radar interface.
- Liveline IVA: weather animation system; 5-projection map database; weather service access and dial-up radar, optional Doppler.
- ADP relational database: NewStar adjunct; reference script, tape library archives; Winchester, digital laser disk mass storage.

Circle (447)

#### **Colortran**

- Dimension 192: rolling dimmer rack, 192 dimmers.
- Scene Master 60: manual/memory lighting console.
- Prestige Series 3000: memory lighting control.
- Majic Disk Writer: portable lighting programmer.

Circle (448)

#### **Columbine Systems**

- News Management: archiving, newswire, teleprompt, scripting, assignment desk.

Circle (449)

#### **Comark Communications**

- CCTT-U-60KS: UHF TV transmitter using Varian Klystrode device; rated 60kW.

Circle (450)

See ad on page 3

#### **Comex**

- MMDS microwave receiving equipment.

Circle (451)

#### **Commercial Cable/CCI**

- CUE TV: interactive laser video music player controller.

Circle (452)

#### **Comprehensive Video**

- Tapemaster: videotape library management program.
- Cabletrak: IBM PC and Apple cable labeling program.
- VICAD: for IBM PCs; studio, teleconference, post-production suite design software.
- LOG-IT: notes, time-code records, edit session lists; runs on IBM PC, Radio Shack.
- APAS: Add Pipe And Shoot lighting package.

*Comprehensive Video, continued*

- Apple teleprompter.

Circle (453)

See ad on page 132

**Comprompter**

- PC-ENR: IBM PC-compatible electronic newsroom; floppy or hard disk systems available.
- PC-TP: TotaPrompter, portable prompter.
- PC-CP: compatible PC commercial production and prompter system.

Circle (454)

**Compu = Prompt**

- CP Micro: prompter display for ENG or hand-held cameras.
- CP-1130XM: extended memory color prompter; more than 4,400 lines of text.
- Portable podium prompter.
- User-defined custom character fonts.
- Find: instant positioning at word or phrase in text.
- Underline capability.

Circle (455)

**Compusonics**

- DSP-1500 recorder: Floppy disk digital recording system; play or record/play audio spots; mono or stereo versions.
- DSP-2002: hard disk digital audio recording system with editing.

Circle (456)

**Computer Graphics Labs**

- Agile-2000: real time animation.
- Interpret: single frame record software for IMAGES-II+ graphics system.

Circle (457)

**Computer Prompting**

- CPC-1000: real-time closed-captioning option for teleprompter system.

Circle (458)

**Comrex**

- Basic extender: single line bandwidth extender encoder/decoder for dial phone lines.
- STLX: sports console, 2-line frequency-extender encoder.
- Diverta coupler: telephone hybrid for PABX systems; balanced at three frequencies, integral oscillator, hybrid balance indicator; for talk shows.

Circle (459)

See ad on page 26

**Comtek**

- MR-182: wireless mic receiver for ENG.
- IFB system: links Comtek, Clear-Com equipment.

Circle (460)

**Comtronix Systems**

- 32kV Hi-Pot high-potential test system.

Circle (461)

**Comwave**

- MMDS 100W amplifier.
- Solid-state 50W amplifier.
- ITFS separate visual/aural repeater system.

Circle (462)

**Connectronics**

- SECK 1882: portable audio mixer; 18-input channels.

Circle (463)

**Connolly Systems**

- MAI-100: automation interface for CATS

# Moment of truth



## You're on-air. Will your console, the heart of your control system, perform flawlessly?

Your air time is too valuable not to be sure. If it's an Auditronics, you can rest easy.

Unlike all the new companies which jumped headlong into the audio market during the last couple of years, Auditronics has proved itself the hard way with almost two decades of experience in building dependable, user-oriented broadcast consoles. So when we say that our Auditronics 200 Series Console is the best long term investment on the

market today, we can back it up with personal endorsements from literally hundreds of station managers and engineers across the country.

For a look at what your competition is saying about us and ours, write or give us a call. Our experience can save you money.



**auditronics, inc.**

3750 Old Getwell Rd.  
Memphis, TN 38118 USA  
Tel: (901) 362-1350  
Telex: 533356

Circle (58) on Reply Card

June 1986 **Broadcast Engineering** 89

#### Connolly Systems, continued

system; converts CATS protocol to machine-specific serial, parallel interfaces.

- CATS executive control panel: master control station for automation.

Circle (464)

#### Conrac

- 6545 Micromatch: video color monitor; auto setup with 6550 Micromatch photometer; dot matrix PIL CRT; digital beam current feedback; auto sensing of NTSC, PAL-B.
- 2620: monochrome monitors; 9-inch diagonal D-6500 CRT option; 750TVL resolution minimum; composite video and external sync; VTR input; audio speaker and volume control.
- 2600 monitor: monochrome 9-inch; without audio system, pulse cross, underscan and notch filter.

Circle (465)

#### Continental Electronics/Varian

- Type 814B: 4.3kW FM transmitter; SCR power control; SWR protection; 4CX3500A tetrode; 802A exciter; solid-state memory recycle control.
- Type 816R-5: 35kW FM transmitter; grounded screen TC130/9019 tetrode final; IC logic control with computerlike memory for restart.
- Type 402B: 500kW AM/SW transmitter; RF amp includes broadband solid-state amp, grounded grip 3CW20,000A7 triode, 4CM400,000 tetrode final.

Circle (466)

See ad on page 195

#### Control Concepts

- Power-line filters, conditioners.

Circle (467)

#### Convergence

- ECS-1000: 6-machine editing control; time-code-based; full switcher control; 1,000-line EDL; auto assemble; multiformat interfaces for most VTRs.
- ECS-205: 8-machine editing control; assignable multiple recorders; serial, parallel interfaces; auto assembly; full EDL management.

Circle (468)

#### Cool Light

- Studio, stage lighting equipment, accessories.

Circle (469)

#### Corporate Communications Consultants

- Sunburst: scene-by-scene color correction; select a spectral range vector, widen it and control intensity.

Circle (470)

#### Countryman Associates

- ISOMAX: microphones for voice, recording and reinforcement.

Circle (471)

#### Cox Electronics

- ACC 200: analog video converters; RGB, Beta, M format transcoders.
- 660: component video color corrector.
- 600/660/TC: component and composite color correction under time-code control.

Circle (472)

#### Crosspoint Latch

- 6129AHK: compact post-production switcher; 7-input, chroma key, three colorizers; 100 4-event sequence storage; DSK outline, edger; serial editor control interface.
- Excalibur 8200: dual-channel TBC, pull on/off, mosaic effects, RGB color key; 5-input, DSK with edging, fade-to-black; edit control input, serial audio mixer port.

Circle (473)

See ad on page 200

#### Crown International

- GLM-200: miniature hypercardioid mic; 150Ω for recording and sound reinforcement.

Circle (474)

#### Cubicomp

- True color paint: 16-bit paint package.
- PictureMaker/20: off-line image creation system.
- Video Image Capture: allows combined live video with computer graphics; 8-bit for Imaging Technologies PC Vision; 16-/24-bit options for AT&T Targa digitizing board.
- RS-422 video recorder control interface.
- Digital Matte Generation: electronic rotoscoping software.

Circle (475)

#### dbx

- 163X: compressor/limiter.
- 263X: de-esser
- 463X: noise gate, expander.

Circle (476)

## Vanguard Series™

# Broadcast Audio Consoles



Performance, Value and Reliability through Innovative Technology

- Raised, tactile feel, lighted membrane switch panel-digitally scanned
- 12 stereo inputs plus optional expander
- VCA controls, rotary and linear
- Analog and fluorescent meters
- Modular, plug in electronics
- Easy punch block installation
- Effective RF protection

**BC8DS  
8 Mixer  
Dual Stereo**  
only **\$2,995**

**AUDIO  
TECHNOLOGIES  
INCORPORATED**



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Circle (59) on Reply Card



# TELEVISION FACILITY DESIGN AND CONSTRUCTION

Innovative concepts, attention to detail and competitive pricing has identified Centro as an attractive alternative for facilities planning, architectural delineation, systems integration and project implementation.

With a decade of nationwide service and dedication to quality, Centro is a design and engineering firm employing the disciplines necessary to implement successful television facilities and mobile systems.

Call us today and compare our services and prices.



**CENTRO CORPORATION**  
9516 CHESAPEAKE DRIVE  
SAN DIEGO, CALIFORNIA 92123

(619) 560-1578

Circle (60) on Reply Card

[www.americanradiohistory.com](http://www.americanradiohistory.com)

#### DX Communications

- TVRO Ku-band receivers, antennas; SNG, CATV, SMATV.
- Circle (477)

#### Peter W. Dahl

- HV rectifier: retrofit for RCA F-line, 4kV aural, 6kV visual supplies.
  - Complete line of transformers, inductors.
- Circle (478)

#### Dago Cases

- ATA shipping cases.
- LaStrada flight case.
- LaStrada carrying case.

Circle (479)

#### Daiwa Manufacturing

- H-540/WT-204: twin tubular tripod with viscosity head.
  - VT series: twin tubular tripods.
  - H-430 fluid head.
  - TD series: tripod dollies.
  - MVH-2D: remote-control motorized head.
- Circle (480)

#### Dalsat

- SNV 6: small-sized news-gathering vehicle.
- SNG-10: satellite news-gathering vehicle; 3m antenna.

Circle (481)

#### Data Communications/DCC

- Computer newsroom system.
- BIAS PC Cable software.

Circle (482)

#### Datatek

- Audio/video routing systems; machine-

control systems; interface modules; A/V DAS.

Circle (483)

See ad on page 173

#### Dataworld

- NCE-FM/TV 6: software program, predicts area of interference to reception of TV channel 6 viewing; per 73.525(e).
- FMINTER: software program; determines prohibited contour overlap between proposed and existing FM facilities.

Circle (484)

#### Datum

- 5350: SMPTE time-code generator.
- 5360: SMPTE time-code reader.
- 5370: SMPTE time-code character generator.

Circle (485)

See ad this page

#### Delcom

- Designer rack series: custom studio cabinetry, furnishings.

Circle (486)

#### Delta Electronics

- ASE-1: improved AM stereo exciter.
- ASM-1: AM stereo modulation monitor.

Circle (487)

#### Desisti/Desmar

- Rembrandt HMI spotlights: 2400-series 575W, 1.2kW to 12kW.
- Venture series.

Circle (488)

#### Dielectric Communication

- Switchless combiner: coaxial RF routing

system.

Circle (489)

See ad on page 127

#### Digital Broadcast Systems

- Astre: scheduling, production on-air control software for logging 4-channel digital audio record/playback storage.

Circle (490)

#### Digital Services/DSC

- Eclipse: optical digital video effects system with perspective, rotations and curved effects as standard; for on-air or production.
- Prisma: graphic animation unit includes 3-D dimensioning and shading, color program, rotation and metamorphosing with anti-aliasing.
- SX-2000D: teleproduction programmable effects system.

Circle (491)

#### Digital Techniques

- Interactive graphics and videodisc systems.

Circle (492)

#### Digital Video Systems/Scientific Atlanta

- DPS series: framestores, TBCs and synchronizers; test-signal generator.
- DPS Four-matte: displays four synchronous video signals on screen simultaneously.

Circle (493)

#### DigiVision

- CP-100: video processor; real time adaptive contrast enhancement, noise reduction.

Circle (494)

# IT'S IN THERE SOMEWHERE... you just need time to find it.

Time code. As a video professional, you know the vital role it plays in the editing and tape management process.

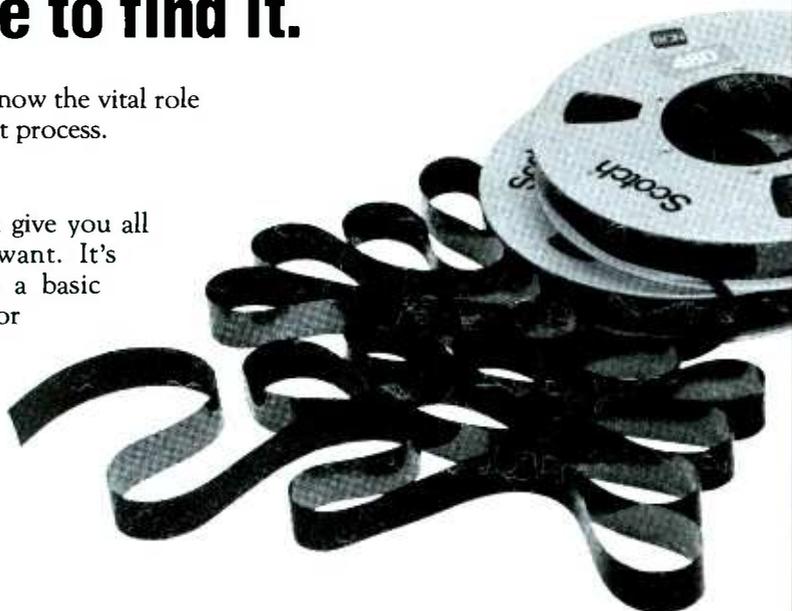
## DATUM's 5300 ITP

Our Intelligent Time Processor (ITP) can give you all the time code capability you'll ever want. It's available in four models, ranging from a basic SMPTE/EBU time code reader/generator to a comprehensive processor, complete with character generation and VITC code capability. And it's expandable. You can choose the basic unit now and upgrade later. Let us show you what our 5300 ITP can do for you.

Call or write for complete information.

**datum inc** TIMING DIVISION

1363 S. State College Blvd. • Anaheim, CA 92806 • (714) 533-6333



Circle (61) on Reply Card

# IN SEARCH OF EXCELLENCE.

Long before it was a popular management theory, broadcasters were searching for excellence. Excellence of Sound.

The search is still on, but the goal is now within the reach of every FM broadcaster.

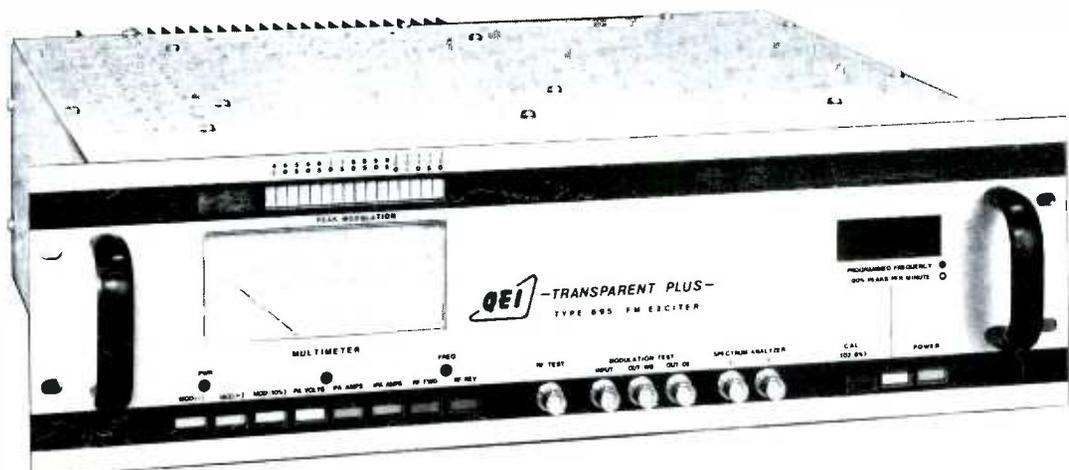
The 695 is an exciter without equal . . . in quality sound . . . in versatility . . . and in value. Any type of distortion you can name (THD, TIM, IMD) is less than .025 percent. This isn't an environmentally controlled lab figure, but rather one that is measurable over the operating temperature range of the equipment. Moreover, noise is so low that it's virtually impossible to measure.

QEI's 695 offers features that the competition has never even dreamed of. A peak counter with LED display, modulation measurements on the front panel, and a measurements grade linear demod built in. It is synthesized, has wideband circuitry, a 3-color LED bar graph for modulation display, a 10-position meter, and many other features that are best described in our new brochure.

For more information on QEI and the 695 Exciter just write or call us. You'll see why our search for excellence has produced the best value on the market today.

## QEI Corporation

One Airport Drive □ P.O. Box D  
Williamstown, NJ 08094 □ (609) 728-2020



Circle (62) on Reply Card

#### Di-Tech

- Model 5860: AFV routing switcher; 64x32 to 256x256 matrix; video, two audio; 4-level breakaway.
- Model 9001: CRT system controller.
- Model 938: X-Y or single-bus control panels; 2-/4-level breakaway; output protection.
- 7006: audio monitor system; dual metering, speakers; amps.

Circle (495)

#### Dolby Laboratories

- Model 380i: auto noise-reduction identification, matches playback to record status.
- Model 390: type C noise reduction for 3/4-inch VCRs; 20dB S/N extension, spectral skewing, anti-saturation.

Circle (496)

See ad on page 145

#### Dorrough Electronics

- Loudness meters; multiband audio processors; FM stereo generators.

Circle (497)

#### The Droid Works

- EditDroid: enhanced software; EDL editing, combining; sound, image control functions.
- SoundDroid: digital audio processing, production system.
- SoundDroid Spotter: records libraries on optical digital disks.

Circle (498)

#### Dubner Computer Systems

- DPS-1 paint system: graphic paint system; real time frame capture; 1-/2-/4-field NTSC

frame buffer; multiple brushes; 68000  $\mu$ P; 2Mb picture storage, various external storage disk types; VTR controls for animation.

- 10K/20K: character generators as production models; playback of CBG, Texta animation and graphics.

Circle (499)

#### Dynair

- Series 1600: 135MHz bandwidth 5x1 switcher; HDTV, computer graphics; serial data remote control.
- Series 1500: 4-output video DA; 120MHz bandwidth; equalization.
- Series 1 Control: MP-9290A computer interface between control panels, ESbus, or System 21/23 and Series 10/25 switching systems; Z80A, DYNLIB software library.
- AD-1570A; audio DA, 500kHz bandwidth; 5 outputs.
- Series 1 machine control: ESbus-compatible; for 20 machines, 10 controls.
- Series 10: video-switching system for NTSC, PAL, HDTV, graphics; 120MHz bandwidth.

Circle (500)

See ad on page 53

#### Dynascan

- Power supplies; AF, RF test equipment.

Circle (501)

#### Dynatech NewStar

- Discovery: entry-level automated newsroom system; 6-terminal, 3-wire service; dual 160Mb disk drives; compatible with larger NewStar systems.

Circle (502)

#### ECD Industries

- E-prom programmers; tubes, semiconductors.

Circle (503)

#### EECO

- Editing work station: expanded PC keyboard, color-coded keys.
- EMME 395: A/B roll editing; time code; basic list management.
- EMME 595: model 395 with intermediate list management; sequential auto assemble.
- EMME 795: model 595 with 8-inch floppy drive.
- EMME 995: model 795 with LTC generator; complete EDL management.
- IVES PRO: A/B roll editing control; 3-VTR system with format mixing possible.
- IVES II: enhancement with split A/V edits; auto assembly from external source; learn mode.
- Econoline PTG-56/MTG-57: portable/master time-code generator/readers.
- Econoline TCR-66/TCR-67: miniature and desktop time-code readers.
- Econoline VCG-76/VCG-77: portable and desktop time-code readers, inserters.

Circle (504)

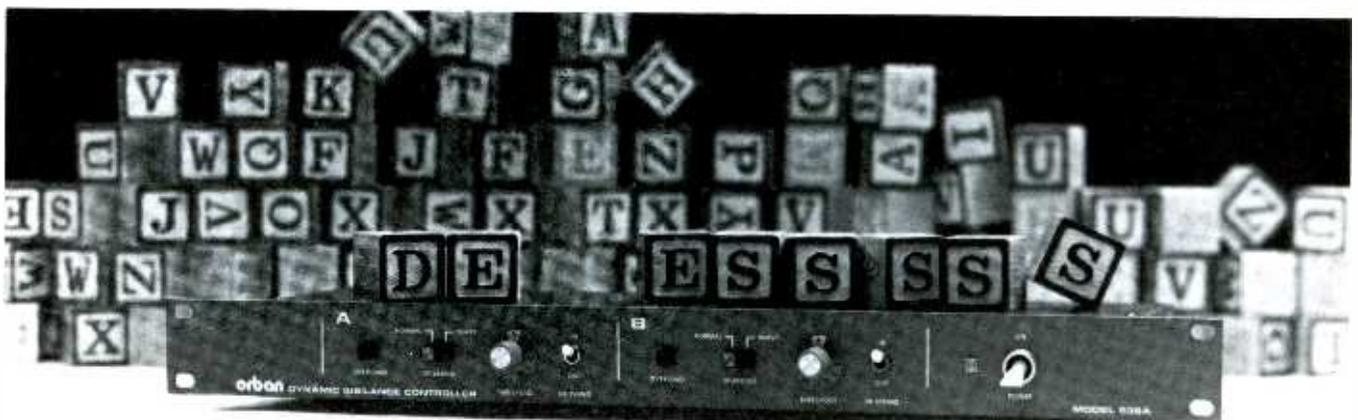
#### EEG Enterprises

- NCI TeleCaption II TV captioning system.

Circle (505)

#### EEV

- P8498/99: 1-inch DG LOC Leddicon; low lag; high resolution; long-life barium aluminate cathode.
- P8456: 30mm DG Leddicon for HDTV.



## The ABC's of de-essing.

You know they're out there—those nasty "S" sounds that stymie your pursuit for top quality vocal production. That's why we've perfected our 536A Dynamic Sibillance Controller which subtly and effectively controls harsh "S" sounds while you mind your P's and Q's.

The 536A is a single purpose, two-channel de-esser which allows your DJ mike and announcer dialogue to have the presence and sparkle you demand without the abrasive, distracting sibillance which can be an unexpected by-product. The 536A also assures you of constant de-essing regardless of changes in input levels.

Discover why the top stations and production rooms in the country rely on the Orban 536A De-Esser to give them a clean, bright vocal sound, without excessive sibillance, which is so important in contemporary broadcasting.

**orban** Orban Associates Inc. 645 Bryant St.  
San Francisco, CA 94107 (415) 957-1067  
Telex: 17-1480

Circle (63) on Reply Card

# There's greater depth in Fujinon's ULTRA WIDES.



## Now with the widest zoom in the world!

When productions call for scenes as wide as all outdoors, or wall-to-wall coverage inside a phone booth, Fujinon's ULTRA WIDES deliver. And they deliver greater depth as well.

The new A8.5x5.5RM is

the widest zoom made. From 5.5mm to 47mm, you get a distortion-free zoom with all the brightness, contrast, and color accuracy that has made Fujinon famous.

The new, lightweight A18x8.5ERM zooms from 8.5mm to 153mm...and, with its built-in 2X extender, can take you all the way out to 306mm. It's destined to become the standard lens for news cameramen throughout the world.

More than the ultra wide field angles you want, the



A8.5x5.5RM

ULTRA WIDES also provide the high MTF, low longitudinal chromatic aberration, fast F1.7 speed, and the minimal ramping you've come to expect from Fujinon. And for absolute production control, the lenses accept a full range of studio conversion accessories including shot boxes that deliver

push-button operation with accuracy to a single millimeter and zooms at the precise speed you want. The A18x8.5ERM is even available with a built-in test pattern projector.



A18x8.5ERM

To learn more about Fujinon's ULTRA WIDES (including the A3.5x6.5RM and A7x7RM), you'll get more information or a demonstration by calling the Fujinon location nearest you.

**FUJINON INC.** 672 White Plains Road, Scarsdale, NY 10583  
**SOUTH** 2101 Midway, Suite 350, Carrollton, TX 75006  
**MIDWEST** 3 N. 125 Springvale, West Chicago, IL. 60185  
**WEST** 118 Savarona Way, Carson, CA 90746

(914) 472-9800 Telex 6818115  
 (214) 385-8902  
 (312) 231-7888  
 (213) 532-2861 Telex 194978



**FUJINON**

Circle (64) on Reply Card

*EEV, continued*

- K317HG: klystron with gridded electron gun; developed in cooperation with BBC. Circle (506) **See ad on page 157**

**EG&G**

- SS-118/SS-119: medium-intensity strobe systems for towers below 500 feet. Circle (507)

**EMCEE**

- TSA100GA: ITFS/MMDS amplifier; 100W.
- TS10GS translator; 10W transmitter output for ITFS/MMDS; phase-locked receiver. Circle (508) **See ad on page 184**

**EMCOR Products/Crenlo**

- Modular equipment enclosures; chassis

slides; instrument cases; EMI/RFI emission-control cabinets; computer furniture.

Circle (509)

**E-N-G**

- SNG vehicle, compact design. Circle (510)

**ESE**

- Digital clocks, timers; time-code products; master, programmable clock systems; DAs; telephone hybrids. Circle (511) **See ad on page 191**

**Eastman Kodak**

- EVT-2000: 1-inch tape with enhanced binder; lengths from 34 to 188 minutes for type C; 34 to 105 minutes for type B.

- Still video system: transfer 35mm still images to miniature magnetic disc cartridge; 50 fields, 25 frames per disc. Circle (512)

**Echolab**

- DV5: digital effects system; control integrated into SEG control panel.
- DI-ALOG: digital and analog effects control from E-6 front panel. Circle (513)

**Econco Broadcast Service**

- Rebuilt transmitter power tubes. Circle (514)

**Editron (Australia)**

- 100A: videotape editing control; improved detachable keyboard; slave capability.
- 500A: editing control; 99 addressable interfaces; subframe capability with ATRs; soft keys; jam-sync record.
- 500V: 6-machine editing system; soft keys; chase mode; RGB color display; LCD flat display; multirecord; console automation options.
- Rank Cintel interlock interface.
- ADR countdown cue display.
- Time-code synchronized metronome.
- Intelligent audio-routing switcher. Circle (515)

**Elcom-Bauer**

- 61000: solid-state FM transmitter; 1kW; broadband FET amplifiers; Fluorinert coolant; dual integral power supplies; auto power control; 6020 exciter.
- 690B FM exciter: noise less than -75dB; direct modulation.
- 6020 exciter: three composite, four SCA inputs; 3-20W RF output; integral modulation indicator.
- ET transmitter: portable, emergency FM device; 300W broadband.
- 6100: solid-state FM transmitters; 100W, 300W, 600W. Circle (516)

**Elcon Associates**

- Elcon 1200: 1-inch videotape cleaner, profilers; B and C formats; LED ladder display; hard-copy printout. Circle (517)

**Electro Controls**

- Prelude: manual preset lighting control console; 12-48 channels, 4-submaster, 2-scene preset. Circle (518)

**Electro Impulse Lab**

- Forced air, dry dummy loads for FM; RF calorimeters; wattmeters; RF attenuators. Circle (519)

**Electronic Research**

- Series 200: FM side-mount antenna; end, center fed; one to 14 bays; 10 to 39kW; pattern circularity to ±2dB. Circle (520)

**Electronic Systems Lab**

- EELA Audio Reportophone: telephone line adapter for reporters.
- Graff Diamond high-speed audiocassette duplicators.
- Haase Hum-killer. Circle (521)

If you're gearing up for greater capability, used equipment from Ampex can save you money. You'll save time searching, too, because we have a wide selection from virtually every manufacturer—for post-production, broadcast or in-house operations.

Give your nearest Ampex sales engineer a call. His list of used equipment ranges from "as is, where is" to reconditioned—so

there's bound to be something that fits your needs and your budget.

Atlanta (404) 491-7112 Chicago (312) 593-6000  
Dallas (214) 960-1162 Los Angeles (818) 240-5000  
New Jersey (201) 825-9600  
(In New York (212) 947-8633)  
San Francisco (415) 367-2296  
Washington, DC (301) 530-8800  
Canada (416) 821-8840

**AMPEX**

Looking for used equipment?  
Call us first.



© 1986 Ampex Corporation

Circle (65) on Reply Card



#### Electronic Visuals

- EV4041: waveform monitor, TV line selector.
- Circle (522)

#### Electro-Voice

- RE-98: miniature omnidirectional microphone.
  - Entertainer 100: portable mixer and speaker system.
- Circle (523)

#### Elicon

- CCS-XL: boom arm camera control system.
  - Ultrasonic follow focus for live action.
  - Motion control system: Cinema Products pan/tilt head with computer control.
  - Portable field computer: interfaces to Mini-mote and Matthews Camera Mote pan/tilt heads; learn, recall modes.
- Circle (524)

#### Energy-Onix

- FM transmitters: 40W-30kW; 1-tube designs; solid-state IPA.
- Circle (525)

#### Environmental Satellite Data

- Custom map, font generation.
  - Model 3000: clutter-free radar system; local clutter is blanked, replaced by data from neighboring radar systems.
  - 6000CD: enhanced Front-End weather and satellite data processor; images viewable directly from satellite without transfer to graphics system.
  - Custom mapping: high-resolution cloud formation for weather graphics.
- Circle (526)

#### Ethereum Scientific

- Transportable Ku-band SNG uplink: 2.8-foot antenna; 600W TWT HPA; frequency-agile.
- Circle (527)

#### Eventide

- RD930: broadcast delay line for talk show or production.
  - Effects software for vocoder, auto panner.
- Circle (528) **See ad on page 165**

#### Evertz Microsystems

- Emulator: tape transport interface; adds VTR-like deck operation to ATRs for editing systems.
  - Chase synchronizer.
- Circle (529)

#### Excalibur Industries

- Equipment cases: custom designs, shock-insulated rack-mount, interlocking.
- Circle (530)

#### FGV-Schmidle & Fitz

- FGV Panther: electromechanical camera dolly;  $\mu$ P control; programmable speeds and positioning; two operator seats.
  - Lightweight camera dolly.
- Circle (531)

#### Fairlight Instruments

- Computer Video Instrument/CVI: effects system with paint features; pixelate; freeze; colorize; pan/zoom; stretch; RS-232, memory, graphics pad options.
- CMI series III: computer musical instrument; 16-bit, 100kHz sampling; waveform editing; 80-track recorder.

- Voicetracker: revised software.
- Circle (532)

#### Faroudja Laboratories

- CFD-N: high-quality comb filter decoder, for large-screen projection, graphics and tape-film transfer.
  - CTE-N encoder: avoids cross-color and cross-luminance patterns.
  - VHP-N: H/V detail processor; improves picture detail with patented boost design.
  - FTC-N: auto NTSC phase error correction re-establishes proper skin tone without altering other colors.
  - CTC-N: component transcoder.
- Circle (533)

#### Ferno-Washington

- Ferno-Freelancer: on-location AV cart; 300-pound capacity; one person handles easily.
- Circle (534)

#### Fiberbilt Cases

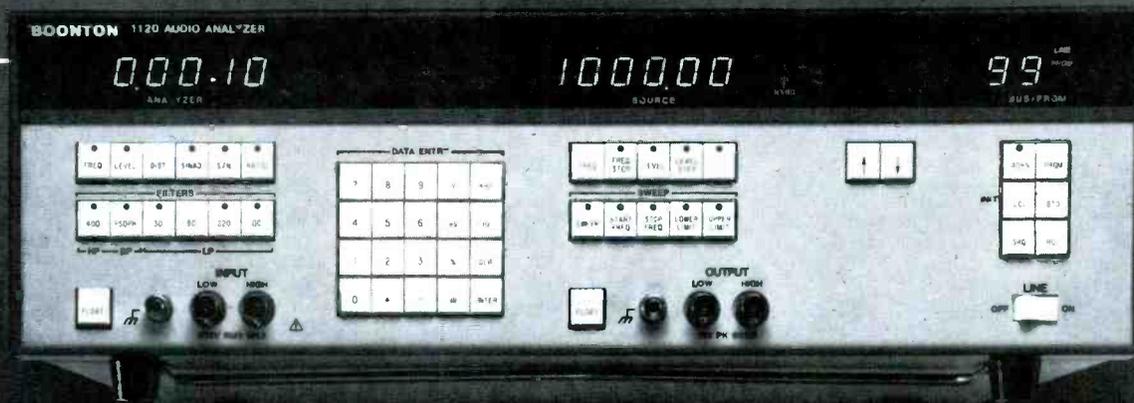
- 855 series: reusable shipping containers, per ATA spec 300.
- Circle (535)

#### Fidelipac

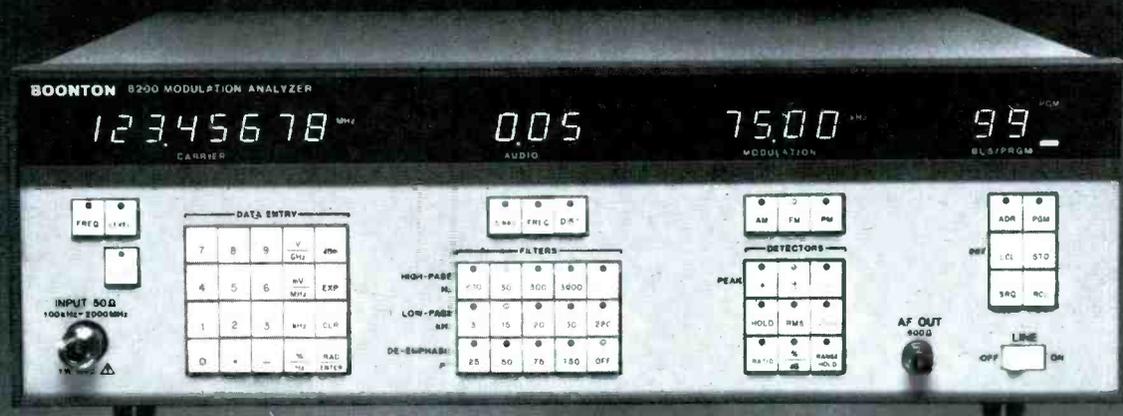
- ESD10: eraser, splice detector; 75dB erasure on reel-to-reel; 27.5ips.
  - CTR30: 3-deck audio cart recorder/producer.
  - CTR100: audio cart system; stereo; Max-trax.
  - CTR100: audio cartridge recorders, reproducers.
- Circle (536)



Circle (67) on Reply Card



Two analyzers  
with one standard...  
**EXCELLENCE!**



### 1120 AUDIO ANALYZER

Characterize audio signals with ease from 5 Hz to 200 kHz, or audio devices using the built-in, low distortion source.

*Measure:*

- Frequency to 0.0001%
- SINAD and signal-to-noise
- Distortion in dB or %
- AC/DC voltage

### 8200 MODULATION ANALYZER

Both baseband and modulated carrier signals can be accurately analyzed with the versatile 8200.

*Measure:*

- Carriers from 100 kHz to 2 GHz, both frequency and level
- Baseband frequencies to 200 kHz
- FM/AM/ΦM
- Audio distortion in % THD or SINAD

Both the 1120 Audio Analyzer and the 8200 Modulation Analyzer are equally at home on the bench or over the bus. Both can store up to 99 complete panel setups for easy repetitive bench testing. Both feature a IEEE-488 interface as standard equipment for sophisticated system application. And, best of all, both offer superior performance at a price below the competition. Call your local representative or Boonton directly for a convincing demonstration.

### Boonton Electronics Corp.

791 Route 10, Randolph, NJ 07869  
Telephone (201) 584-1077

Signal Generators ■ Modulation Analyzers ■ RF Power Meters ■ RF Millivoltmeters  
Capacitance Meters and Bridges ■ Audio Test Instruments

Circle (68) on Reply Card

**BOONTON**

### Film/Video Equipment Service

- Wide Eye I, II: wide-angle lens attachments; slip over lens.
- Modification: use Arriflex mattebox, follow focus with ENG/EFP cameras; F/Vesco J-6 zoom controller.

Circle (537)

### Flash Technology

- SC110: high-intensity light-control unit.
- FTB139: 24Vdc medium-intensity light.
- FTB301: medium-intensity obstruction tower light.

Circle (538)

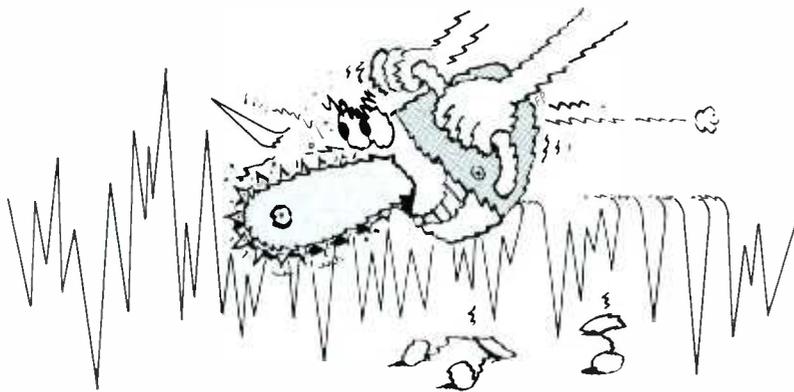
### John L. Fluke Company

- 9000A-006: asynchronous probe for Fluke

- 9000 Troubleshooter, PCB fault locator.
  - Model 37: benchtop analog/digital display meter.
  - Touch Control screens.
- Circle (539)

### FOR-A

- FA-800: frame synchronizer, auto level control; DOC, velocity correction; for type C VTRs.
- DEC-110: NTSC-to-RGB decoder.
- CCS-4400: color-correction system; Y/R-Y/B-Y inputs, outputs; RGB, B/W correction, gamma control; NTSC monitor output.
- CT-500: component transcoder; RGB, YIQ, Y/R-Y/B-Y; full matrix transcoding.



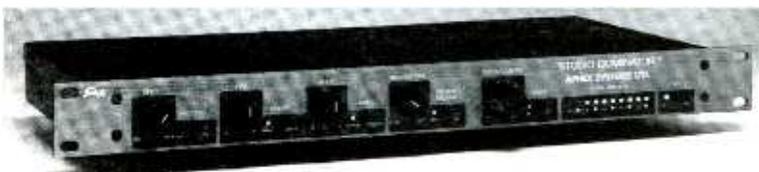
## DOES YOUR LIMITER MASSACRE YOUR SOUND?

### The Aphex Dominator™ is the perfect solution!

Unlike dumb, over-threshold devices, the Dominator is an intelligent 3-band limiter with a proprietary circuit which varies the threshold for limiting. The result is an *absolute* peak ceiling while retaining a transparent sound. You can run hotter levels to maximize signal-to-noise without fear of overloading.

The Dominator provides total transparency below processing threshold... increased loudness... freedom from spectral gain intermodulation... maintenance of transient feel... high density capability... and can be used for multiple applications. It's flexible and easy to use.

Ask your audio professional for a free demonstration. Once you've heard it, you'll never be satisfied with your old limiters.



© 1986

Aphex Systems Ltd.  
13340 Saticoy Street • North Hollywood, Ca 91605  
(818) 765-2212 • TWX: 910-321-5762

Dominator is a trademark of Aphex Systems Ltd. and manufactured in the U.S.A.

Circle (69) on Reply Card

- CCG-500: color-bar generator; RGB, Y/R-Y/B-Y outputs; blackburst; composite sync; H/V drives, gen-lock.
- TKY-2000: title, DSK, matte, edge, background color generators.
- TGR-3300: time-code generator, reader, title display; VITC, LTC modes.
- LG-100: logo generator.
- Sirius-100: digital audio memory; 1,000 minutes with random access; for cart, audio editing.
- VTW-220: character generator/titler; 32-page memory, 512 colors.

Circle (540)

See ad on page 135

### Fortel

- Turbo 2: digital TBC with infinite window correction; field/frame freeze; composite or Y-688 dub components; Y/R-Y/B-Y outputs; dynamic tracking, high-speed shuttle, DOC, luma noise reduction, H-enhancement.
- CC-1: color corrector; separate vector color correction.

Circle (541)

See ads on pages 27, 120

### Fort Worth Tower

- Towers, erection, installation; communications buildings.

Circle (542)

### Frezzolini Electronics

- Uninterruptible power interface: allows 3-minute camera operation during battery changes.
- HM-NP1 adapter: accommodates two NP-1 12V, 1.5Ah batteries to Anton/Bauer or Frezzolini bracket without cables.

Circle (543)

### Fujinon

- P17x16.5ESM: modular studio, EFP lens; 1-inch, 1¼-inch.
- P20x14ESM: studio/EFP lens, modular construction.
- P44x18ESM: EFP/OB/sports zoom lens; modular design.
- A8.5x5.5RM: f/1.7 wide-angle lens; 77° view angle.
- A18x8ESM/A15x8ESM: ¾-inch modular zoom lens; 2X extender.
- A18x8.5ERM: f/1.7 zoom with 2X extender and 0.9m MOD; ENG/EFP.

Circle (544)

See ad on page 95

### Fuji Photo Film

- H621E: 1-inch videotape.
- H421M: M format videocassettes.
- H321B: Betacam videocassettes.
- M-II metal tape videocassettes.

Circle (545)

### G&M Power Products

- Nicad batteries, packs, belts; chargers.

Circle (546)

### GML/GML America

- X-Calibre: digital video effects system; dual-channel, multiple input; zooms, slides, flips, tumbles, spins; programmable; RS-422.

Circle (547)

### GTE/Sylvania

- FKK(CP41): 2kW 240V, studio, TV theater.
- FKJ(CP40): 1kW, 240V, SSTV use.
- FKN(CP52): 1kW, 240V, medium prefocus, STTV lamp.
- PAR-64 series: EXC, EXD, EXE, EXG; 240V.

## R-42 diversity receiver • Now with GaAsFET's.

### Improved sensitivity and system range, with ultralow noise.

Cetec Vega's top-of-the-line PRO PLUS R-41 and R-42 wireless-microphone receivers have quickly become the worldwide standard of excellence. Overall quality of the PRO PLUS wireless system is equal to wired microphone systems, with respect to dynamic range, signal-to-noise ratio, distortion, etc. *We invite your comparisons.* Check these features of the new, improved PRO PLUS receivers:

- **GaAsFET front end.**

Provides the highest achievable sensitivity for maximum system range. Also incorporates a high-performance helical filter.

- **Lowest distortion.**

0.25% maximum, 0.15% typical.

- **Measurably the highest signal-to-noise ratio and widest dynamic range.**

Quiet as a wire. With DYNEX II (a new standard in audio processing), SNR is 101 dB (108 dB A-weighted). System dynamic range is 133 dB including transmitter adjustment range, from input for maximum nondistorting gain compression to noise floor.

- **"Infinite gain" receiver.**

Improved performance in the critical threshold region, superior handling of multipath conditions, better SNR, and constant receiver audio output level.

- **Professional audio circuits.**

Output is adjustable from +20

dBm to -60 dBm in four ranges. Also featured are selectable phasing and 0.2-watt independent headphone amplifier.

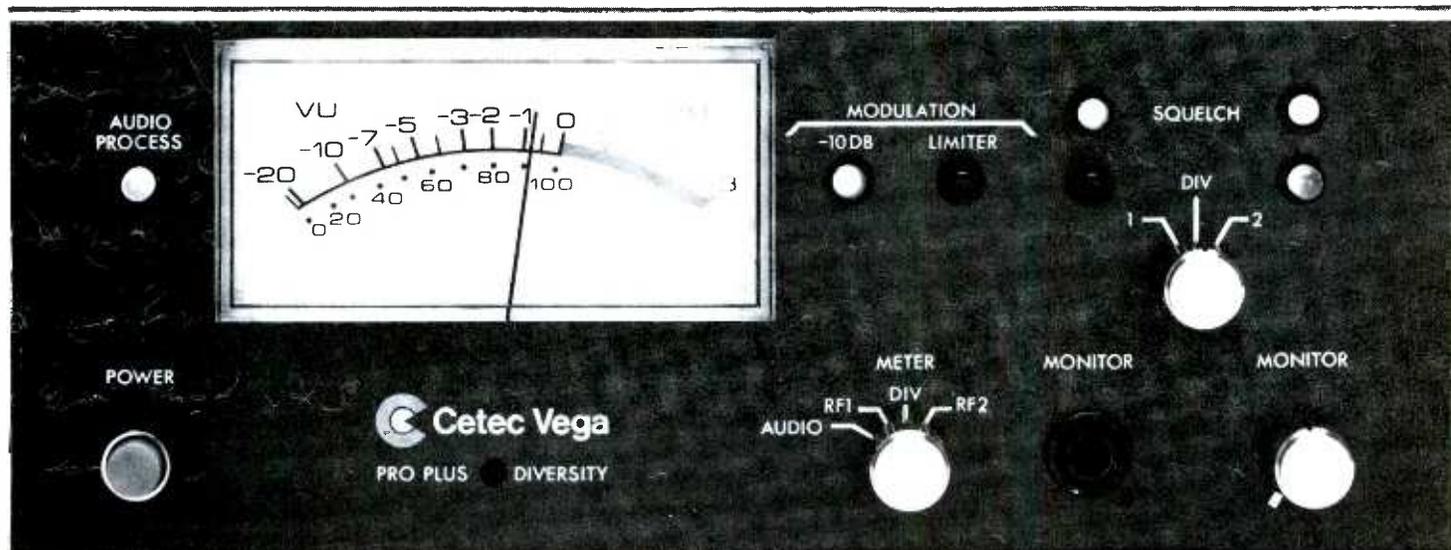
- **True dual-receiver diversity.**

The R-42 diversity system is the most reliable method to avoid dropouts. The R-41 nondiversity receiver has all of the other features of the R-42.

PRO PLUS wireless-microphone systems achieve the highest performance possible with today's advanced technology.

Write or call for further information and location of your nearest dealer: Cetec Vega, P.O. Box 5348, El Monte, CA 91734. (818) 442-0782.

# The best wireless gets even better.



Circle (70) on Reply Card

**Cetec Vega**  
...the professional's wireless

June 1986 **Broadcast Engineering** 101

*GTE/Sylvania, continued*

- PAR-64 series: FFN, FFP, FFR, FFS, 1kW; 800-hour rating.

Circle (548)

**Garner Industries**

- Model 2700: degausser, continuous duty; for videocassettes, floppy disks, computer cartridges and high-coercivity media; dual-coil design.

Circle (549)

**General Electric**

- Comband: bandwidth compression through frequency and time division multiplex; transmit two TV signals on one cable channel or one ITFS/MMDS carrier.

Circle (550)

**General Electric/Lamps**

- Watt-Miser quartz studio lamps.

Circle (551)

**Gentner Engineering**

- Model VRC-1000: transmitter remote-control unit; FCC-certified; synthesized voice or digital data status report of all parameters; command capability.
- EFT-900: frequency-extender transmitter; duplex operation on single phone line.
- TC-100 interface: for automatic system; optional touch-tone decoder.
- Teleprocessor: audio processor; Aphex and EQ adjustments for customer's hybrid or frequency-extension equipment.

Circle (552)

See ads on pages 55, 110

**Giese Electronic**

- Machine synchronizer lock system 3/3.

- Multislave selector unit for synchronizer.
- Time-code test equipment.
- Taker 1000: automatic dialogue replacement/editor.

Circle (553)

**Alan Gordon Enterprises**

- EOS/FAX: video animation control; frame-by-frame recording on U-matic; for animation, titles, pencil tests, time lapse, clay animation, pixelation, computer graphics.
- Spectrum: computer-assisted motion control with FAX 6-motor animation stand; menu-driven; for 650K non-dedicated IBM-PC.

Circle (554)

**Gorman-Redlich**

- EBS equipment; weather receivers; digital AM antenna monitors.

Circle (555)

**Gotham Audio**

- EMT-227DX: limiter for AM, shortwave broadcasting; 0.3ms delay line transient control.
- EMT-48: digital audio spot recorder, reproducer; Winchester disk; for sound effects or fast access to short announcements.

Circle (556)

**Graham-Patten Systems**

- Model 608 ESAM: edit suite audio mixer; 8-input plus tone and external preview; serial RS-422-compatible; 2-program, 2-preview outputs.

Circle (557)

See ad on page 106

**Grass Valley Group**

- 9505: source sync generator; encoded sub-carrier or color black reference versions.
- 9510: reference sync generator; protected video gen-lock; phase preset control for 16 gen-lock phase memory settings.
- 9520: master reference sync generator;  $\pm 5\text{Hz}$ ,  $\pm 1\text{Hz}$  or external reference stabilities; dual test generators with source ID option.
- Kaleidoscope: digital effects system; based on 4:2:2 CCIR 601 with 4x key sampling; 8-bit system; RGB, YUV, NTSC and digital input, outputs.
- HDTV version of model 100 video switcher.
- Series 85 EZ-link fiber-optic products.
- Key Extender: external key signal associated with all inputs of model 300 series switcher with Omni-Key.

Circle (558)

See ad on page 9

**Gray Communications Consultants**

- SNG/ENG units, Ku-band.
- Light belts; batteries; chargers; power belts.

Circle (559)

See ad on page 77

**Gray Engineering**

- TCA-143: SMPTE time-code analyzer; checks editing code for various diagnostic faults, retransmits corrected signals.

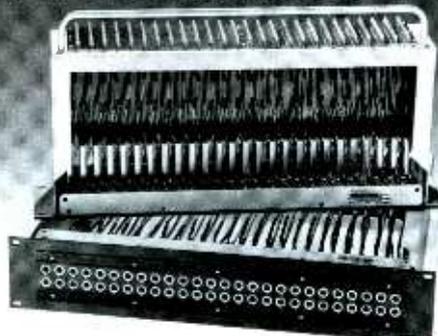
Circle (560)

See ad on page 184

**The Great American Market**

- FOG POWER: fog effect fluid, scented.
- MicroBrute LV-9: miniature 9-light instrument; 12V lamps.
- RDS/USA: HMI lighting fixtures; studio,

# JACKS BE NIMBLE.



**WHAT ARE YOU WAITING FOR?**

Take a look at your broadcast facilities. Are there empty spaces where there should be jack panels and patch cords? Let Audio Accessories fill those gaping holes with premium pre-wired or unwired jack panels, featuring our exclusive Audio-Line™ jacks.

We have a vast array of audio jack panels and related items in stock, ready to ship within 24 hours. We'll get your facilities upgraded faster than some companies can give you a quote. Call us. 603/446-3335.

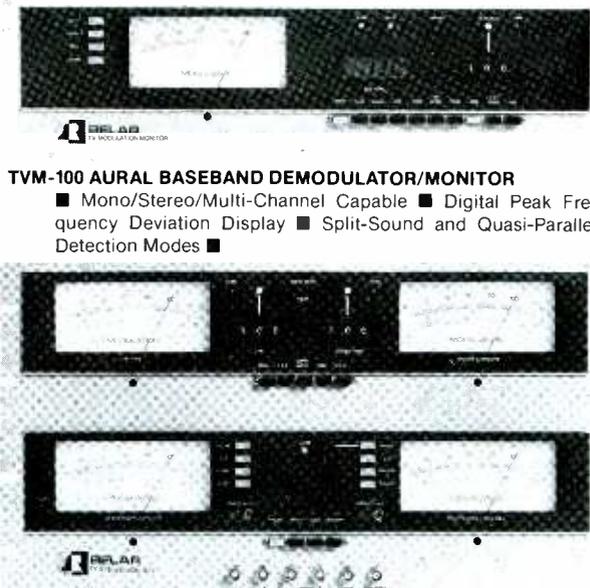
**audio accessories**   
**audio-line**

AUDIO ACCESSORIES, INC., MILL ST., MARLOW, NH 03456

Circle (71) on Reply Card

# TV STEREO

## BTSC AURAL MODULATION MONITORS



**TVM-100 AURAL BASEBAND DEMODULATOR/MONITOR**

- Mono/Stereo/Multi-Channel Capable
- Digital Peak Frequency Deviation Display
- Split-Sound and Quasi-Parallel Detection Modes

**TVM-200 BTSC STEREO DECODER/MONITOR**

- Full-Time Composite and L&R Metering
- Two Auto-Ranging Meters for Full Stereo Signal Test and Measurement
- Genuine dbx® Decoder Card
- Line Level Stereo Audio Outputs

**BELAR ELECTRONICS LABORATORY, INC.**  
119 LANCASTER AVENUE, DEVON, PA 19333  
(215) 687-5550  
*Where Accuracy Counts . . . Count on Belar*

Circle (72) on Reply Card



**Microprocessor control, amorphous metal core heads, and superior performance . . . technology that's typically AEG.**

Chances are that the M-21 Professional Audio Tape Recorder from AEG will outperform whatever 2-Track you're currently using or considering for future purchase. No other machine is built to such exacting standards, no other machine handles tape as gently yet rapidly, and no other machine is presently available with Amorphous Metal Butterfly Core Heads. (Ours are standard equipment; ask about our exclusive head warranty.)

The M-21 is microprocessor controlled and user-programmable for any 2 of 4 speeds. It is a totally

self-contained package with no external power supplies or cabling, and access to all components for maintenance and alignment is quick and easy. The performance specifications are unexcelled.

It's only natural that the M-21 should be such a fine machine. After all, we invented the modern tape recorder over 50 years ago. To arrange for a free demonstration at your facility, or for information on any of our other high technology products, please give us a call.

In Canada:  
AEG BAYLY INC.  
167 Hunt Street  
Ajax, Ontario L1S 1P6  
(416) 683-8200

In U.S.A.:  
AEG Corporation  
Route 22 — Orr Drive  
P.O. Box 3800  
Somerville, NJ  
08876-1269  
(201) 722-9800

# AEG

*The Great American Market, continued*  
portable; batteries, accessories.  
Circle (561)

**Grumman Electronic Systems**

- AIS-5000: automation system; random access from sales and traffic; spot insertion, billing; machine control.

Circle (562)

**James Grunder & Associates**

- CEL P156/2: video standards converter.
- EFX-2: effects system; menu control from touch screens.
- EFX-3: dual-channel effects; touch-screen control.
- EFX-4: dual-channel effects with multi-channel combiner.
- MCMM37B/50B: multistandard color monitors; 14-/20-inch; high resolution.

Circle (563)

**HEDCO**

- HD-12 router: 12x12 matrix for video, dual audio or AFV in 2-rack unit frame; single power supply.
- ADA-601: 12-output audio DA; unbalanced; for duplication installations.
- VDA-608: 6-output VDA; 60MHz bandwidth; wide dynamic range for video, pulse, subcarrier.
- VAC-300: video-activated switch.
- SSG-321: audio test generator.
- HDA series: 8-output audio, video DAs.
- DA6000: audio, video DAs.
- HBB106: 6- and 12-input passive A/V monitoring switchers.

Circle (564)

See ad on page 47

**HM Electronics**

- BH720 belt pack: cabled intercom, single-channel headset station.
- BH721 belt pack: cabled intercom, 2-channel headset station.
- RL742: rack-mounted 2-station intercom speaker station.
- RH710: rack-mounted 2-channel headset station.
- H5210-Z: lightweight headset with dynamic mic.

Circle (565)

See ad on page 73

**Hallikainen & Friends**

- Audio on-air mixer; remote-control systems.

Circle (566)

**Harris Broadcast/  
Harris Broadcast Microwave**

- FM-35K: 35kW FM transmitter with 80% efficiency rating; advanced diagnostics record and store data and time of overload events to aid problem isolation.
- SkyGain: high-performance circularly polarized FM antenna.
- PUP: portable uplink package.
- Ku-band SNG transceiver.
- Microstar 23: 23GHz RS-250B video microwave link.
- UDL 634 multiplex system.

Circle (567)

See ads on pages 60, 84, 187

**Harris Video**

- Model 640: frame synchronizer/TBC with smart noise reduction option; separate synchronizer and TBC inputs; audio synchronizer control output; tracks slow motion and shuttle.

- Model VW-3: frame synchronizer/TBC for 3/4- and 1/2-inch heterodyne processing.
- 560 TBC: 16-line window system includes advanced sync and variable-speed option for 3/4- and 1/2-inch.
- AC-20AS dual-channel video signal processor: modular design allows selection of desired TBC, synchronizer features; variable-motion capable and effects options.
- ESP-II still-store system: single or dual channel; frame-grab feature; recall individual images or sequences; two Winchester drives hold 800 stills.

Circle (568)

**Harrison Systems**

- Series 10: audio console, hard disk automated support; reset to previously established signal flow and processing settings: TV, film, multitrack applications.

Circle (569)

**Heie Engineering**

- BC1 Commander: on-air audio mixer; auto sequencing; telehybrid interface; tape machine controls; clock, timer, temperature display.

Circle (570)

**Karl Heitz**

- 510 Mini Tele Studex: short tripod; 21-inch folded, 63-inch maximum height.
- 480: fluid head, counterbalanced for cameras to 30 pounds.
- 563LM: mic fishpole; 5-section ranges from 2.5-10.5 feet.

Circle (571)

**JACKS  
BE QUICK.**



**READY TO SHIP IN 24 HOURS.**  
MAXI panels with 2 rows of 24 or 26 long frame (1/4") jacks per row. MINI panels with 2 rows of 48 or 52 MINI jacks per row. All featuring Audio Accessories' premium Audio-Line™ jacks. Standard pre-wired MAXI panels are also in stock.  
We carry a large assortment of jacks, patch cords, and accessories. And custom panels can usually be delivered within a couple of weeks of your order. Call for more information. 603/446-3335.

**audio accessories**   
**audio-line**

AUDIO ACCESSORIES, INC., MILL ST., MARLOW, NH 03456

Circle (74) on Reply Card

**RUSLANG  
HAS IT ALL  
RADIO AND T.V. STUDIO FURNITURE**



**BUY DIRECT AND  
SAVE**

Write for our complete 40 page catalog showing **RUSLANG'S** fine studio furniture and consoles.

320 Dewey St. Bridgeport, CT 06606  
Telephone: (203) 384-1266

Circle (75) on Reply Card

# SHOOT IT.

Take your best shot with Thomson Betacams, studio cameras and field cameras.

# SHAPE IT.

Create your best ideas on Vidifont Character Generators/Paint and Graphics Systems.

# SCAN IT.

Digitize, process and store your best slides on the Thomson TTV 2710 slide scanner.

# PICTURE IT ALL. WITH THOMSON.

 **THOMSON-CSF BROADCAST, INC.**

37 Brownhouse Road

Stamford, CT 06902-6303

Tel: (203) 965-7000 TWX: (701) 474-3346

Circle 78 on Reply Card

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#### Hipotronics

- Automatic voltage regulator systems.
- Circle (572)

#### Hitachi Denshi

- Z-31P: Plumbicon version of Z-31 auto set-up camera.
  - 8mm ENG system.
- Circle (573) **See ad on pages 40-41**

#### Hoffend & Sons

- Omni: motorized winch for studio rigging.
  - Light Lifter: motorized hoist for individual studio lighting instruments.
  - Micro Commander: programmable rigging control.
- Circle (574)

#### Holiday Industries

- HI-3500: broadband RF radiation exposure meter.
- Circle (575)

#### Hotronic

- AF71: TBC frame synchronizer; 8-bit 4x<sub>sc</sub> sampling or heterodyne color; optional auto  $\mu$ P-controlled freeze frame, 16-bit auto-matched digital audio delay.
- Circle (576)

#### Howe Audio

- Series 2300: Phase Chaser, corrects phase inversion, time delay, channel dropout.
  - Series 8000: modular audio mixer; rotary faders; eight to 12 channels.
  - Series 10000: flexible modular audio mixer.
- Circle (577) **See ad on page 78**

#### Hubcom/Hubbard Communications

- VFP Video Flight Pack: 1.8m Ku-band antenna, full monitoring, audio/video switching and spectrum analyzer in SNG package; packs into eight transport cases; 20-minute setup time maximum.
  - HCD-500: video time delay machine; three minutes to two hours.
  - LWA-1: TWT HPA; 27W output; antenna mounting.
- Circle (578)

#### ICM Video

- CG-7000P: color character generator; genlocks to any video source; plug-in module contains character faces; 20-page memory, auto sequence.
- Circle (579) **See ad on page 174**

#### IGM Communications

- IGM-SC: automation audio switcher; IBM PC-based.
  - IGM-EC: computer-controlled audio-switching system.
  - Custom audio-switching designs.
- Circle (580)

#### ITELCO

- TV transmitters: low/highband VHF and UHF; 10W to 40kW.
  - TV transposers/translators.
  - FM transmitters: tube-type, 5 to 55kW.
  - FM exciters: solid-state, to 20W.
  - LKFM 01 radio link: one video, two audio channels in 1.7-2.5GHz band.
  - Portable relay link from camera to studio.
- Circle (581)

#### ITS

- ITS-10: VHF TV exciter.
  - ITS-70: ICPM corrector.
  - ITS-231: UHF backup exciter, 1kW transmitter.
  - ITS-1610B: 10W MMDS/ITDFS transmitter.
  - ITS-29: aural IF modulator for MTS operation.
- Circle (582)

#### Ikegami Electronics

- TKC1125: HDTV telecine; 1125/60 system; 5:3 or 16:9 aspect ratio; 2:1 interlace.
  - TPP-1125 HDTV projector: 50fL light output.
  - ITC-120: CCTV camera, single  $\frac{3}{8}$ -inch Newvicon.
  - CMU-1450: utility and CCTV color monitor; 14-inch.
  - Series 16 monitors: 14-/20-inch in-line self-converging gun; comb filter; A, B, RGB inputs.
  - VBA-1A: HL79E/ITC-730A/AP Beta recorder adapter.
  - HK323: production models of fully automatic camera; 14 cameras may be controlled from one camera control panel.
  - Series 5 monochrome monitors.
  - HL-95 Unicam adapters: Beta, M-II VCR formats.
- Circle (583) **See ads on pages 65-72**

#### Image Video

- Automated master control switchers; machine assignment systems; voltage monitor systems; custom routing switchers.
- Circle (584)

## Talk To Us First... about a Downstream Keyer

### It could save you a bundle!

**Model 1231**

- Up to 6 simultaneous key signals over one background
- Internal matte and masking generators
- Rack or console mount control panels
- Timed key dissolves, or key cuts
- Fade or cut to black
- Edit system control capability
- Optional Analog key bordering

**Model 1235**

- Mix or cut a single key source
- Fade to black
- Matte generator for colorizing keys
- Optional Analog key bordering

**Model 1238**

- Versatile single key system
- Self key or external key
- Remote or local key control & adjustment capability
- Many uses for special effects
- Optional matte generator



Call us for a complete brochure

**GRAHAM-PATTEN SYSTEMS, INC.**

P.O. Box 1960, Grass Valley, CA 95945  
916/273-8412

Circle (77) on Reply Card

# THE SOLUTION OF THE FUTURE. NOW

10 kW fully solid state VHF TV transmitter EVHF 30 000s\*



- High efficiency
- Low operating cost
- Easy to maintain
- Built-in redundancy
- Built-in input voltage regulator
- Rapid pay-back

\*Not yet approved by F.C.C.



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[www.americanradiohistory.com](http://www.americanradiohistory.com)

Circle (78) on Reply Card

### Innovative TV Equipment/ITE

- P8: portable pedestal with camera operator seat.
  - Fluid mounting heads: H17, H60, H70, H90.
- Circle (585) **See ad on page 189**

### Inovion

- PGS II: still-frame image processor; paint, flash grab functions.
  - APGS: real time image processor; paint, flash grab features.
- Circle (586)

### Inovonics

- 700 X-tra: FM/FMX stereo generator; audio processor; SCA generator on optional plug-in.
  - Model 390: magnetic film recording electronics.
- Circle (587)

### Integrated Media Systems

- Intelligent audio-routing switchers, audio DAs.
- Circle (588)

### Integrated Technologies

- Weather-Maker: IBM-AT-based weather graphics with effects and paint features; interface to all weather services.
- News-Maker: IBM-AT news graphics system; paint, cut-paste and object editor, clip-art library; 20Mb cartridge storage.
- Ani-Maker: IBM-AT animation unit with full paint, object editor, in-betweening, amorphic metamorphosis, splining.
- Ani-Maker Plus: 3-D animation capability and rendering added to Ani-Maker system.
- Image-Maker: 3-D rendering unit; serial in-

terfacing to four animation systems for 3-D work, multiple light sources, texture mapping, shading.

Circle (589)

### Interactive Motion Control

- IMC Lifter: precise up/down movement of camera on nodal-point pan/tilt head.
- IMC video slide image system: automated animation stand; remote zoom lens; magnifies 35mm or 2¼-inch transparencies to 4½-inch image.

Circle (590)

### Interand

- Teleconferencing products, graphic image capabilities.

Circle (591)

### Intergroup Video Systems

- Models 9410/9420: 10- and 20-input production switchers; two mix/effects; DSK with edge, outline effects; RS-232/422.
- Model 9310: 10-input video production switcher; RS-232/422; two mix/effects amps; 14 patterns; re-entry effects.
- Series 8000: master control switcher; 12- to 30-input models in PAL/-M and NTSC; 4-input DSK keyer, edger; five audio breakaway, three cart starts; RS-232/422; stereo standard.
- 8001: master control switcher; stereo option; eight A/V inputs; RS-232; LED audio indicators.

Circle (592) **See ad on Inside front cover**

### International Tapetronics/3M

- ESLV: eraser/splice locator; both tasks in one pass; for NAB A carts.

• OMEGA: mono and stereo, record and/or play cartridge machines; NAB A.

• ScotchCart II: 10s to 7.5min cartridges.

Circle (593)

**See ad on page 59**

### JBL/UREI

- Model 6215: audio power amp; 1-rack-unit high.
- Studio monitors:
  - 4406, 2-way, 6.5" titanium dome tweeter.
  - 4408, 2-way, 8" titanium dome tweeter.
  - 4410, 3-way, 10" titanium dome tweeter.
  - 4412, 3-way, 12" titanium dome tweeter.

Circle (601)

**See ad on page 79**

### J&R Film/Moviola

- LOK Box: hard lock synchronizer, interconnects editing equipment with VTRs.

Circle (602)

### JVC

- Mindset Titler: entry-level character generator for professional and small studio applications.
- Mindset II: titling, graphics and animation capabilities with work station, video production module, graphics tablet and software; dual disk drives and 512kb internal memory.
- GX-N8PCU camera: single ½-inch Newvicon RGB camera for graphics system input; NTSC and RGB signals available; 1fc sensitivity.
- TOPIX: CD-ROM premastering system, based on VP-900 digital audio processor; structures audio, video and computer data to conform to CD ROM data standard; stores 600Mb on standard compact disk.
- KY-M280U camera: special purpose 3-

# Winsted®

## FREE CATALOG



### Winsted Matchmaker Systems

Big, full color catalog includes complete descriptions, pricing and ordering information on:

- Editing Consoles
- Video Consoles
- Production Consoles
- Dubbing Racks
- Equipment Cabinets
- Micro Computer Stations
- Computer Graphic & Newsroom Consoles
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Circle (79) on Reply Card

## Nothing Comes Remotely Close

### SPECTRUM RPU LINKS



SCT500 RPU Transmitter

**The Spectrum SCR500 & SCT500 are a series of high performance broadcast quality RPU Receivers and Transmitters.** They incorporate the latest advances in solid state technology—brought about by Spectrum's more than a decade of experience in the two way radio field. These rugged units use the highest quality components & construction for high reliability in either fixed or mobile applications.

#### RX FEATURES

- VHF & UHF Units
- High Sensitivity & Selectivity
- High Rejection of IMs & strong local signals
- 4 IF Bandwidths Available
- Very Low Distortion
- Full Panel Metering
- Built-in AC Supply
- Many Advanced Features

#### TX FEATURES

- VHF & UHF Units
- 2-75 Watts
- Direct FM
- Front Panel Metering & Indicators
- Built-in AC Supply
- 12VDC Input or "Battery Backup"
- 19" Rack Mt. - Cabinets Available
- FCC Type Accepted. Parts 74, 90



SCR500M RPU RECEIVER

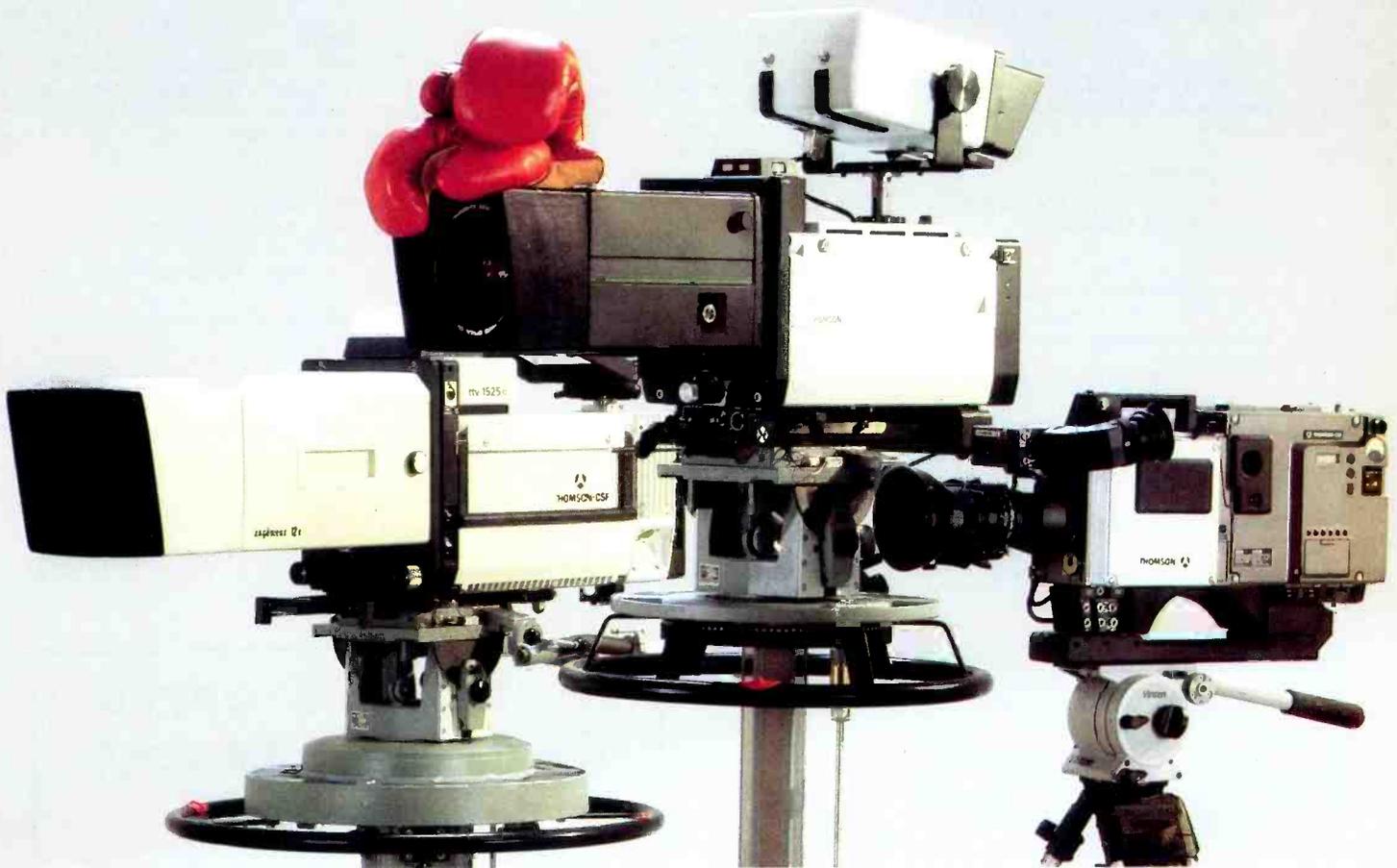


**SPECTRUM COMMUNICATIONS CORP.**

Call or Write for Details, Data Sheets & Prices  
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19403, (215) 631-1710 • Telex: 846-211

Circle (80) on Reply Card

**TTV 1530**, the middle-weight video camera which takes on all-comers. Now, Thomson presents a team of all-round champions.



# NEW MIDDLE-WEIGHT CHAMPION

 **THOMSON VIDEO EQUIPEMENT**

Because the best need the best.

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BP 8244 - 95801 CERGY-PONTOISE CEDEX  
Phone (1) 34.20.70.00 - Telex 204.780 F  
Fax (1) 34.20.70.47

U.S.A.  
THOMSON-CSF BROADCAST Inc.  
37 Brownhouse Road - STAMFORD  
CT 06902 - U.S.A.  
Phone (203) 965.7000 - Telex 6819035 TCS FB.  
Fax (203) 327.6175.

**TTV 1530** is a professional 2/3 inch studio and OB camera. For the least possible investment, it gives you the best of Thomson technology and quality: the know-how of a world leader in advanced electronic equipment. Great image quality, automatic setup and all the operational facilities of the bigger cameras. Compact, maneuverable and lightweight.

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**JVC, continued**

- tube system targeting medical market.
- BR-9000U time-lapse VCR: VHS-compatible for frame/field recording of up to 240 hours on T-120 cassette.
- Paltex Abner: A/B roll editing control system with time code or control track timing of 1/2- and 3/4-inch VCRs.

Circle (603)

**The J-Lab**

- Universal signal transcoder and machine control unit.
- Component adapter for Ikegami ITC-730/A/AP.
- Component adapter, camera control for Ikegami HL79A/D/E.
- Betacam playback device.

Circle (604)

**Jampro Antennas**

- JSL antennas: UHF TV slot designs.
- Broadband FM antennas.

Circle (596)

See ad on page 64

**Jefferson Pilot Data Systems**

- ENP: AP NewsPower electronic news processing for TV newsrooms.

Circle (605)

**Jensen Tools**

- Shock-mount cases: EIA-RETMA standard; fiberglass-reinforced shell, rack interior.

Circle (606)

**Johnson Electronics**

- AT-4A tuner: SCA receiver, addressable.
- DTR receiver: desktop SCA unit.

Circle (607)

**KEM Elektronik Mechanik**

- TRS/TRS2: tape transports; vertical orientation; no capstan; 16mm, 17.5mm, 35mm magnetic film.

Circle (608)

**K&H Products**

- PC-101: nylon reinforced audio case.
- PC-201: nylon accessory case.
- C150: padded nylon case or BVU150.
- HB20A: heavy-duty shoulder strap with leather and foam padding.

Circle (609)

**Kahn Communications**

- Signal generator: AM stereo signal source; joint project with Boonton; for receiver manufacturer use.
- LPGP-1: Lines Plus with gap-proof response; 50Hz-5kHz.
- RSO-1-2: Sound Off audio squelch module.

Circle (610)

**Kangaroo Video Products**

- KVP-150: video pack for BVU-150.
- Nagra Pack: for all Nagra recorders.
- Raincover/KOTE: covers for most TV cameras.
- SQN-4: pocket for SQN-4 stereo mic mixer.
- FP-32: pocket for FP-32 mixer.
- Super-Tough II: top-loading camera case.
- KVP-25: for BVW-25 recorder.
- RF interference cover for Betacam.
- Soundman's case: for Betacam user.

Circle (611)

**Kavouras**

- RADAC 2020: color weather radar receiver; ground clutter elimination system.

- Triton enhancements: graphics, animation software.
- Weatherlink-Vista: push-button satellite communications; instant weather images in video form.
- Weatherlink-Metpac: hard-copy satellite communication system.

Circle (612)

**Key Industries/Phasemaster**

- Electric power phase converters; power-line conditioners.

Circle (613)

**Keltec Florida**

- TWT HPAs: 25 to 600W; single thread and power combined redundant system; for fixed, transportable uplink and earth stations; C-/X-/Ku-band.

Circle (614)

**Keylight PSI Group**

- QuartzColor Arturo: laniro series; HMI and incandescent softlights.
- QuartzColor Sirio: laniro 12kW HMI light; ballast.
- SuperCrank: Matthews adjustable support stand.

Circle (615)

**Kinemetrics/Truetime**

- Clock systems: synchronized to National Bureau of Standards.

Circle (616)

**Kings Electronics**

- RF coaxial, triaxial connectors; video patch panels, accessories.

Circle (617)

**NEW**

**Maximize your telephone audio...**  
with Gentner's

**TELEPROCESSOR**



- Use with any telephone hybrid or frequency extender.
- High and Low Band EQ adjustments improve phone line sound, reduce line hiss and hum.
- Aphex® processing improves high end content.
- Maintains consistent send level to caller.
- EASY installation - XLR connections, no internal adjustments.

Suggested list price \$499.00.

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ENGINEERING COMPANY, INC.

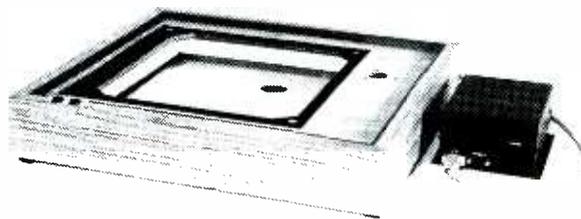
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**The Clear Choice.**

Circle (82) on Reply Card

**FEEDBACK STOPPED DEAD IN ITS TRACKS**

**THE GSP-1000E TURNTABLE ISOLATION SYSTEM**



**FOR TECHNICS SP-10, SP-15, SP-25**

Eliminates 98% of feedback at 90db S.P.L. and significantly reduces the effects of vibration from heating and air conditioning systems including building movement from street and internal traffic.

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206 • 362-0700

Circle (83) on Reply Card

# We put networks on the air

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From sunrise here to sunrise around the world, the reliability built into our standard and miniaturized components keeps the talk coming, the music flowing and the news and entertainment top quality. We want to help put you on the air! Call or send for our latest product literature.



Send me information on your quality components:

- Please have a representative contact me.  
 Please send me your Short Form Catalog covering the complete Switchcraft line.

My area(s) of interest is:  Switches  Connectors  Power Cords  
 EAC Receptacles  Jacks/Plugs  
 Molded Cable Assemblies  Patch Panels

My application is  Current  Future  (date) \_\_\_\_\_

Name \_\_\_\_\_

Company \_\_\_\_\_ Title \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Telephone ( \_\_\_\_\_ ) \_\_\_\_\_

Mail To: Marketing Communications Dept., Switchcraft, Inc.  
 5555 N. Elston Ave., Chicago, IL 60630

**At Switchcraft, Quality Begins With Fundamentals**

BE6-86

**Switchcraft**  
 A Raytheon Company

Switchcraft, Inc.  
 5555 N. Elston Ave.  
 Chicago, IL 60630  
 (312) 792-2700

Circle (84) on Reply Card

#### Kintek

- KT-960 Monogard: electronic stereo polarity corrector.
  - KT933 Stereogard: electronic footprint generator.
  - KT-930 Stereoguard.
- Circle (618)

#### Kintronic Laboratories

- Antenna phasing and tuning units; RF connectors; STL isolators.
- Circle (619)

#### Kliegl Brothers

- HMI fresnels: 575W, 1.2kW, 2.5kW, 4kW, 6kW, 12kW.
  - Quartz fresnels: 200W to 2kW.
  - 1kW nook light.
  - Softlights: 400W to 8kW.
  - Performer IV: computer memory light-control system; 250 control channels, 999 digital dimmers; color CRT status display; 960 event memory.
- Circle (620)

#### Knox Video Products

- Character generator/titlers; color-correction and processing equipment.
- Circle (621)

#### Kobold Lighting

- DLF-230FL: lightweight open-face HMI unit; electronic ballast; single-ended lamp; 200W to 4kW.
  - CID-200: portable battery kit for ENG, location work.
  - PROFIMINI: compact tungsten lights; 12V, 30V, 120V.
- Circle (622)

#### Kulka Smith

- X-series: in-line connector; 3-pin XLR-type without screws; various finishes and contacts.
  - D-series: panel receptacle; male and female types use same hole cutout; removable insert; solder and PCB mount.
  - NJ3FPGC: locking phone jack; locks to any 1/4-inch phone plug; large release button; usable with D-series.
  - GNS-series: black finish gooseneck; stainless steel, noiseless, anti-theft lock.
- Circle (623) See ad on page 134

#### LEA Dynatech

- Triaxial inductors: surge eliminators for high-power radio, TV transmitter use.
- Circle (624) See ad on page 54

#### LEMO

- Miniature audio connectors: 2-, 3-contact; less than 1-inch length, 1/4-inch diameter; for 3mm OD cable.
  - Plastic connectors: 6-, 10-, 14-conductor styles.
  - High-voltage connectors: small, to 5kV; push-pull, self-latching.
  - Prototype fiber-optic products.
- Circle (625)

#### LPB

- Alpha series: 6-, 8-, 10-mixer audio consoles; VCA control; logic-controlled switching; FL VU meters; modular circuit boards.
- Circle (626)

#### LTM of America

- Mark III lights: Luxarc 4K, 2,500W, 1,200W and 575W HMI lights, featuring instruments

- and ballasts of smaller and lighter construction without affecting photometrics.
  - Pepper Pot: light dimmers; 40A triac, 1kW.
- Circle (627)

#### L-W International

- Photo-Video: film-to-tape telecine system.
- Circle (628)

#### Laird Telemedia

- Character generators/titlers; slide projectors; telecine light controls.
- Circle (629)

#### Lake Systems

- Video cart system: multichannel multi-deck system; multiple spots per cassette, SMPTE time-code control and random access; M, Betacam, U-matic configurations.
  - La-Kart II: commercial insertion and master control automation system; for all tape formats; single or multiple channel; LTC and VITC time code.
- Circle (630)

#### Landy Associates

- Distributor for Ikegami HL79 Unicam; Nisus vari-speed slow motion shutter; Schwem Gyrozoom lens system; Interphase M40/41 machine control systems.
- Circle (631)

#### Lang Video Communications

- SNG852: small format video switcher, audio mixer, waveform, picture, audio monitoring.

## The art of shaping sound.

SONEX is a high-performance acoustical foam that upgrades your studio inexpensively. Ideal for a temporary isolation booth, it can also eliminate slap echo and harsh resonances in the main room or silence noisy tape equipment in the control booth. Write for our color brochure today.

SONEX is manufactured by Illbruck and distributed exclusively to the pro sound market by Alpha Audio.

**Alpha Audio**  
2049 West Broad Street  
Richmond, Virginia 23220 (804) 358-3852  
Acoustic Products for the Audio Industry



Circle (85) on Reply Card

## The Proven Lightning Deterrent!

Prevention is the only protection  
Lightning rods attract lightning—that's their function. The only sure protection is to prevent the lightning from striking the structure and damaging the installations inside. That's what the VERDA Lightning Deterrent does—it gives you protection from all lightning-associated problems by deflecting lightning. A positive corona is formed which deters positive lightning energy. The VERDA Lightning Deterrent can be applied in all situations requiring lightning protection—

- Communications systems—microwaves—two-way radio
- TV—FM—Nurad antennas
- boats—police and fire stations—ambulances—telephones—trucks—

It's round-the-clock protection against lightning. This system has been storm-tested on the highest structure in the world.

**Lightning Deterrent Corp.**  
5321 South Kedzie Avenue  
Chicago, Illinois 60632  
(312) 434-7912 or  
1-800-241-2360 ext. 532

Circle (86) on Reply Card

# PERFORMANCE AND ECONOMY. SIDE BY SIDE!

Now get more performance for the money in two new additions to Tek's 1700 Series family: the 1720 Vectorscope and 1730 Waveform Monitor.

For years television facilities have looked to the Tek 528A and 1420 for reliable, consistent signal monitoring. Our two new monitors do the job faster, better—and at a substantial reduction in cost.

**Even easier to use.** Now four front panel setups can be stored—from the front panel—and recalled at the touch of a button. You get complete line select capabilities including field selection,

15-line display and CRT read-out of field and line number. You can display Channel A and Channel B inputs simultaneously. The information you need is there at a glance.

Each monitor includes its own advanced feature set. There's an X-Y input for stereo audio monitoring in the 1720. Dual filter operation in the 1730. Plus proven 1700 Series family advantages. Excellent viewability. Low power consumption. All in a compact package suited for stand alone use or rack-

mounting and available in NTSC and PAL versions.

The new 1720 Vectorscope can also be combined with a 1710B Waveform Monitor—for even greater side-by-side economy!

**Get the full story from your Tektronix representative.** Ask for a demo and see what makes the 1720 and 1730 the leading price/performance values on the market today!

**Behind the Scenes in Quality Television.**



**Tektronix**  
COMMITTED TO EXCELLENCE

Circle (87) on Reply Card

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[www.americanradiohistory.com](http://www.americanradiohistory.com)

**Lang Video, continued**

- SK8000: mic/line processor; 8-input, 8-output.

Circle (632)

**Larcen**

- TTC-50LH: 50kW VHF transmitter; 2-tube design; highband.
- TTC-1200LH: solid-state 1.2kW highband VHF transmitter.
- 3kW aural transmitter for 30kW VHF system.
- FMT-25L: self-contained, single cabinet, 5kW FM transmitter.
- Contactless switcher for parallel VHF transmitters.

Circle (633)

**Leader Instruments**

- LMS-237: TV stereo signal generator; baseband audio with SAP, baseband video and modulated carriers for channels 3 and 4.
- LFG-1310: 10MHz sweep and function generator.
- LBO-5865: waveform monitor; single raster line display of any TV line, field 1 or 2; 1/2-rack package.
- LDM-171: distortion meter; auto-null, S/N, ac signal level, high-pass filter.
- LBO-325: attache case oscilloscope; 2-channel, 60MHz; 3.5-inch CRT.
- LVM-5863A: EFP monitor; combined waveform, picture monitors; audio system.
- LSG-245: C-Quam AM stereo synthesized signal generator.

Circle (634)

**Leaming Industries**

- MTS-1: BTSC stereo generator with com-

panding for LPTV, CATV or commercial standby.

- 813TX/813RX: audio transmission transmitter and receiver; for SCPC use on microwave; compensating for noise reduction with 90dB dynamic range.

Circle (635)

**LeBlanc & Dick Communications**

- Multichannel FM, TV antennas.

Circle (636)

**Leitch Video**

- CDA-5500: auto changeover system for CSD-5300N master clock driver; switches to backup if driver output signal level is too low.
- DFS-3000N: digital frame synchronizer, handles noisy signals without freezing; includes field/frame freeze, RS-232C control, RS-170A output with 2- or 4-field operation.
- TTG-2500N generator: digital test set for transmitter, satellite links, telco and video network use; 22 10-bit signals selected from EPROM aid in circuit testing.

Circle (637)

See ad on page 137

**Lenco**

- TBC-450: heterodyne correction system; 8-bit resolution, 16-line window; constant H-phase; pixel-by-pixel DOC.
- MPA-2100: monitor power amplifier; 1,000W/channel at 8Ω.

Circle (638)

**Lexicon**

- Model 2400: stereo audio time compressor/expander; provides mono compatibility and precise stereo imaging; 16-bit PCM;

machine interfacing for RS-422 serial data.

- 480L effects system: 20kHz bandwidth, digital I/O, dynamic MIDI, reverb, room simulations; with LARC remote control.

Circle (639)

**Lighting Methods**

- SD-2400/6000/12000: single dimmer packs, rated 2.4kW, 6kW, 12kW; controllable at fixture or from remote console.

Circle (640)

**Lighting Eliminators & Consultants**

- CR-6/8/10 CHEM-RODS: chemically activated grounding electrodes; hollow tube holds chemical salt to increase ground conductivity, reduces resistance for improved grounding.
- Lightning, power-conditioning consultant service.

Circle (641)

**Listec Video**

- A-3170: CRT status display monitor; for edit system or routing switcher terminal display; 12-inch, rack-mount unit.
- A-3200: 9-inch, CRT status display monitor; fits in rack-mount with 1/2-rack waveform monitor; amber or green phosphors.
- A-9600: video character enhancer; selectable normal or inverted video.
- Acron 605N: NTSC encoder; RGB and Y/R-Y/B-Y to NTSC or RGB and YIQ to NTSC.
- Acron 512N master sync generator, RS-170A.
- Models 10040/10050: Polar Video safe area generators.
- Model 10030: Polar Video auto-fade unit

**STOP GROUND-LOOP HUM!**

**VIDEO HUM STOP COIL...HSC 1**

Will ELIMINATE HUM and other INTERFERENCE in Video Lines caused by differences in Ground Potential.

- For Color and Black and White.
- FLAT-DC to 6.5 MHz.
- No Low-Freq. or Hi-Freq. Roll-off.
- No Differential Phase Distortion.
- No Differential Gain Distortion.
- No Envelope Delay.
- Passive Device - Failure Free-Low Price.
- Small Compact Package 4" x 4" x 2-1/4".

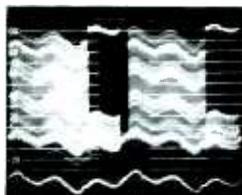
**ELIMINATES HUM AND INTERFERENCE:**

**IN STUDIO**

- Between Buildings
- On long runs in Buildings
- Between Studio and Transmitter
- On Incoming Telco circuits
- On Outgoing Telco circuits

**IN FIELD**

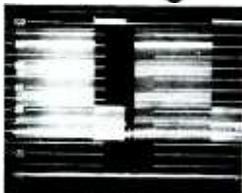
- Betw. Remote Truck and Telco
- Betw. Remote Truck and Microwave
- For Intertruck Hookup
- For VTR Units
- For Monitoring Lines



**NEW!**



**\$190 F.O.B. N.Y.**



Available on 10 day free trial

**AUDIO-VIDEO ENGINEERING COMPANY**  
65 Nancy Blvd., Merrick, N.Y. 11566  
Tel. (516) 546-4239

Circle (88) on Reply Card

**AVCOM Lets You SEE and HEAR YOUR SCPC Satellite Audio Feeds!**

AVCOM manufactures satellite SCPC receivers for virtually every possible application; from voice to data, from direct 4 GHz input to IF loop-throughs allowing an endless 'daisy chain' of receivers tied to a common downconverter. Some of our models are totally compatible with Microdyne and Scientific-Atlanta IFs for stacking and ALL are rack-mounted, extremely stable, low-phase-noise professional receivers.



AVCOM SCPC-2000 Single Channel Per Carrier Receiver. \$1875.00

The best part; AVCOM (established in 1976 and a pioneer in satellite receiving system technology) receivers are field proven in thousands and thousands of applications worldwide!

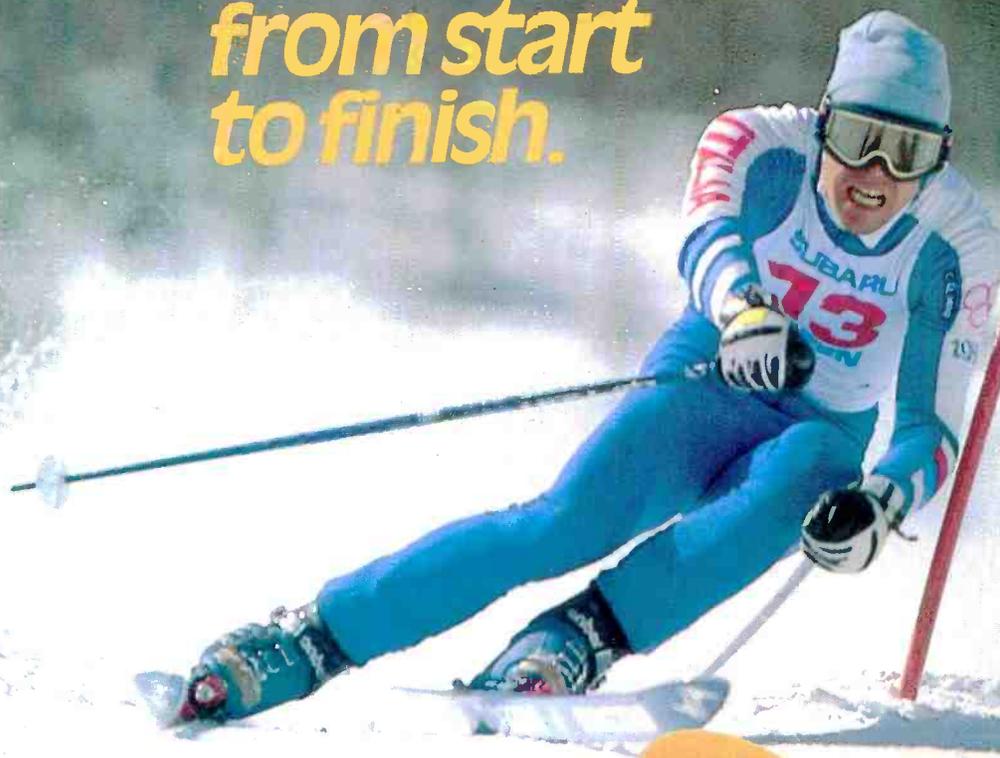
Now/ You can 'see' your SCPC downlink transponders or an entire satellite with the AVCOM PSA-35 rechargeable, battery operated, six band portable spectrum analyzer. Direct 3.7-4.2 GHz input plus IFs between 10 and 1500 MHz. The price? Just \$1965!



**AVCOM** of Virginia Incorporated  
500 Southlake Boulevard  
Richmond, Va. 23236  
804/794-2500; Orders: 800-446-2500

Circle (89) on Reply Card

# Precision motion control... from start to finish.



## Practice, learn, fine tune, recall and execute!

- MultiController operates the programmable high speed HS-100P head and will accurately and repeatedly execute your most creative camera shots... adding new artistic dimensions to your productions.
- The controls are carefully placed and designed to provide the proper feel and responsiveness. When a shot is recalled, the camera is positioned to its new location with all the skill and finesse of an experienced camera operator.
- Stored camera motions are "learned" through the manual controls which remain "live" so motions may be fine tuned (edited) in either the rehearse or recall modes.
- MultiController operates up to 4 cameras (from a single panel) and up to 5 miles from the HS-100P head.
- Discover how MultiController can expand your production capabilities. Call or write for complete details.



# TSM

**TOTAL SPECTRUM  
MANUFACTURING INC.**  
20 Virginia Avenue, West Nyack, NY 10994  
(914) 358-8820  
Circle (90) on Reply Card

*Listec Video, continued*

for auto transitions on PVM-1 switcher.

- Simplicity II: digital prompter; color-coded QWERTY keyboard allows single key prompter and word-processing modes; script generation, storage and display functions.

Circle (642)

**Logitek**

- Crossfire: 4-channel device for audio mixers provides automatic crossfade between stereo buses; controlled from editor or GPIB system; handles balanced and unbalanced sources; fade rates programmable for seconds or frames.
- Audio accessory system: rack-mount system for DAs, AGCs, pre-amps and other modular devices with optional redundant power supply.

Circle (643)

**Lowel-Light**

- Air-cushioned KSA stand.
- CM-90: Surmountable kit.
- CM-10: Maxamount kit.
- CM-20: scissor mount.

Circle (644)

**Luxor**

- Endura mobile equipment tables, projection stands, computer work stations.

Circle (645)

**Lyon Lamb Video Animation**

- ENC VI: video encoder, sync generator; generates composite, component outputs.

Circle (646)

**M/A-COM MAC**

- SKYPOD with NAVTRACK: improved helicopter ENG system.
- Parabolic antenna transmitting system for van use.

Circle (647)

**MARCOM**

- 710 TV stereo generator.
- 730 monitor: for MTS stereo, with meters.
- 701-00M: modification kit for TFT-701 modulation monitor.

Circle (648)

**MATCO Control Products**

- M10VNPAMP: audio-follow router switcher.
- MBC-24: tape-duplicating system; includes audio/video routing, verification, distribution and control.
- MA-204: single-channel sequencing system.
- BC-24A: hardware component of BC-24 tape duplicator.

Circle (649)

**MCG Electronics**

- Surge-Master (Avalanche): ac power-line protector; avalanche diode design.

Circle (650)

**MCL**

- 10775: 160W Ku-band TWT uplink amplifier; hub mount.

Circle (651)

**3M/Broadcast & Related Products**

- 324: master-control switchers; 32x4 matrix; stereo audio.

- 422: machine-control system based on RS-422.
- Series H 128x32: routing switcher; 1-video/3-audio crosspoint format.
- Model 660 panels: new switcher-control panel designs.
- Panther: graphics paint and variable-font titling features; digitizing input; frame grab.
- D3600: titling system; 96 resident font sizes with three modes of operation.

Circle (652) See ad on pages 128-129

**3M/Magnetic Tape**

- MBR U-matic: 3/4-inch master broadcast media in 60-minute lengths.
- PB tape: professional Beta 1/2-inch cassettes; with anti-stat.
- Snap cap hanger: protects cassettes, allows easy storage in minimum space.

Circle (653) See ad on pages 50-51

**3M/Optical Recording Project**

- Showroom Online: interactive optical desk CD-ROM type database; selections by key words; mixes text, images.

Circle (654)

**MPO Videotronics**

- Integrated video units, using VHS, 8mm, laser disc.

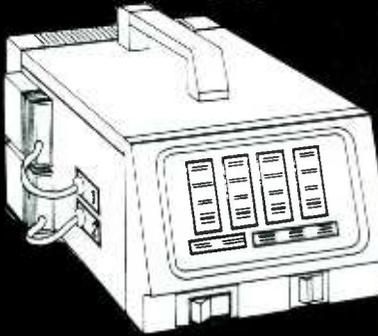
Circle (655)

**MZB & Associates**

- Mobile production vehicles.

Circle (656)

*The Ultimate*



**mastercharger**

Fast or slow charges a mixture of any four Nicad ENG batteries of any manufacture.

**PAG America, Limited**  
PO 15194 ASHEVILLE NC 28813 1704) 274-1438

Circle (91) on Reply Card

**HUM ELIMINATOR**  
HEC1000



Eliminates Hum & other interference from equipment caused by differences in ground potential.  
Now available: New High Frequency Version.

- FLAT - DC to 10 MHz
- No Low Frequency or High Frequency Roll-Off
- No Differential Gain Distortion
- No Differential Phase Distortion
- Passive Device - Failure Free
- Reversible
- Small Compact Package
- Low Cost

**SPECIFICATIONS:**  
Impedance - 75 ohms, unbalanced  
Connectors - Type BNC  
Bandwidth - DC to 10 MHz (0.6 dB @ 10 MHz)  
Hum Reduction - to 50 dB depending on system  
Dimensions - 5.3" x 4.0" x 2.0" (135 x 102 x 51 mm)  
Weight - Approx. 3 lbs. (1.36kg)  
Insertion Loss - <0.2 dB

CALL/WRITE for CATALOG

**ALLEN AVIONICS, INC.**  
224 East 2nd St., Mineola, NY 11501  
Phone: 516-248-8080

Circle (92) on Reply Card

**SAVE UP TO 40% ON 3/4" U-MATICS**

3/4" U-Matic  
NVS now offers you great savings on first quality remanufactured broadcast cassettes loaded with new 3M Color Plus, 3M MBU, Sony K or Agfa B.P. Call for a complete price list or free sample.

**TCR-100**  
New TCR-100 Cartridge Sales and Reloading with 3M Scotch 400

**VHS**  
New VHS cassettes (T-3 to T-120)

**NATIONAL VIDEO SERVICE**  
2150 Rheem Drive, Bldg. G  
Pleasanton, California 94566  
(415) 846-1500



Circle (96) on Reply Card

# THE NEW TSM-60 WAVEFORM MONITOR & VSM-60 VECTORSCOPE



Both available in PAL and PAL-M standard.

## Simply the Best.

*Prove it, you say? Frankly, we welcome the opportunity.*

**Performance:** In frequency response tests, the TSM-60 Waveform Monitor is *flat to 10 MHz* and is as accurate at 20 MHz as most others at 5!

**Features:** The TSM-60, with its impressive array of standard features, is the only waveform monitor to offer *both* Line Select and selectable 1H/2H Display Modes.

**Delivery:** You don't have to wait months or even weeks for a waveform monitor or vectorscope.

Videotek sets the industry standard by consistently delivering in just *days!*

**Support:** If you ever need an answer or technical backup, you can count on us. Our "Distinguished Video Industry Service Award" attests to that.

**Value:** Compare Performance vs. Cost of the TSM-60 and VSM-60 to any others in our field, and you'll find none better.

*Need more proof? If so, we invite you to personally evaluate the TSM-60 Waveform Monitor and VSM-60 Vectorscope in your own facility. Contact your Authorized Videotek Dealer or the Videotek office nearest you, and we will arrange for you to prove to yourself what we mean by Simply the Best.*



**VIDEOTEK** INC.

243 Shoemaker Road, Pottstown, PA 19464. (215) 327-2292, TWX 710-653-0125. 9625 North 21st Drive, Phoenix, AZ 85021. (602) 997-7523, TWX 910-951-0621.

© 1986-Videotek, Inc.

Circle (93) on Reply Card

[www.americanradiohistory.com](http://www.americanradiohistory.com)

### Magni Systems

- Model 1527: combined waveform, vector monitor, test-signal generator, SC/H phase meter.
  - Model 1510: digital test-signal generator.
  - 2015: software enhancements.
- Circle (657) **See ad on page 31**

### Magnum Towers

- Towers, services for AM, FM, TV, microwave.
- Circle (658)

### Marconi Communications

- B7536 transmitter: 30kW VHF (band III); ceramic tetrode PAs; containerized.
  - NTSC comb filter decoder.
  - PAL synchronizer.
- Circle (659)

### Marconi Instruments

- TV test signal generators; VITS analyzers; automated test systems.
- Circle (660)

### Mark Electronics

- Equipment racks, enclosures.
- Circle (661)

### Marti Electronics

- MW500: on-line STL booster amp; redirect STL around objects; no change of frequency.
  - MA25-25: dual audio power amplifier.
  - UPS-12: uninterruptible power system.
- Circle (662)

### Matthews Studio Equipment

- Egripment Unit 85 dolly.

- Egripment Delta dolly.
  - Briefcase dolly.
  - Super Crank: crank-up stand on 10-inch pneumatic wheels.
  - Boom arms.
  - Auto Mount: accessories for camera attachment to automobiles.
  - Gift line.
- Circle (663)

### Matthey Electronics

- Low-loss video delays, DIP; boxed, rack-frame configurations.
  - ZL delays: 10ns to 1,830ns, compatible with GVG 3400.
  - Micro video filter: phase-equalized, sharp cutoff; DIL package.
  - MHD filters: HDTV; to 30.4MHz, 75MHz sampling rate compatible.
- Circle (664)

### Maxell

- PI+: epitaxial VHS and Beta videocassette tape material, designed for special rugged requirements of the distribution market.
  - BQ formulation: broadcast quality tape, based on HGX-Pro formulation for low noise.
  - Tape shipper: for 1-inch reels, flame-retardant case includes locking hub and rotating plate to reduce tape cinch.
- Circle (665) **See ad on page 123**

### McCurdy Radio

- Audio consoles; routing switchers; intercoms; radio studios; audio DAs.
- AMS-210: audio editing system; RS-422 ports for interfacing to video editor and

switcher; 12 stereo inputs, 3-bus; auto transitions under frame control; preset transition patterns.

- CS9400: microprocessor-controlled digital intercom.

Circle (666)

### Media Computing

- ANGIS: automated news graphics interface system software, enables use of micro-computer for alternate data entry device with Chyron CG for elections, sports, weather; direct wire interface.

Circle (667)

### Merlin Engineering

- ME-318 VISA: vertical interval stereo audio conversion; for ACR, TCR quad video cartridge machines.

Circle (668)

### Micro Communications

- VHF/UHF switchless combiners; UHF unit to 240kW.
- MTS UHF TV diplexer.

Circle (669)

### Micro Controls

- Transmitter studio link.
- SCA/GEN: FM subcarrier paging equipment.

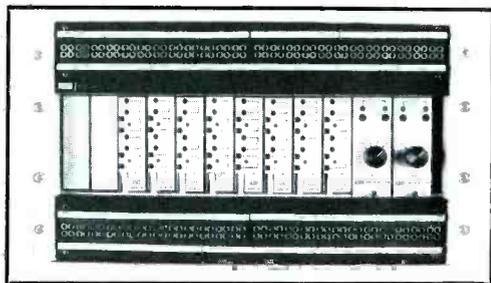
Circle (670)

### Microdyne

- QuickLink: transportable Ku-band uplink; auto satellite acquisition; order wire; 1-person setup.
- M.A.T.: Microdyne automated terminal; programmable C-/Ku-band earth station;

## BJ-800

### STEREO AUDIO DISTRIBUTION SYSTEM

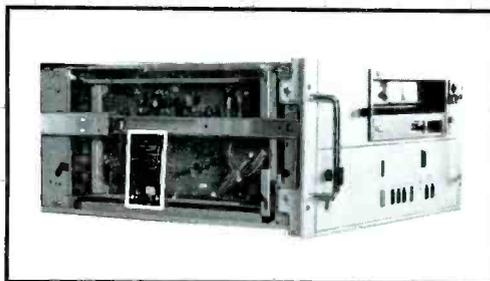


Eight - four output Utah Scientific stereo audio DA's prewired through two ADC Bantam jack panels. Easy to install, connect only external audio circuits. Occupies only 10.5" rackspace. You can convert your plant to stereo in same space now occupied by old style long frame jack panels.

- Jacks paired for patching both channels simultaneously.
- Dual designation strips
- Solderless barrier strips for external connections.
- Dual power supplies.
- THD distortion  $\leq .05\%$ .
- Freq. Resp:  $\pm .05\text{dB}$ .
- 10.5" rack space.

## Q-MOD

### ANTI HEAD CLOG SYSTEM



- Prevents head clogging during long periods of operation in PAUSE mode
- For Sony Type V transports.
- Almost instant start & lockup.
- Simple, easy installation.



BROADCAST SYSTEMS INC.

8222 Jamestown Drive Austin, Texas 78758

512/836-6011

800/531-5232

800/252-9792 TX

Circle (162) on Reply Card

# Realistic reverb at a realistic price.



And not just reverb, but a full range of studio effects. All very controllable. All in the new Yamaha REV7 digital reverb. And all for only \$1,295.\*

How did we do it? By analyzing the early reflections and subsequent reverberations of actual environments to see what gives reverb its natural character and richness. And then using specially developed LSIs to handle this immense amount of information and the high processing speeds required to effectively simulate natural reverb.

The REV7 has 30 factory preset programs permanently stored in its ROM. These presets include large and small hall, vocal plate, gated reverb, reverse gate, early reflections and stereo effects such as chorus, flanging, phasing and echo.

And each of the presets incorporates up to seven user-programmable parameters which can be edited and then stored in RAM.

For even greater realism, you can alter the reverb time of the HI and LOW frequency ranges in proportion to the MID range (RT60) and simulate the dampening qualities of absorptive materials in a room. So the sound can be as live or as dead as you want.

Programming is easy because of the REV7's logical front panel layout which gives you instant access to all functions and

the LCD readout panel which tells you at a glance the name of the program and the edit parameter selected.

So besides the 30 presets, you can store up to 60 of your own programs in the REV7's RAM. All available for recall from the front panel or the hand-held remote.

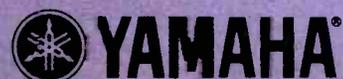
The REV7 features electronically balanced XLR input and output connectors. And balanced TRS phone jacks which will accept standard phone plugs. Both stereo and mono inputs can be connected producing, in either case, a simulated stereo reverb output.

There's even a three-band semi-parametric EQ so you can fine-tune the sound of your reverb to work in any environment. And, of course, MIDI compatibility.

Realistically speaking, there's no finer digital reverb at the price on the market today than the REV7. Available now at your Yamaha Professional Products dealer.

For a catalog explaining all the features and capabilities of the REV7 digital reverb, write: Yamaha International Corporation, Professional Products Division, P.O. Box 6600, Buena Park, CA 90622. In Canada, Yamaha Canada Music Ltd., 135 Milner Ave., Scarborough, Ont. M1S 3R1.

\*Suggested U.S.A. retail price. In Canada, \$1,595 CDM.



Circle (97) on Reply Card

*Microdyne, continued*

- allows advanced scheduling of transponder, polarity, audio subcarriers; of 200 presets, 32 can be timed.
- 110-CIM: addressable data modem; drives hard-copy printer from satellite audio sub-carrier.
- 1100-TDC: tracking downconverter; narrowband use of voice, music and data on Ku-band satellite.
- CIM-8511: communication information manager; for SCPC networks allows voice text, network control and command distribution; fill dead air with revenue-earning electronic mail or data.

Circle (671) See ad on page 175

**Micron Audio**

- DSH-1: mobile, modular diversity receiver, complementary noise suppression.
- CTR5-1: mobile wireless mic system.

Circle (672)

**Microprobe Electronics/MEI**

- Disisound: digital audio storage unit; instant random access; 76-minute storage.

Circle (673)

**Microsonics**

- MicroFilter: miniature DIL video filters.
- LPC video filters for stereo.
- 20MHz equalized delay lines for HDTV.
- 1H/2H digital border generator delays, 2-TTL in/2-TTL out.

Circle (674)

**Microtime**

- T-320D TBC: field freeze; vertical interpolator; digital comb filter; pictures to

- $\pm 40x$ ; heterodyne and 3.58MHz feedback.
- T-320 TBC: 35-line window; RF-sensing drop-out DOC; pictures to  $\pm 40x$ ; heterodyne and 3.58MHz modes.
- T-300 TBC: 35-line window; wideband processing at 3.58MHz; pictures to  $\pm 5x$ .

Circle (675)

**Microwave Network**

- Microstar 23: microwave radio systems, 23GHz operation; meets EIA RS-250B.

Circle (676)

**Midwest Communications**

- S-25: SNG vehicle on IVECO Z-340T chassis.
- S-18: SNG van, with Ku-band antenna.
- S-1 flyaway: Ku-band SNG equipment in rack-mount cases.

Circle (677) See ad on page 1

**Minolta**

- CRT monitor color analyzer; color temperature meters; luminance, illuminance, light meters.

Circle (678)

**Mitomo**

- Videocassette winders.

Circle (679)

**Mitsubishi Pro Audio**

- X-86: digital audio recorder, 2-track.
- X-850: 32-track digital audio recorder.
- SuperStar: Quad/Eight audio-mixing console.
- Westrex master motion controller.

Circle (680)

**Mobile-Cam Products**

- Camera cradle: shock-mount cases for camera transportation in production vehicles.

Circle (681)

**Modulation Associates**

- KU 02: portable uplink for SNG and remote broadcast; 2-way communication and program link in small transportable case.
- T-SAT: C-band agile SCPC receiver; accesses any transponder and any frequency with a transponder.
- SR 23: agile subcarrier receiver; linear discriminator with low distortion; pre-programmable for local and remote control.

Circle (682)

**Modulation Sciences**

- SRD-1 decoder: stereo reference system; composite baseband audio from demod forms L+R or sum/difference signals.
- CLD-2504: composite signal-distribution amplifier.

Circle (683)

**Mole-Richardson**

- 200W Molequartz Tiny Mole.
- 650W Molequartz Mini-softlite.
- 6,000W ac-to-dc Mole dimmer.

Circle (684)

**Monroe Electronics**

- Models 5001/6005: remote transmitter-site controllers.

Circle (685)

**Morton Hi-Tek Furnishings**

- Series 100: vertical rack systems.

# FORTEL SALE

## FORTEL ANNOUNCES DRAMATICALLY REDUCED PRICING ON SEVERAL PROCESSORS

| ITEM    | DESCRIPTION                       | OLD PRICE   | NEW PRICE  |
|---------|-----------------------------------|-------------|------------|
| CCD-1H  | Skew Corrector                    | \$ 3,950.00 | \$1,200.00 |
| PR-2    | Prerecord Detail Booster          | \$ 1,030.00 | \$ 550.00  |
| DP/G    | Differential Phase/Gain Corrector | \$ 2,900.00 | \$ 600.00  |
| RMR-2   | Prerecord Detail Booster          | \$ 1,495.00 | \$ 550.00  |
| C-YIQ   | TBC, Composite Video or M-Format  | \$14,995.00 | \$4,600.00 |
| Colorex | Chroma Noise Reducer              | \$ 4,995.00 | \$2,500.00 |

\* Above Inventory Is Available Only From Fortel

\* Limited Supply - Call Today!!!  
1-800-241-5046  
In Georgia (404) 447-4422

**Fortel Incorporated**  
2985 Gateway Drive  
Norcross, Georgia 30071



Circle (98) on Reply Card

## Experience a tape transport ready for the balance of this millenium.

After spending a few minutes with the A820 you'll know you're in touch with tomorrow. Here is everything you've ever dreamed of in a production/mastering ATR. And then some.

For openers, note these features: Four tape speeds. Reel sizes up to 14". Real time counter accurate to *tenths* of a second. Advanced phase compensation in all audio circuits. And, of course, the massive chassis, rugged construction and precision Swiss manufacturing you'd naturally expect from Studer.

And now for the unexpected. Inside the A820 you'll find the most comprehensive microprocessor control systems ever put in an ATR - by anybody. Multiple microprocessors govern all tape motion parameters, switching functions, and audio alignment settings. These innovations not only provide unprecedented operating flexibility, but also explain the A820's uncannily smooth tape shuttling and remarkable editing efficiency. When the

production pressure is on, the A820 becomes a joy and a lifesaver.

The A820 also ushers in a new era of user programmability. In a matter of minutes, by selecting from a menu of more than a dozen operating features, you can tailor an A820 to meet any application. All primary and secondary top panel buttons can be assigned to any desired function. You can practically "redesign" your machine on a day-to-day basis!

The A820 line has been augmented by the addition of 1/2" two-track and center-track time code versions. Also, interfaces for control by external computers or video editing systems are now available.

Call or write today for more information on the new Studer A820. It can transport your facility into the future.

Studer Revox America, 1425 Elm Hill Pike, Nashville, TN 37210 / (615) 254-5651 / New York (212) 255-4462 / Los Angeles (818) 780-4234 / Chicago (312) 526-1660 / Dallas (214) 943-2239 / San Francisco (415) 930-9866

# STUDER REVOX

Circle (99) on Reply Card



#### Morton Furnishings, continued

- Series 500: production console system.
- Series 1100: vertical duplication rack system.

Circle (686)

#### Moseley Associates

- MRC-2 option video analyzer.
- MRC-1600: software enhancement; secure dial-up system for remote controller.
- IMS intelligent audio-switching and distribution systems.

Circle (687)

#### Motorola Communications

- Starpoint 23 AV/HPV: AM/FM video microwave radio systems; 21.2-23.6GHz.
- Starpoint 23 AM microwave radio; telemetry applications.
- Starpoint 23 digital microwave radio.

Circle (688)

#### Motorola/AM Stereo

- 1300 C-Quam AM stereo exciter.
- 1310 C-Quam AM stereo modulation monitor.

Circle (689)

#### Multi-Track Magnetics

- Datacode enhancement: magnetic film transport interface allows operation with Eastman Kodak magnetic surface control-data system; interface heads retrofit to current dubbing products.

Circle (690)

#### Musco Lighting

- MuscoLight: high-illumination, flexibly controlled light source.

Circle (691)

#### Mycro-Tek

- Network Communications: option for MycroVision character generators; 300-1,200 baud; no disturbance to on-air text.
- Replacement font for Ernie and Max character generators.

- Audiocassette data storage recorder/player.

- Dissolve enhancement: controls Ernie character transparency in take mode.

Circle (692)

#### NAUTEL

- Solid-state AM transmitters, to 50kW.

Circle (693)

#### NEC America/Broadcast Equipment

- System 100: digital video effects equipment for on-line environments; 3.5-inch floppy disk holds 19 sequences of 100+ events.
- System 10 interface: combines DVE system 10 with E-Flex or E-Flex/Optiflex systems.

- FS-19: frame synchronizer.

- RCU-3: CCD camera remote-control unit; compatible with RTS intercoms; matches standard camera cable and triax; RGB, Y/R-Y/B-Y outputs.

- SP3-AES: CCD camera with electronic shutter; variable speeds from 1/60- to 1/1,500-second exposures.

- DFP-840: telephone video system; for transmission of ENG video through existing telco lines.

- FBN-11k: FM transmitter series.

- PCN-1400: VHF TV transmitter series.

- PCU-900: UHF TV transmitter series.

Circle (694) See ads on pages 192-193

#### Nady Systems

- QuadPak coupler: links multiple wireless mic systems.

- IRT-200M: cordless studio monitor.

- 501VR: wireless receiver for video production and stage monitor use.

Circle (695)

#### Nagra/Kudelski

- T-Audio-TC: audio recorder with RS-422 remote serial port; software emulation of audio and transport functions of Ampex and Sony VTRs.

Circle (696)

#### Nakamichi USA

- MR2 deck: audiocassette system; 2-head; wired remote control with daisy-chaining of multiple units from single control station; RCA phono, ¼-inch phone jacks for unbalanced inputs, outputs.

Circle (697)

See ad on page 43

#### Nalpak Video Sales

- TP0936 TRIPAK: tubular tripod, light stand cases.

- SP5/-8/-12 scrim paks: lighting scrim, gel frame storage boxes.

- Pak-Krate: folding utility box.

- AccuChart: video alignment charts; small size, fold for storage.

Circle (698)

#### Narda Microwave

- 8682 probe: monitors microwave radiation per ANSI standards.

- 70006 multipath simulator instrument.

Circle (699)

#### National Television Systems

- CAPS: multi-user, multitasking computer, oversees operation to 32 VTRs, mixed formats, video switchers and other equipment; SMPTE time-code-based; produces as-ran log.

Circle (700)

#### L.E. Nelson

- PAR-64 lamps: 1kW, FFN, FFP, FFR, FFS; very narrow, narrow, medium and wide-flood types.

- DSF 1.5kW scoop instrument.

- 99-1435R lamp: PAR-64 1.2kW, daylight, 6,500°K.

Circle (701)

#### Rupert Neve

- 8232: production, post and multitrack audio console; 32 mic/line inputs, 24 mixing buses; optional stereo reverb returns; 4-band Formant Spectrum Equalization; four mono aux and one stereo cue sends; VU metering for 24 tracks and 4-track mixdown.

## COX THE ENCODER COMPANY



New Options: black stretch, component video inputs.

There's a lot more to encoding than taking a three wire signal and combining it into one. COX, the world's foremost encoder manufacturer has elevated the encoding of color primaries to a fine art. With a time tested, no-compromise design, COX has gained the enviable reputation of building encoders by which others are judged. COX encoders are the choice of manufacturers who lead the industry in telecine systems, computer graphics and matting equipment.

Available in NTSC, PAL, PAL M, SECAM and switchable, multistandard versions. For detailed data and our encoder evaluation check list, call:

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Circle (100) on Reply Card



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engineering



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**m**  
VIDEOTAPE

**CV90**

## We wouldn't give you an inch until it was perfect.

**Maxell perfects the 1" tape.**  
Introducing Maxell Broadcast Quality 1". Superior videotape technology to satisfy the perfectionist in you.

**Perfect for mastering.**  
Maxell's exclusive epitaxial formulation provides clean, dropout-free video, with RF output consistent to within 0.2dB from head to tail. We've even licked the stiction problem, with uniquely

effective resistance to high humidity and other harsh environmental conditions.

**Perfect for editing.**  
Maxell Broadcast Quality 1" is made tough to resist stretching, scratching and head clogging. . . yet it's made gentle to minimize head wear. So you can keep it parked in STILL for well over 3 hours, without taking the typical toll on the tape, video output or your sensitive heads.

**Perfect for broadcast.**  
Our superior 1" tape stays that way for up to 2,000 passes. So not only can you achieve perfection in production, but you get more of your money's worth when you take it on the air.

Find out for yourself. Just clip and mail the coupon below. But keep in mind: If we didn't think it was perfect, we wouldn't have called it Maxell.

**Give me an inch.**

- Give me more information on Maxell Broadcast Quality 1".
- Give me the name of my nearest Maxell Distributor.
- Give me a sales call so I can see for myself.

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Tel. (     ) \_\_\_\_\_

Circle (101) on Reply Card

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BE866

*Rupert Neve, continued*

- V series: broadcast, post-production consoles; 48-bus multitrack system, 36-, 48-, 60-channel frame sizes; individual channel compressor, limiter and gate; 4-band EQ; full monitoring.

Circle (702)

**New England Digital**

- Synclavier music system: direct to disc multitrack recording system.

Circle (703)

**Normex Electronic**

- Telnox L-O: computer-controlled on-air telephone system.

Circle (704)

**Norpak**

- TTX6S: VLSI consumer teletext data reception unit.
- IPS4: NAPLPS videotext frame-creation system.
- VTX6R: lap-top videotext decoder.

Circle (705)

**Nortronics**

- Maxtrax heads: retrofit for Pacific Recorders Engineering cart machines.
- Playback heads with improved low-frequency response; noise-rejection shield on mono and stereo types.

Circle (706)

**nova systems**

- nova 501: 32-line TBC for direct operation with subcarrier feedback.
- nova 511: 32-line TBC for heterodyne or

direct operation with 1¼-inch and ½-inch capstan servo VCRs, includes comb filtering.

- nova 620: full-frame memory for field/frame freeze, includes comb filter and corrects even non-capstan servo VCRs.
- All feature digital full-color DOC, 50x forward/reverse shuttle, test mode color bars, 8-bit 4x sampling and dynamic tracking option.

Circle (707)

**Fred A. Nudd**

- Complete tower service; manufacturing, erection, painting, modification, antenna and transmission line work.

Circle (708)

**Nurad**

- Central ENG receiver systems.
- STL/ICR systems.
- Remote-control systems.
- Ku-band SNG antenna.

Circle (709)

**Nytone**

- Telecine systems; TV slide projectors.

Circle (710)

**O'Connor Engineering Labs**

- Sys105/155: camera support systems.
- Sys105HD: support system; fluid head, claw ball leveler, tripod with internal spreader and dolly.
- Betacam tripod bracket.
- Mini-side loading camera platform for model 30/50 fluid camera heads.
- Model 155M-B: tripod for 200-pound loads,

folds to 36-inch length, weighs 21.5 pounds.

Circle (711)

**Odetics**

- TCS2000: automated TV cartridge machine; four to six Beta or M format play or record/play decks; robotic random access to 280 carts in storage library.

Circle (712)

See ad on page 151

**Olesen**

- TriLite: lighting rig system.
- Studio fixtures, rigging; draperies, tracks; lighting instruments, lamps, control systems.

Circle (713)

**Omicron Video**

- 507 Switcher: master control; 10-input, flip-flop between preset and take buses; two lighted VU meters monitor audio levels; DSK with pop-in/fade-in keying; stereo audio option; automate from IBM PC; PAL or NTSC.
- 501-10/3PT: preset-take RGB component switcher; 10-input, 3-output; for use with digital-effects generators.
- 501-10/1PT: preset-take video switcher; 10x1; creates A/B switch to simulate 2-channel digital effects per channel.
- 415 generator: RS-170A sync.

Circle (714)

**Omnimount Systems**

- 300 assemblies: universal mounts for TVs, audio speakers; loads from 60 to 125 pounds.
- 25 assemblies: mounts for 12-pound loads.

# Why do Jensen Transformers have Clearer Midrange and Top End?

The high frequency rolloff of a *Jensen Transformer* is optimized, by computer analysis, to fit the *Bessel Low Pass Filter* response. This means *minimum overshoot and ringing and flat group delay* for best *time alignment* of all spectral components of the musical waveform.

In other words, the harmonics arrive at the same time as the fundamental frequency.

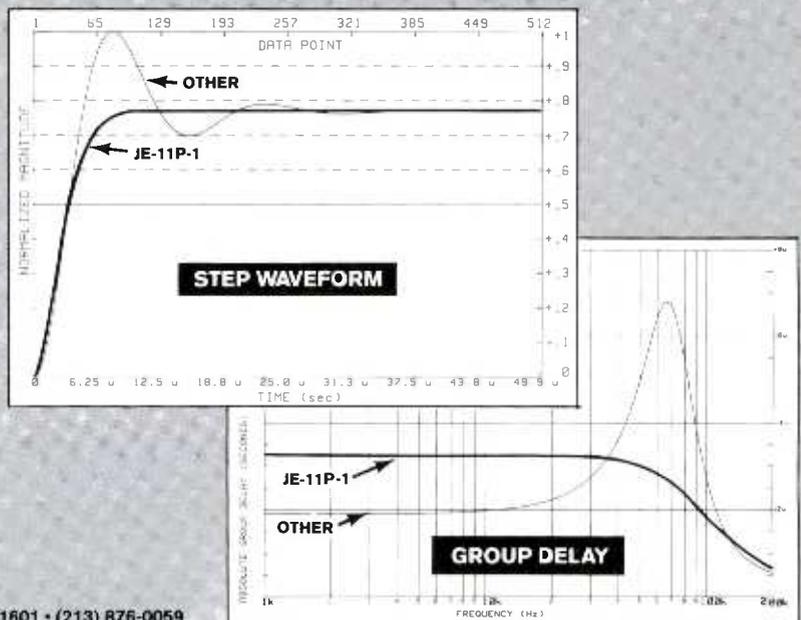
The result is a clear midrange and top end without the harsh, edgy sound which has been one of the most objectionable sonic complaints about transformers.

There's no "midrange smear."

Only *Jensen* has this benefit of hi-tech computer optimization.

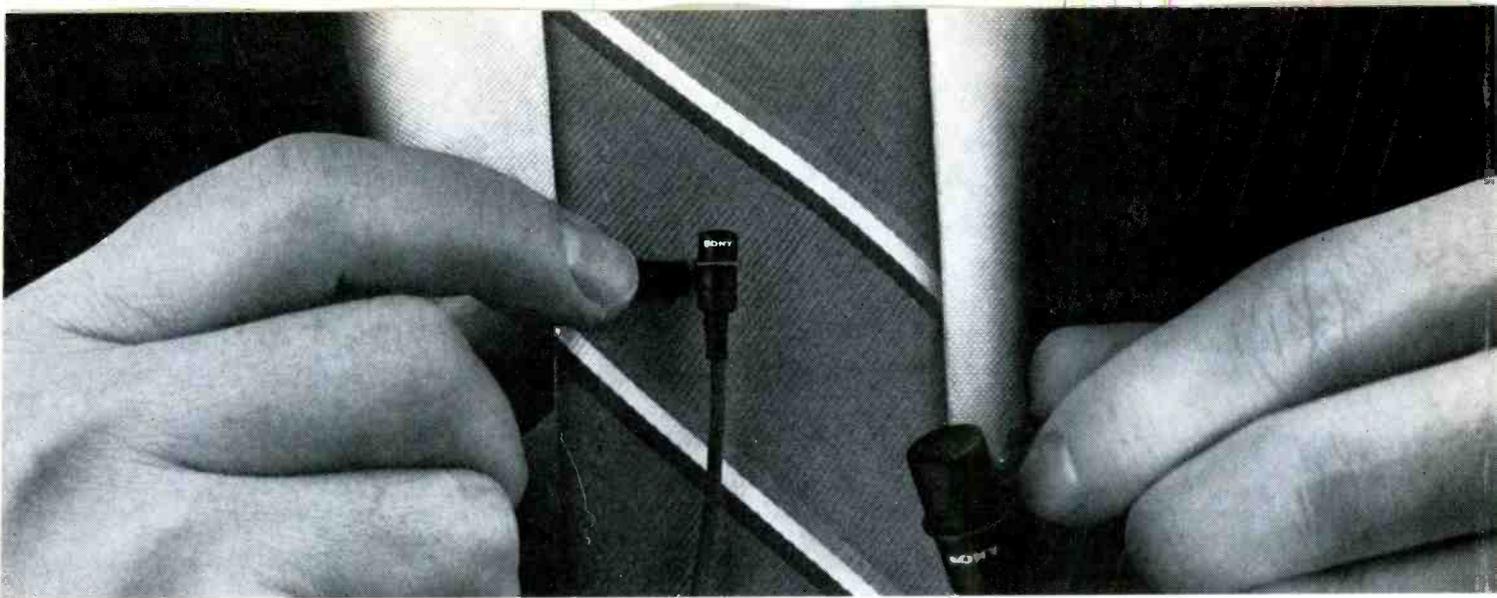
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**jensen transformers**  
INCORPORATED

Circle (102) on Reply Card



# THE ONLY COMPANY THAT DIDN'T HAVE TO IMPROVE ITS LAVALIER MICS JUST DID.

As the world's leader in lavalier microphones, we've just taken some very important steps to ensure that we retain that distinction.

For one, we've taken our mics in a new direction with the addition of the Sony ECM-66 uni-directional. Its wide-angle cardioid pattern provides better off-axis frequency response than the classic pattern—while also providing an unprecedented level of isolation from ambient noise.

We've also made the least of a good thing: The new ECM-77 is the smallest microphone in Sony history. We've even made our new cable housing smaller—and more durable.

We've made more of some good things, too. The new ECM-55, for one: the latest refinement of our successful ECM-50 series.

And we've expanded our line of accessories—with new color windscreens; pencil-type, safety-

pin and necklace-type clips; and a power supply holder that clips to your belt.

Sony lavalier microphones operate on either a single AA battery or phantom-power. You also have a choice between black or satin-nickel finishes; and XLR, pigtail or Sony wireless-compatible output configurations.

So to see (barely) and hear (very clearly) the results of Sony's refusal to rest upon its laurels, call your Sony representative: Eastern Region, (201) 368-5185; Southern Region, (615) 883-8140; Central Region, (312) 773-6000; Western Region, (213) 639-5370. Or write to Sony Professional Audio Products, Sony Drive, Park Ridge, NJ 07656.



**SONY**  
Professional Audio

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Circle (108) on Reply Card

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**Omnimount Systems, continued**

- 500: mounting assemblies; 100 to 225 pounds.
- Circle (715)**

**Optical Disc**

- ODC 610A: LaserVision; NTSC/PAL-compatible video-disc recording system.
- Circle (716)**

**Orban Associates**

- 275A synthesizer: automatic operation in stereo; TV FMX stereo generator system.
- Circle (717) See ads on pages 17, 80-81, 94**

**Orion Research**

- AMU consoles: audio mixers; rack-mounted electronics handle analog functions from digital-control panel; 7-band EQ; 32-panel setups, retrieval, reset functions.
- Circle (718)**

**Otari**

- MX-80-24: multitrack ATR; 24-track, 2-inch tape.
  - CTM-10: NAB cart machines; mono, stereo; discrete, matrix stereo.
  - DTR-900-32: 1-inch 32-channel digital recorder; PD format; remote control, autoloader.
- Circle (719) See ads on pages 15, 159**

**PACO Electronics**

- DP-11 nicad battery: replaces NP-1.
  - KD-440: quick-charge unit, four simultaneous channels.
  - Mobile charger.
  - KD-120: battery dememorizer, conditioner.
- Circle (720)**

**PAG America**

- PAG-lok: battery-to-camera mounting system with self-cleaning contacts avoids spark hazards; improved contact over banana-pin types.
  - Microcharger: single-channel fast charger; microprocessor control for 12-14V nicad batteries; Pag-lok and PP90 connectors.
  - Master 90: PP90-type battery features screw closure, allowing easy access for maintenance and integral spare fuse storage.
  - Nitecam: ENG camera with safe laser illuminator and image intensifier tube; sensitivity to 10<sup>-5</sup>fc.
- Circle (721) See ads on pages 116, 195**

**PEP**

- Batteries, accessories; editing interface between VHS and 3/4-inch VTRs.
- Circle (722)**

**PESA America**

- SR-91785A: rack-mount satellite TV receiver; no tuning 950-1,750MHz.
  - EEFM-1A FM transmitter.
  - Solid-state TV transmitter, 1kW.
  - BM-9U: 9-inch color video monitor.
  - ASC-4625B: SWAT sync analyzer system.
  - BM4309/4314: 9-, 14-inch broadcast video monitors.
  - CG4721B: character generator/titler.
  - IFM8501 modulator.
- Circle (723) See ad on page 185**

**Pacific Recorders & Engineering**

- SDA-8A: stereo DAs.
- MMDA-8E: mono DAs with filter, EQ.
- TX990: phono pre-amp.

- EFX-11: frame for audio-processing modules.
  - Voice-processing modules.
- Circle (724) See ad on page 21**

**Paltex**

- Esprit Plus: video edit control system; 6-machine rolls with mixed formats; repeatable learn mode; multirecord function; Data Store switcher memory; programmable Slow Play and Speed Set key applicable to each machine; look-ahead cue in auto assembly.
  - Director ES/1D: on-line edit control equipment allowing variable play-speed VTRs; slow-, fast-action sequences preset, rehearsed, repeated with SpeedScan; Freeze-Scan for freeze point; advanced auto assemble routines.
  - Producer ES/1P: off-line edit control system; includes Backtrac historical reference to EDL, generates Master Decision List; 998 event memory; VITC readers available.
  - Excel: 3-machine edit control; three user-defined keys for up to 20 keystrokes; three special-function controls for interfacing to external devices; list management, auto trim, auto color frame, auto assembly; 326-event memory.
  - AR-2000: interface for JVC KM-2000U video switcher; includes ramp generator allowing auto-transition capability; allows switcher operation from edit controller GPI commands.
- Circle (594)**

Continued on page 130

**Where the hell is THAT feed coming from?**

**Identify the source, immediately, with QSI's new Video Source Identifier.**

Unique in the industry, the new CB 1680 provides an ID in the vertical interval of an external video source. Character programming is easy thanks to the front panel pushbuttons. And, the built-in memory stores up to 80 separate 16 character messages. Plus you get genlocking SMPTE bar generator and 2 blackburst sources. Call or write QSI Systems, Inc., 12 Linscott Road, Woburn, MA 01801, Tel. (617) 938-1403.

**Model CB 1680  
Color Bar Generator/Video Source Identifier**

**Circle (120) on Reply Card**

**OTHER FEATURES:**

- Built-in 1 kHz tone generator
- Separate SMPTE bar output without ID
- 1 rack unit high



**AUTOMATED BROADCASTING SYSTEMS**  
Four Models

**SOL-6800/MICRO**  
For 1 VTR with 4-input AV switcher  
From **\$2,500**

**SOL-6800/MINI**  
(Fully programmable)  
For 4 VTRs with 6-input AV switcher  
From **\$9,000**

**SOL-6800/U.I.S.**  
(Upgradable intelligent system)  
For 8 VTRs with 12-input AV switcher  
From **\$12,000**

**SOL-6800**  
(Fully programmable/expandable)  
For 8 VTRs with 12-input AV switcher  
From **\$17,000**

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**Circle (131) on Reply Card**

# We've never skimped on quality or reliability.



## The Tradition Continues.

That's why we've added the best antennas we could find to our already extensive line of VHF broadcasting equipment. Dielectric Communications' recent purchase of RCA's Antenna Division now makes us your single source for complete VHF RF systems. Through Dielectric's long-term association with RCA, we knew that the RCA antenna line would match the quality and reliability of our own equipment.

Among the VHF Antenna Series now manufactured by our new division are Circularly Polarized Antennas for Channels 2-13. The Circularly Polarized TDM (Channels 2-6) Antenna illustrated will mechanically replace an existing batwing type antenna with minimal tower modifications. The Circularly Polarized TCL (Channels 7-13) Antenna is designed with standard gains to replace existing antennas, or can be custom-

designed to meet your specific requirements. Both top-mount TDM and TCL models can be directionalized for close-spaced protection or gain improvement in a preferred direction.

For horizontally polarized applications, Dielectric Communications will continue to supply the service-proven superturnstile and traveling wave models.

Our extensive line of high quality broadcast equipment includes: coaxial diplexers; motorized switches; rigid coax transmission line and filter products; and custom RF systems including the Opto-SX™ for switch-less RF routing.

Dielectric's equipment is backed by a full range of support services from design through field testing. Call us today for free specification brochures—**1-800-341-9678**.

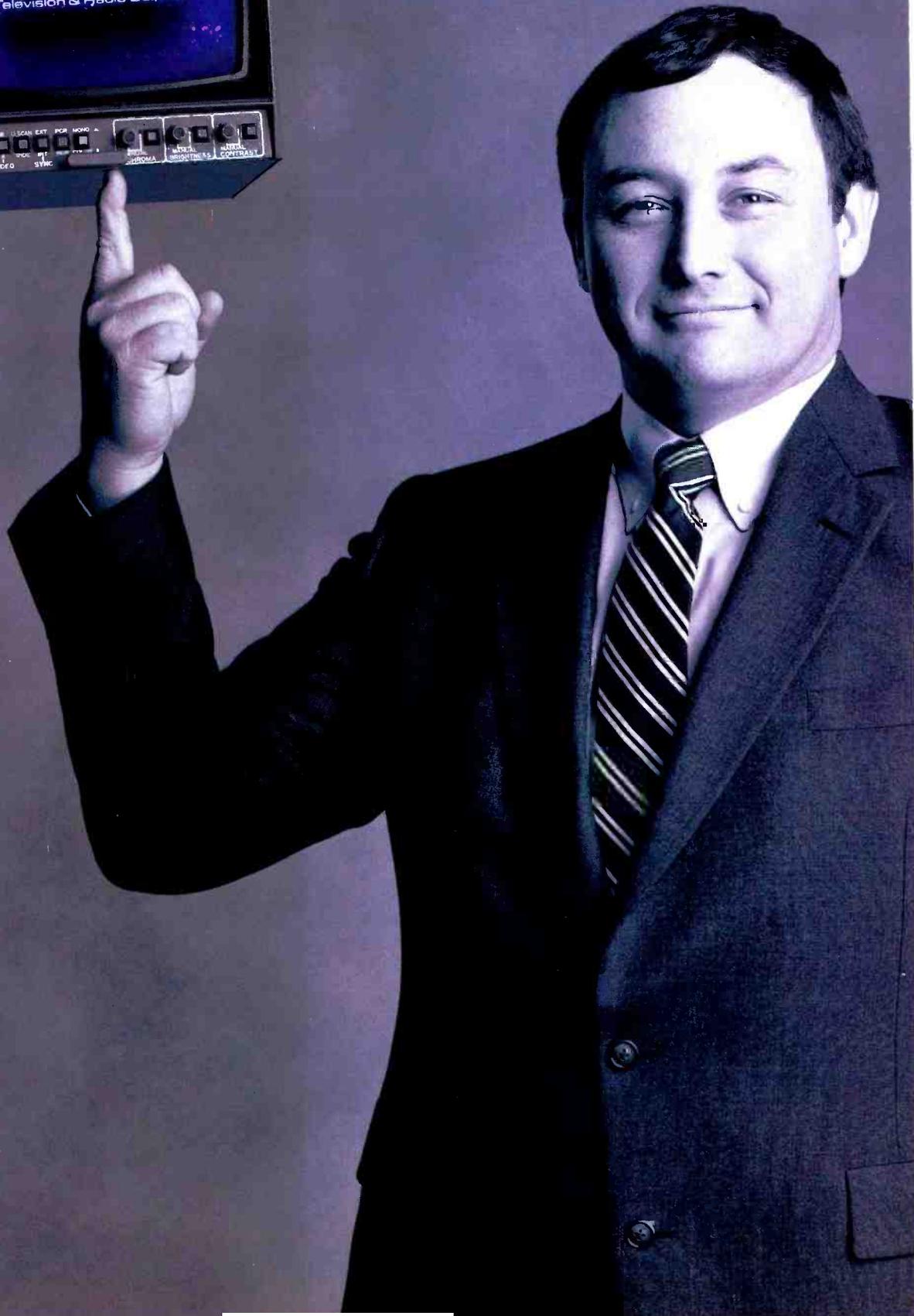
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Circle (105) on Reply Card

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*"With 3M Switchers, We've Got Control Right At Our Fingertips."*

John Owen, VP Engineering, Taft Broadcasting

When you've got your finger on the pulse of a dozen stations scattered across the country, you can't simply install routing switcher equipment and then hope for the best.

You have to be sure it's the best.

With the best specs in the industry. With keyboard controls that are fast and easy to use. And software that's as flexible as it is friendly.

That's why John Owen, VP of Engineering for Taft Broadcasting, chose 3M Series H Routing Switchers when six of Taft's stations recently underwent plant redesigns.

"We wanted to quadruple our capacity, and the Series H provided the means of doing it. This system is expandable and has excellent flexibility while providing clean signal switching. It was a major improvement.

"The Series H is based on a primary switching matrix increment of 16 x 16, so you can install a switching frame configured for initial needs, and have room for a good deal of expansion later on.

"We have a concept at Taft that is somewhat different from most. We look at routing systems for more than distribution from point to point. We try to use the system creatively, and we use it for quality control as well as switching diversity. We believe we are on the leading edge of technology, and we wanted equipment that best reflected that.

"If you want to be one of the premier broadcasting groups, you'll be working closely with a lot of different component companies. 3M took the time to listen when we talked about switchers and was right here in the trenches every step of the way. If I were doing it again, I'd look to 3M in a minute."

More information about 3M Series H Routing Switchers, switching systems, machine control systems and master controls is right at your fingertips as well. Just call toll free: 1-800-328-1684 (in Minnesota 1-800-792-1072).

3M Broadcasting & Related Products Division

**3M**

Circle (106) on Reply Card

©3M, 1986

Continued from page 126

#### Panasonic Industrial Company

- RAMSA WR-8628 post-production mixer, 28 inputs.
- AU-400: M-II camera recorder system.
- AU-500: field recorder, M-II format.
- AU-550: M-II field editing/recorders.
- AU-A50: field editing controller.
- AU-MX50: field audio mixer.
- AU-TB50: time base corrector.
- AU-650: M-II studio recorder.
- AG-6400: professional VHS hi-fi recorder/player, portable.
- AG-155: professional VHS CCD camcorder, piezo auto-focus system.
- VP-5610-P: 100MHz oscilloscope; GPIB option.

- VP-8190P: AM/FM signal generator; GPIB interface.
  - VP-7722P: audio analyzer, 0.0001% distortion factor.
  - AG-6500: VHF hi-fi editing VTR.
  - AK-3090/3091: coax, triax cable adapter for AK-30 camera.
- Circle (725) **See ad on page 39**

#### Patch Bay Designations

- Custom labeling for patchbays, control panels, any field designation area; film inserts for back-illuminated switches.
- Circle (726)

#### Peerless Sales

- Equipment cart with 8-inch pneumatic

wheels.

Circle (727)

#### Penny & Giles

- T-bar controller: for video mixing or video-signal controllers.
  - Motorized fader: for automated audio remix desk applications.
- Circle (728)

#### Perrott Engineering Labs

- PE 38 NP: minicharger system; 1 pound, 2"x3"x6", operates from 115/230Vac.
  - Dichroic filter: Pyrex color-correction filter for Minilight On-Camera light.
  - Cozies: quilted, battery-operated warming covers for cameras, VTRs.
  - PE 868: multicharger for eight PE-90, PB-90 or other batteries simultaneously.
  - PRB 38: on-board battery charger for 14V nicad batteries; 115Vac or 230Vac input, worldwide.
  - PE 138 NP: Betacam battery discharger.
- Circle (729)

#### Philips TV Systems

- LDK6A/26A: upgraded camera chains; total computer setup capability; COACH maintenance interface; dynamic lens-error correction; RS-232C printer interface at master-control panel; contours from red; adjustable cross-hairs on 7-inch viewfinder.
  - LDK54A: compatible portable camera for LDK6A family; operates independently or with computer setup system; ENG, EFP triax or multicore.
  - COACH: diagnostic, remote control and monitoring system; Philips YES or IBM PC-compatible.
  - LDM1791 transmitter: production models of Pye TVT UHF transmitter, 60kW rating with Amperex/Valvo UK1265 klystron.
  - Serial interface: links CD players to station automation computer.
- Circle (730) **See ad on pages 182-183**

#### Philips T&M

- PM5654: VITS generator and signal inserter; color bars, 50Hz/60Hz and 250kHz square waves; security lock prevents reprogramming of signals; external input for data, teletext.
  - PM5560: TV demodulator with broadband stereo output option; separate output for ICPM measurement; wide aural carrier notch; envelope and synchronous detector modes.
  - PM5539: color analyzer; simplifies adjusting monitor's color white without guesswork; monitors screen while flat-field signals from PLM 5630 series generators drive CRT.
  - PM5646: universal TV test signal generator for TV studios and CATV systems; integral sync generator allows gen-lock; auxiliary RF modulator for lowband (I) VHF channels.
- Circle (731) **See ad on page 183**

#### Pinzone Communications Products

- VIMCAS: vertical interval multichannel audio system; for tape, routing, microwave, satellite; uses three video lines per channel, 85dB S/N.
- Circle (732)

#### Pioneer Electronics (USA)

- OMDD: optical-disc memories.
- Circle (733)



## "I made the comparison, then I made the decision to go with IKEGAMI HL-95 and VCC."

-Bob Wexler, President, WEXLER VIDEO INC.

"Running a video equipment rental house in Los Angeles is a tough, competitive business. My customers are the most demanding in the country.

When I decided to buy the Ikegami HL-95 I went to VCC. As always, VCC had the state-of-the-art equipment I needed to stand apart from the competition."

Video Communications Corporation is now featuring the HL-95 Unicam, the latest in the Ikegami line of broadcast equipment. The HL-95 provides you with extremely high signal-to-noise ratio and Ikegami's famous knee circuitry. It will stand alone, or work with Triax and

accommodate any on-board recording format including Beta.

Video Communications Corporation's full service staff of video professionals are ready to define and meet all your broadcast needs. We sell only brands that are manufactured to the strictest specifications and state-of-the-art standards, to guarantee you a trouble-free production. Write or call for your VCC Product Roster!

# VCC

Video Communications Corporation

Broadcast Television Equipment Specialists

Southern California: 2514 Ontario St. • Burbank, CA 91504 • (818) 954-0150  
Northern California: 314 Martin Ave. • Santa Clara, CA 95050 • (408) 988-2968

Circle (107) on Reply Card

# TO CHECK A MONITOR'S COLOR ACCURACY, JUST PUT IT NEXT TO A SHARP.



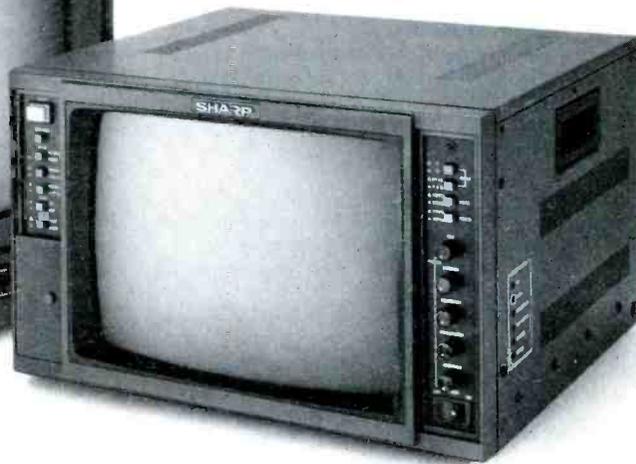
The only colors you'll see on these Sharp monitors are true colors.

Because they both have a shadow mask CRT with U.S. controlled phosphors. Plus a comb filter that cuts cross-color interference.

They also have 600 lines of resolution, so the picture is as sharp as the color is accurate.

Plus multiple inputs, including RGB, that let you change sources at the flick of a switch.

And two time constants, so you can analyze VTR reproduction.



All for \$3,500 for our 13-inch model and \$4,300 for our 19-inch.

Or for \$770, there's our 9-inch utility color monitor for remotes and editing. With many of the features our larger models have.

So contact your local Sharp dealer, call Sharp at (201) 529-8731, or write Sharp Electronics Corporation, Professional Products Division, Sharp Plaza, Mahwah, N.J. 07430.

And the next time you're checking out monitors, remember:

Next to Sharp, any other monitor is the next best thing.



Our 9" utility color monitor for remotes and editing.

A/V Equipment, Audio, Banking Systems, Broadcast Cameras, Calculators, Cash Registers, Computers, Copiers, Electronic Components, Electronic Typewriters, Facsimile, Medical Products, Microwave Ovens, Televisions, Vacuum Cleaners, Video Recorders.



**FROM SHARP MINDS  
COME SHARP PRODUCTS™**

# COMPUTER AIDED VIDEO™

## Automatic Time Code Logging On Location

The creation of shooting logs on location has never been easier. Comprehensive's LOG-IT™ 100 Program transforms your 4½ pound, battery-operated Model 100 computer into a time code reader and tape logger that can be used anywhere. With the stroke of a single key, LOG-IT™ 100 automatically reads SMPTE time code at up to 6 times play speed in forward and reverse. A built-in programmable stop watch even lets you log control track tapes.

The LOG-IT™ 100 program is supplied on a plug-in cartridge. No additional hardware, special tools, or modifications to the Model 100 are required.

For more information call Comprehensive toll-free at 1-800-552-2CAV.

## LOG-IT™ 100



**Comprehensive**  
VIDEO & SUPPLY CORPORATION

148 Veterans Drive  
Northvale, New Jersey 07647  
(201) 767-7990

Circle (109) on Reply Card

### Polaroid

- Film recorder: uses type 339 film for instant pictures; video field is digitized, then recorded on the 4:3 format 35mm film; raster-fill removes normal visible scan lines.

Circle (734)

### Polar Video

- PPM-1 Picture Mover: analog picture positioner.
- PVM-1: video switcher; 4-input; int/ext key; single mix/effects amp.
- PAF-1 Autofader: controls mix/wipe effects over 0 to 999 frame duration.
- Safe area generator.

Circle (735)

### Porta-Pattern

- RCA P200: aperture response test chart for camera tube beam focus adjustment for minimum astigmatism.
- RCA P300: aperture response test chart, modulation transfer function.
- Depth of modulation test chart, 9"x12" or 8"x10" transparency.
- BBC zone plate: to check frequency, phase characteristics; chart or transparency.
- 11-step gray scale: for HDTV and new generation camera; chart or transparency.

Circle (736)

### Potomac Instruments

- QuantAural QA-100: audio program analyzer; checks character and quality of program signal.
- Subcarrier modems: mod/demod modules link Potomac remote-control equipment to other STL and return telemetry systems.

Circle (737)

See ad on page 48

### Provisional Battery

- PRO Pouch: weather-treated carrying pouch; holds one 12V PB90-type battery.
- PRO Lite: portable lighting system; 12V and 30V.

Circle (738)

### QEI

- 695T10kW: 10/15kW FM transmitter with automatic remote-control system.
- ARC-34 automatic FM remote-control system.

Circle (739)

See ad on page 93

### QSI

- AF-1000B: upgrade package, automatic phasing 3-channel blackburst generator.
- CB1601: SMPTE color-bar generator with ID in vertical interval of active video, 16 ID characters.
- CHID-10: remote-controlled cable channel identifier.
- BG308/BG316: split-field color-bar generator; 8- or 16-character alphanumeric ID fields.
- Star-16N/16NBG: video ID generator for portable satellite uplinks; auto switching with active video.
- Synthesized visual, voice 8-character ID generator.
- VT-7A: upgrade package, 10s countdown tone/character generator, auto recycling.

Circle (740)

See ad on page 126

### Q-TV

- SB:QCP Mark I: IBM-compatible computer prompter system.
- VPS-500 II: computer prompter system.

Circle (741)

### Quality Video Supply

- TELEcomp 2000C/M: color or mono video combiner; mixes computer video output with a video source.

Circle (742)

### Quanta

- Dimension: 32-bit computer graphic system; 3-D solid modeling, animation capability; input digitized video or Quantapaint 2-D graphics.
- Quantapaint 32: full-color graphics and paint system; 32-bit computer-based; color tweening; 640x485-pixel resolution NTSC.
- Quantafex: digital graphic effects; 32-bit, 3-D; XYZ rotations, positioning, adjustable center of rotation.

Circle (743)

See ad on page 153

### Quantel

- Harry DCR-7700 enhancement: free-standing control system; frees Harry unit from Paintbox.
- Mirage DVM 8000 update: Starlight 3-D shading, light sourcing; spectral highlighting.
- Cypher DCG 9000 software: roll, crawl, 3-D animation sequences.
- Satin: bidirectional standards converter; PAL, NTSC and RGB components; line/field interpolation; ESBUS parallel interface standard.

Circle (744)

See ad on page 85

### Quantum Audio

- Audio-mixing consoles.

Circle (745)

### Quickset

- Tripods, pan/tilt heads, pedestals.

Circle (746)

### RAM Broadcast System

- Phasescope stereo monitor: 3-inch CRT displays starburst when stereo is present, straight line for mono; minimum of adjustments for <2° phase accuracy from 20Hz to 20kHz.

Circle (747)

### RCA New Products

- 1.1kW UHF LPTV, translator tube and cavity, reduces intermodulation distortion, fast warmup.
- VHF power tubes with cavities for internally diplexed TV transmitters.

Circle (748)

### R-Columbia

- 66058/T: hands-free EN/IFB telephone; clips to belt for tone dialing; modular jacks; UL-85 headphone/mic; auxiliary ENG/IFB functions.
- 2-channel FM wireless intercom headphones.
- Model 52/700: lightweight camera operator headphone.

Circle (749)

### RE Instruments

- 901686 interface: IEEE-488 control interface for RE 201 analyzer.
- RE-201: dual-channel audio analyzer system; new options for wow/flutter, weighting filters, IEEE-488 bus, external keyboard.

Circle (750)

### RF Scientific

- F/A model 2A: Ku-band flyaway SNG unit, 340W output, convertible to SCPC.

#### RF Scientific, continued

- F/A model 1A: Ku-band flyaway, 260W minimum at flange, convertible to SCPC. Circle (751)

#### RF Specialty Products

- Fixed and ribbon and tubing variable inductor coils; meter disconnect switches; RF contactors; lighting chokes; jack plugs. Circle (752)

#### RF Technology

- RF-1300/RF-1301: portable receiver, transmitter units, 13GHz.
- RF-700/RF-701: portable 7GHz receiver, transmitter units.
- RF-102B system: wireless mic, diversity receiving, 950MHz. Circle (753)

#### ROH

- Audio power amplifiers, distribution

equipment.  
Circle (754)

#### ROSCO Laboratories

- Cinefoil: matte black metal foil; light-weight, shape-conforming material to stop light leaks.
- Cinegel: swatchbook available with samples of light color-balancing materials.
- Polarizing filters.
- Stage pin electrical connectors. Circle (755)

#### ROSCOR

- MTS-1: monitor tally system; displays source IDs on monitors.
- Mobile uplink/receiver units.
- Design services for mobile and fixed-production facilities. Circle (756)

#### RPG Diffusor Systems

- QRD-734 designer diffusor: reflection phase gratings, laminate, wood, stain or painted finished with aluminum or hard wood dividers.
- QRD-734: ABFFUSOR: combines absorption and diffusion in a panel, available in wide range of fabric coverings.
- QRD-734S: reflection-phase grating diffusor mounts on wall or standard ceiling grid. Circle (757)

#### R-Scan

- Model N100: lightning position and tracking system interface to Kavouras Triton-X weather equipment.
- Model E100: LPATS interface to ESD color connection.
- Model 60-48: NVG 48-picture animation system for GOES-TAP imagery. Circle (758)



# Be Vocal...

Your station spent a lot of money for that super-sophisticated microphone, not to mention George Goldenthroat's salary and benefits. So, does it make sense to underwhelm your audience with mediocre mic processing?

Our Model 400 microphone processor offers a preamp section superior to that found in your on-air audio console. After all, we revolutionized the industry by introducing low noise, low distortion, transformerless preamp technology way back in 1977. There's an on-board 3-band E.Q. section to emphasize your on-air personality's performance. For dramatic dynamic range control, a compressor is included with a "smart" interactive expander to cancel noise level artifacts. For further enhancement of your signal, other processing effects, such as delay or reverb, may be inserted in the signal path via balanced line-level patch points. And, sibilance problems will never lead to listener fatigue, because they are handily eliminated with the Model 400's de-esser.

All of the Model 400's controls are user-friendly and can be readily comprehended. Gain reduction and true vu metering offer visual confirmation of dynamics processing, as it takes place. The 400 is designed to be interfaced into your system in a matter of minutes.

So... **BE VOCAL... DEMAND THE BEST...** Demand the Model 400 Mic Processor from...

VALLEY PEOPLE INC. • P.O. Box 40306 • 2817 Erica Place • Nashville, TN 37204 • (615) 383-4737 • TELEX 3785899 • NASH AUDIO  
VALLEY PEOPLE INTERNATIONAL • C/O Gotham, AG, Regensdorf Switzerland • Telex 59222 gothm ch, Tele 0041-1-840-1044

Circle (110) on Reply Card

#### RTS Systems

- Model 848: matrix intercom station; 24-bus dedicated lines; all talk paging; TW conference line for standard RTS systems.
- Model 927: programmable reference tone generator; discrete tones; pink/white noise; noise-reduction tones; stereo channel ID.
- LH267/268: lightweight headphones; open-air headset; unidirectional mic; XLR-4 connector.

Circle (759)

See ad on page 86

#### Radio Resources

- Distributor: audio, RF products; audio processors; radio exciters.

Circle (760)

#### Radio Systems

- DCX amps: modular studio amplifier series, accessories.
- RF-42: portable, tabletop SCA receivers.

Circle (761)

#### Rank Cintel

- MK3HDTV telecine: flying spot film transfer system for mastering 1,125-line, 60Hz television.
- ADS1 telecine: CCD film scanner with multiplexed capability and dirt concealment.
- Slide File/Art File: RGB digital still-storage system holds up to 400 images created with a graphics tablet and software or from other sources.

Circle (762)

#### Reach Electronics

- Subcarrier paging systems; communications equipment.

Circle (763)

#### Real World Technologies

- On-screen audio level monitor; safe area generator.

Circle (764)

#### Recortec

- Videotape cleaners, evaluators for 3/4-, 1-inch tape; bulk tape degaussers.

Circle (765)

#### Rees Associates

- Facilities planning: computer-aided design system helps to determine space requirements; architectural, engineering services.

Circle (766)

#### Research Technology

- TC6120 evaluator: tape cleaner and condition analyzer; for 1-inch tape.
- DV-5: videotape dropout analyzer and time-code generator.

Circle (767)

#### Richardson Electronics

- Distributor: replacement tubes, RF transistors, related sockets; accessories; weather radar magnetrons, TWTs.

Circle (768)

See ad on page 88

#### Rockwell International

- Microwave video radio systems, STLs; digital program channels.
- Doppler radar equipment.

Circle (769)

#### Ross Video

- Model 216: 16-input multilevel effects production switcher; serial interface; transition preview; downstream key tie and analog key border generator.

Circle (770)

See ad on page 63

#### SEA-TEX div/SI-TEX Marine

- Color weather radar systems.

Circle (771)

#### SESCOM

- Portables: audio interface products; ac/dc-powered; plug-compatible for integration.

Circle (772)

See ad on page 150

#### SG Communications

- Tower and antenna maintenance services.

Circle (773)

#### SWR

- Clarion UHF transmitting antenna: slotted waveguide design.
- FMST: single-station FM antenna.
- FMPM: multiple-station FM antennas.
- TM10: high-power, low-gain UHF antenna.

Circle (774)

#### Sachtler

- HotPod: tripod; pneumatic center column; for Panorama 7+7 or Video 20 fluid heads.
- Video 20: pedestal for studio and OB; pneumatic center column for video 20/25 fluid heads; adapts to steerable dolly.

Circle (775)

See ad on page 83

#### Samson Products

- Ibanez SDR-1000: stereo digital reverber;

Look. We know that for PC board mounting you want a receptacle that keeps a low profile and turns in a top quality performance.

Now you can get it...just about any way you want it...from Neutrik® Ag, the leader in innovative XLR technology.

You want to make the right connections? Easily? Then you'll appreciate the D series' compact design. It saves time with a quick-connecting contact assembly that's removable from the rear of the housing just by turning a cam with any slotted screwdriver. While the housing sits tight...right on the panel.

You're after more options? D series receptacles give you a stockpile. Three pin types. Silver or gold contacts. Front or rear mounting. Vertical or horizontal PCB styling. Solder cups for wire connections. Your choice of locking or non-locking receptacles. In fact, you get options right down to the satin nickel or black chrome finish.

You just need a little more information? Learn all the angles by contacting: Kulka Smith, Inc., Sales Dept., 1913 Atlantic Ave., Manasquan, NJ 08736. (201) 223-9400. TLX: 244536.

**Kulka  
Smith**®

**In board room  
maneuvers,  
Neutrik® D Series  
receptacles know  
all the  
angles.**



Circle (111) on Reply Card

# Professional Signal Processing...

The FOR-A Broadcast Product Group (BPG) is an innovative line of high-end video equipment setting trends in professional broadcast video:

## Digital Signal Processors

- FA-430 Time Base Corrector and Image Processor – with Y/C Dub Processing and Image Enhancement, Noise Reduction, Color Correction and Black Stretch

- FA-440 Time Base Corrector – with Video Production Effects
- FA-450 "Universal" Component Time Base Corrector – with Y/R-Y/B-Y, YIQ, RGB, Y/C Dub Component as well as Composite Signal Processing and Freeze Frame
- FA-800 AUTOCOR Frame Synchronizer – with Automatic Video Level Control

## Production Switchers

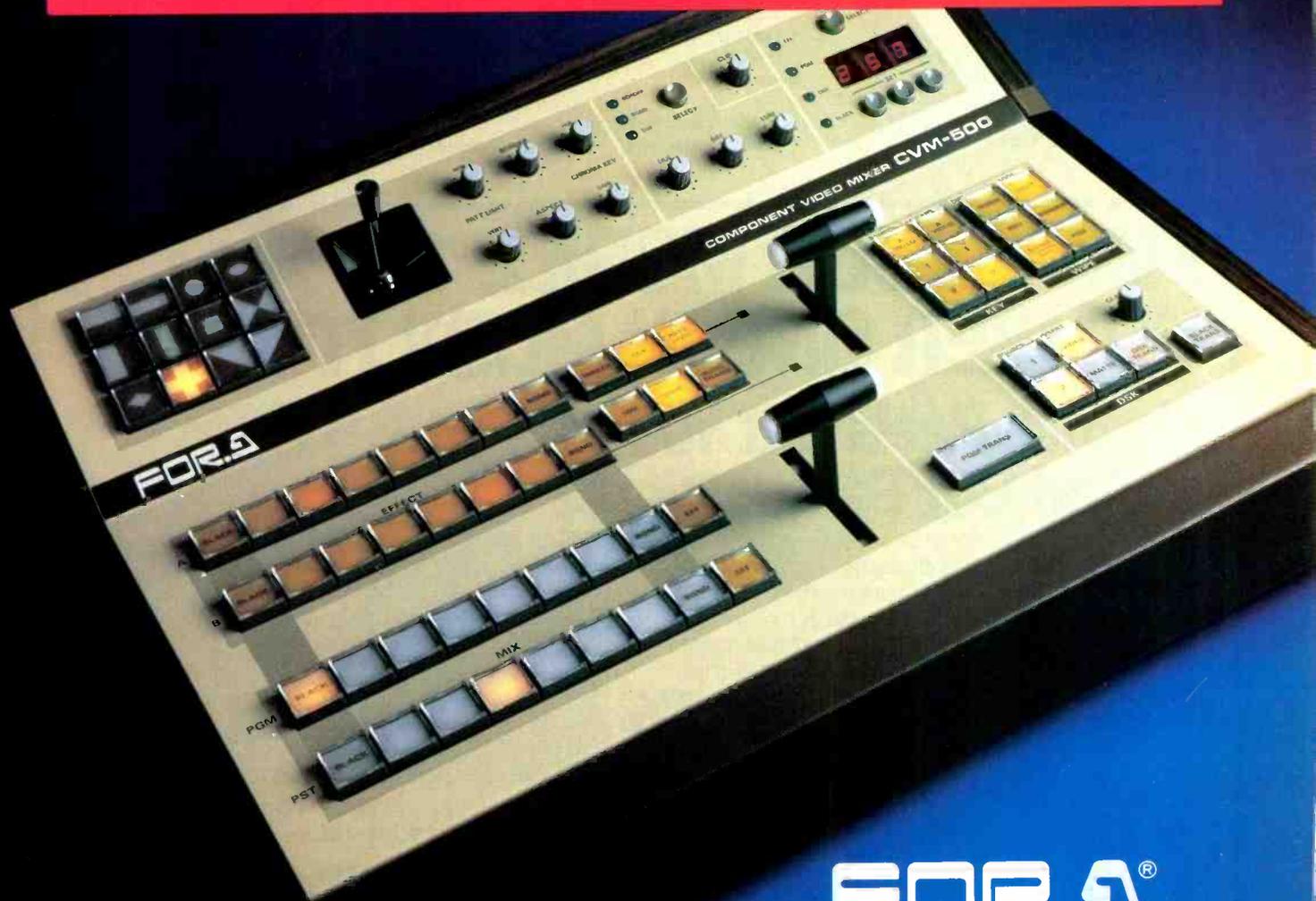
- CVM-500 Component Video Mixer – with Chroma Key and Effects Memory options
- PVM-500 Composite Video Mixer – with Chroma Key and Effects Memory options

## Signal Processors

- CE-10 Character and Graphics Effects Generator
- CCS-4300 Color Corrector

Strongly supporting the trend toward post production component processing is the new FOR-A CVM-500 Switcher. The CVM-500 provides multiple source mixing of component format VTRs, RGB cameras, RGB graphic and character generators, and decoded signals. Features include: six inputs plus black and color background, four buses, independent auto transition rates for mix effects, program, DSK and Fade to Black, and three independent colorizers.

These FOR-A BPG products are marketed nationally through a select dealer network which is prepared to provide technical support and service for your broadcast and post-production system requirements. Call or write now for your copy of the FOR-A Broadcast Product Group System Guide.



**FOR-A**<sup>®</sup>  
INNOVATIONS IN VIDEO

FOR-A CORPORATION OF AMERICA 49 Lexington Street, Newton, Massachusetts 02165  
East Coast: (617) 244-3223 / West Coast: (213) 402-5391

Circle (112) on Reply Card

#### Samson Products, continued

user-programmable; 26kHz 16-bit sampling; 4-band EQ.

Circle (776)

#### Sansui

• Digital transmission system: narrowband; DC-PCM, Tricode technologies; 16-bit reduction to 8-bit cuts bandwidth to one-fourth normal.

Circle (777)

#### Satcom Technologies

• 1523KS: offset elliptical earth-station antenna with prime focus feed.  
• 950 feed: dual C-/Ku-band primary feed system.  
• 240KV: 2.4m SNG antenna.

Circle (778)

#### Schafer World Communications

• 2000 family: 5- and 8-mixer stereo audio consoles.  
• 8000 consoles: 8-mixer, expandable to 16-, 24-input, expands to 48; compatible with automation systems.  
• Ready Spot: 30-tray standard cartridge automation unit, increment by units of 10 trays.  
• 7000/7000GLS: cart automation unit; full or assist operation.

Circle (779)

#### Schneider Optics

• TV-64/65/66: lens family for 3/8-, 1- and 1 1/4-inch cameras; 56° to 2° horizontal angle of view, integral 2X range extender and 14.5X zoom range; applicable to Philips, Ikegami, Sony, Hitachi, Thomson and

Bosch cameras.

• TV-80 lens: 17X zoom range covers 8.5mm-150mm at f/1.4 for 3/8-inch tubes; integral 2X extender provides 16mm-300mm at f/2.8 aperture.

Circle (780)

#### Schmid Telecommunications

• SZ340 analyzer: stereo sound program test system; CCITT 0.33 recommendations.  
• SZ311/SZ331: signal transmitter and measuring receiver for telephone and audio program circuits.

Circle (781)

#### Schwem Technology

• Wide angle attachment: effectively shortens focal length by 5X; unstabilized.  
• Remote control: includes focus, iris, zoom; stabilization.

Circle (782)

#### Scientific-Atlanta

• Model 367: low-noise block converter.  
• Model 363: Ku- to C-band block down-converter.  
• Model 8345: 4.5m antenna, dual Ku-/C-band capability.  
• Model 9630: Ku-/C-band satellite TV receiver.  
• Digital audio system data card.  
• Optima: equipment racks, enclosures; modular.

Circle (783)

#### Scip Electronic Systems

• 3302: stereo-signal manager; diagnose,

reconfigure, correct, calibrate; discrete or matrixed stereo, SAP, time-code signals.

Circle (784)

#### Selco/Sifam

• Equipment knobs; VU, peak program meters.

Circle (785)

#### Sennheiser Electronic

• HD1/SI-2: transmitter, receiver for infrared wireless system; mono, stereo and 2-channel reception.  
• HD 540 reference: circumaural open headphone; 16Hz to 25kHz response.  
• Infoport: wireless tour guide system; SK1010-7 100mW transmitter, HDE 300-6 stethoscope headphone receivers.

Circle (786)

See ad on page 152

#### Sharp Electronics

• XM-1900: high-resolution color monitor; rack-mount, 19-inch diagonal.  
• XC-A1TC accessories: for XC-A1 camera; top-mount plate, 3-camera remote operations panel; remote-control lenses.  
• XA-110/120: pro series videocassette recorders; VHS-HQ picture enhancement.

Circle (787)

See ad on page 131

#### Shintron

• DK3/CK3: component DSK, combines shadow and RGB chroma keyer; drop shadow may be filled by internal generator.  
• 12x-C4: routing switcher; 12-in, 4-out component system.  
• Empress C-2000: 4-bus component video-production switcher; RS-422 orange inter-

# MAKE YOUR MOBILE 1 NUMBER ONE IN MOBILITY.

## Hannay Reels Get You In And Out Fast.

Save precious seconds in set-up, tear-down time. Just pick up the durable, lightweight Hannay portable cable storage reel, and go. When the story's in the can, direct rewind makes pick-up easy. And the portable cable storage reel is compact to take up minimal storage space.

It's just one in the full line of Hannay cable reels, available in a wide selection of sizes, shapes and capacities.

When it comes to getting in and out fast, no other reel is "remotely" as efficient as a Hannay Reel!



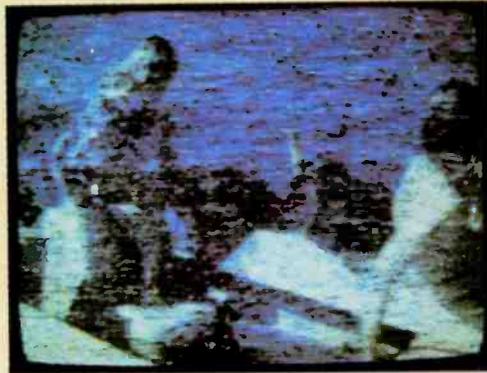
Send Today For  
Free Literature Packet.



# HANNAY REELS

CLIFFORD B. HANNAY & SON, INC., 600 EAST MAIN STREET  
WESTERLO, NEW YORK 12193 • TELEPHONE (518) 797-3791

Circle (113) on Reply Card



# UNWANTED FRAME GRABBING STOPS HERE



DFS-3000N Digital Frame Synchronizer

If your video synchronizer lets you down on a noisy feed, you need the new Leitch DFS-3000N. This digital frame synchronizer incorporates input processing circuitry that uses the latest in digital auto-correlation techniques to prevent intermittent frame grabbing or switching to black. Only Leitch offers this capability.

Now you know one of the features of the Leitch DFS-3000N. But the advantages don't stop there. Neither should you. Write or call (toll free) for further information.

In U.S.A. 1-800-231-9673

In Canada 1-800-387-0233

**LEITCH**

Progressive Concepts in Television Technology

Leitch Video of America, Inc.  
825k Greenbrier Circle  
Chesapeake, VA 23320  
(804) 424-7920

Leitch Video International Inc.  
10 Dyas Road, Don Mills  
Ontario, Canada M3B 1V5  
(416) 445-9640

Circle (114) on Reply Card

### *Shintron, continued*

- face; software-oriented.
  - Model 392: Y/C component switcher; post-production use.
- Circle (788) See ad on page 190

### Shively Labs

- ½-wave space FM antenna: reduced downward radiation; per ANSI non-ionizing guidelines.
  - Vertical polarized FM antenna: decreased TV channel 6 interference.
  - Custom FM antennas: special ratios, for varying H/V polarization requirements.
- Circle (789)

### Shook Electronic Enterprises

- 14-22D: mobile production vehicle, 22 feet.
  - 48-63: network production trailer; 48 feet.
  - EN/EPF prep kit: for Ford E-350 or Dodge Maxi Van, with instruction manual.
- Circle (790)

### Shure Brothers

- FP32: portable stereo mixer; 3-input, hi/lo-Z switchable; two transformer-coupled outputs; slate mic/line; 9Vdc cells or external 12Vdc power.
  - FP42: 4-input stereo audio mixer; ac/dc power; limiter; tone oscillator; dual VU meters; low-cut filter.
  - FP11: mic-to-line amp, 84dB gain.
  - FP-12: headphone bridging amp.
  - SM83-CN: lavalier condenser mic, omnidirectional.
  - SM90/91: omni/unidirectional microphones, condenser design; surface mount.
  - FP16: 1-input, 6-output field audio DA.
  - SM63L: omnidirectional dynamic mic, elongated version of SM63.
- Circle (791) See ad on page 11

### Sigma Electronics

- BSG-10: blackburst generator.
  - CBG-100: color-bar generator.
  - TSG-375: test signal, sync generator.
- Circle (792)

### Sims Vibration Dynamics

- GSP-1000: turntable isolation system; eliminates 9% of feedback at 90dB SPL.
- Circle (595) See ad on page 110

### Singer Products

- CCA FM20,000G: FM transmitter; zero bias triode in grounded grid.
- Circle (793)

### Skotel

- TCG-80: electronic length reader; measures film in feet/frames and by time code.
  - TCR111: LTC time-code reader; LED display.
  - TCR112: LTC time-code reader; video display.
- Circle (794)

### Solid State Logic

- SL 4000E/6000: optional hardware, software for master studio and stereo video production audio desks.
  - SL 5000M: audio and control component modules; SSL stereo submixer.
- Circle (795) See ad on pages 170-171

### H.A. Solutec

- SOL6800/UIS: broadcast automation for eight VTRs; integrated A/V switcher.
- SOL6800/Micro: 1-VTR automation system

with 4-input switcher.

- SOL AD, ID/Q: for log printout.
- Circle (796) See ad on page 126

### Sono-Mag

- CD multiple reproducers.
  - CD live-assist music system.
- Circle (797)

### Sony Broadcast

- BVW-105: specifically for ENG, Betacam camcorder with three CCD sensors for 2,000 lux, f/5.6 sensitivity or full video with +18dB gain and 15 lux; effective resolution of 1,020TVL.
  - DVR-1000: digital videotape recorder based on 4:2:2 component design per CCIR 601 standard and EBU/SMPTE D-1 format; four digital audio channels, 525/625 switchable, RS-422 control and insert/assemble editing features.
  - BVH-2800/2830: type C VTRs provide two 16-bit linear quantization PCM audio channels with two analog channels; dynamic range of 90dB and 20dB headroom on 1- and 3-hour machines.
  - BVX-10: component color corrector matches Betacam footage to other component signal sources of different transfer characteristics.
  - BVW-21: portable player provides RF output with optional RF modulator; ac or dc operation.
  - BVU-850/870/150: U-matic recorders with SP-mode VCRs; for H-resolution to 340TVL, 2dB increase in chroma S/N; 800-series machines include Dolby C noise reduction.
  - BVH-2000/10, -2000/12: streamlined VTRs for specific applications, such as duplication or on-air playback.
  - BVM-1310: 14-inch diagonal color monitor; current feedback controls color temperature drift; 0.25mm pitch CRT; PAL, SECAM option plug-in modules.
  - BVE-900 Edit Control: for any combination of Betacam, U-matic and type C VTRs; serial, parallel control outputs; menu-driven display, LTC, VITC and control-track timing.
- Circle (798) See ad on page 169

### Sony Video Communications

- DXC-3000: 3-CCD camera for video professional has 520TVL effective resolution; 56dB S/N ratio.
  - SEG-2550: special effects generator for production use; E-file storage of 63 custom-created or frequent-use effects; transition memory.
  - VP-5020 player: ¾-inch playback system; 45dB S/N; resolution to 240TVL.
  - 8mm systems: EVO-110 camera/recorder; EVO-1000U recorder; PCM-EV1000U PCM audio processor; EVO-510/210/410 players.
- Circle (800) See ads on pages 34-35, 125

### Sony Magnetic Products

- KSP cassettes: U-matic videocassettes using Super Vivax formulation; wider luminance bandwidth, extended audio response, anti-static treatments.
  - D-1 19mm cassette: optimized formulation for D-1 digital video recorder.
  - BCT-30K cassette: 30-minute Betacam magnetic material with anti-static coating and housing.
- Circle (801) See ad on page 97

### Sony Pro Audio

- MXP-2000: stereo audio console for on-air, post-production; assignable dynamics processor; optional interface for editing suite applications.
  - DFX-2400: 2-channel 16-bit digital audio processor; sampling at 32kHz, 44.056kHz, 44.1kHz and 48kHz.
  - VSU-3310 Vari-sync: controller peripheral for PCM-3324 digital ATR; allows ±12.5% variation of clocking frequency.
  - MXP-29 mixer: stereo audio with interface to video editors; VCA per channel; balanced inputs for 8-channel unit.
  - Dynamic mics: F-730 hand-held, F-720 multipurpose.
  - VHF wireless mics: 48 synthesized channels: 174MHz-216MHz; WRT-210 hand-held, WRT-220 body-pack transmitters; WRR-210, WRR-220 diversity receivers.
  - CDK-006 auto disc loader: CD changer, 60-disc capacity; external 8-bit microprocessor controller; 16-second disc access time.
  - BTA-210 adapter: VHF wireless mic systems; extends range beyond integral camera mics.
- Circle (802) See ads on pages 34-35, 125

### Soundcraft Electronics

- Series 200B: compact audio console for live use, recording, broadcast, post-production; routing allows direct assign to subgroups, stereo buses; aux sends selectable pre-, post-fader and EQ.
  - Saturn: multitrack recorder with multi-memory autolocator, integral meter bridge; remote from mix position.
- Circle (803)

### Soundtracs

- MC series: monitor desk audio mixers for stage foldback, conference and communications; in 32-10+2 and 24-10+2 formats.
  - CMS2 Interface: ties CM4400 studio console to multitrack audio and synchronized video equipment.
  - T-series: master mixing systems, expands by groups of four to a 32-8-2 configuration.
- Circle (804)

### Sound Technology

- 3000 series: programmable transmission audio test system.
  - Product enhancements: menu-driven software, graphics for IBM, Compaq, HP80 systems.
  - Bus-control switching: for multichannel test systems.
  - 1530A: MTS/stereo analyzer system.
- Circle (805)

### Spantel

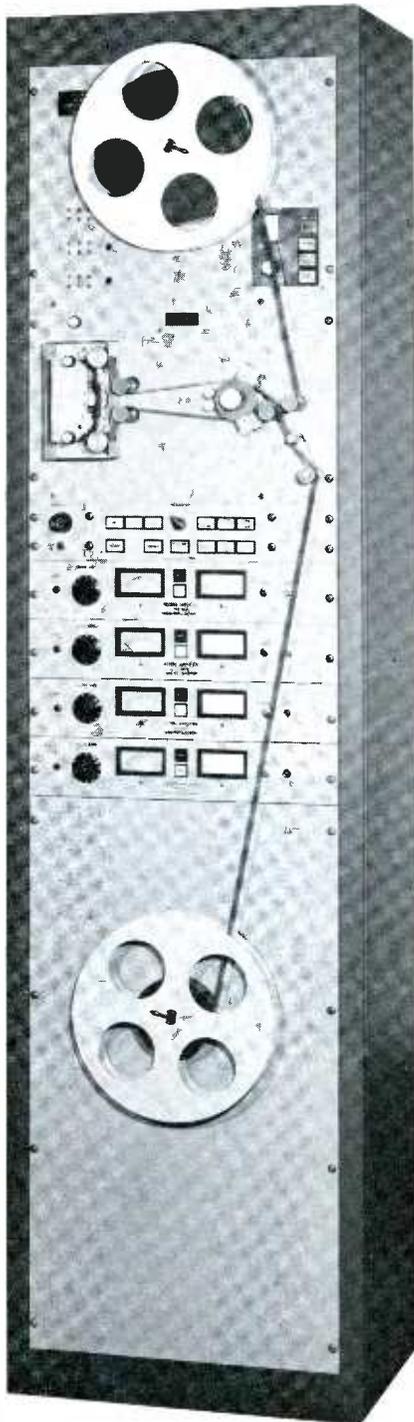
- Tone, voice pagers, voice message system.
  - SCA equipment.
- Circle (806)

### Sprague Magnetics

- Replacement heads: Ampex, Otari ATRs, Sony BVH audio heads.
- Circle (807)

### Spectrum Planning

- BEAM service.
  - FM 80/90 engineering service.
  - SNG training.
- Circle (808)



# MAGNA-TECH

## THE SOUND HEARD AROUND THE WORLD

Magnetic Film  
Recorders and Reproducers  
for Television and Film  
Sound Post-Production

### HIGH SPEED

Telecine Magnetic Followers  
Video Tape-Film Interlock  
Electronic Looping  
Dubbing Systems  
16 and 35mm Electronic Projectors  
Total Facility Engineering

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75009 Paris, France

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Crows Nest NSW 2064  
Australia - Telex 24655

**Johannesburg**  
General Optical Co., Ltd.  
15 Hulbert Road  
Johannesburg 2001,  
South Africa

**Rome**  
Alberto Sciaretta  
Via Siria 24  
Rome 00179  
Telephone 7943618

**Brussels**  
A.R.C.  
Rue de Boisde Linthout 45  
1200 Brussels Belgium

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3 Salisbury Road  
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Persekutuan,  
Federal Hill  
Kuala Lumpur, Malaysia

**Caracas**  
Cine Materiales srl  
Apartado Postal 61.098  
Caracas 106 Venezuela

## MAGNA-TECH ELECTRONIC CO., INC.

630 Ninth Avenue, New York, N.Y. 10036

Telephone (212) 586-7240

Telex 126191

Cables "Magtech"

Circle (115) on Reply Card

### Stage Lighting Distributors

- Q4Z light: 4.5-inch zoom ellipsoidal spot-light.
  - SP1500: fog/smoke machine.
  - SERVO: color changer, pan/tilt, speed control.
  - 12x24 dimmer: 12 2.4kW circuits.
- Circle (809)

### Stainless

- Self-supported and guyed towers to 2,000 feet; support structures for multiple antennas.
- Circle (810)

### Standard Communications

- Agile Omni: C/Ku-band audio/video receiver.
- LNBC-4: C-band LNA and block downconverter.
- LNBC-12: Ku-band LNA/BDC.
- CRC800: remote-control satellite receiver system.

Circle (811)

See ad on page 167

### Stanton Magnetics

- DYNA 30M/SR: headphones: samarium cobalt magnet, 20Hz-22kHz, 100Ω shoulder rest, single-muff headphone.
- 681EEE Mk IIs: upgrade cartridge; Stereo-hedron II diamond stylus; 22kHz response.
- 310B phono pre-amp: ac power supply; unbalanced, balanced outputs.

Circle (812)

### Stantron

- Studio furnishings.
- Modular video center.

Circle (813)

See ad on page 146

### Star Case

- Protective equipment-shipping containers.
- Circle (814)

### Steady-Film

- X/Y animation table.
- Steady-Film gate: retrofits Rank Cintel Mark III; pin-registered gate, eliminates unwanted film movement during transfers.

Circle (815)

### Steenbeck

- Perfo recorder: machine synchronizer accessory syncs film, video and multi-audio tracks.
- ST1401/1401C: 35mm, 4-plate film editor with video camera.
- 16mm film editor, 6-plate, with video camera.
- ST201V: video reporter film-editing system with synchronizer.

Circle (816)

### Storeel

- Room stretcher: high-density VHS storage.
- Setup truck for Beta cassettes.
- Beta room stretcher storage.

Circle (817)

### Straight Wire Audio

- CDQue: CD player with improved cuing system; dual D/A converters; 4X oversampling; Philips transport; 3.5-inch rack-mount.
- SpeedDemon: variable-speed controller for CD player; adjustable  $\pm 10\%$  speed range.

Circle (818)

### Strand Lighting

- Color changers.
- DC-90 dimmer banks.
- Lightboard XP lighting controller.
- Lightboard M lighting controller.
- Arturo softlights.

Circle (819)

### Studer Revox

- A812: analog audio recorder: microprocessor deck, signal control.
- SC4008/4016: ESBUS 8 and 16 multitrack machine controllers.
- B203: RS-232 automation controller; for radio production, on-air.
- A820-TC: analog mastering recorder; center-track time code.
- A810-2-TC/FM/NEO: audio recorder; stereo audio with SMPTE, FM pilot and Neopilot tone modes.
- A725-OC: compact disc player; digital audio data and subcode outputs.
- Model 970: prototype on-air and production audio console.
- Model 963: prototype 16- to 40-input, 40 direct outputs, four stereo subgroups, two stereo masters; PCM-compatible.
- Model 807A: 2-channel audio recorder; general-purpose as well as mastering.

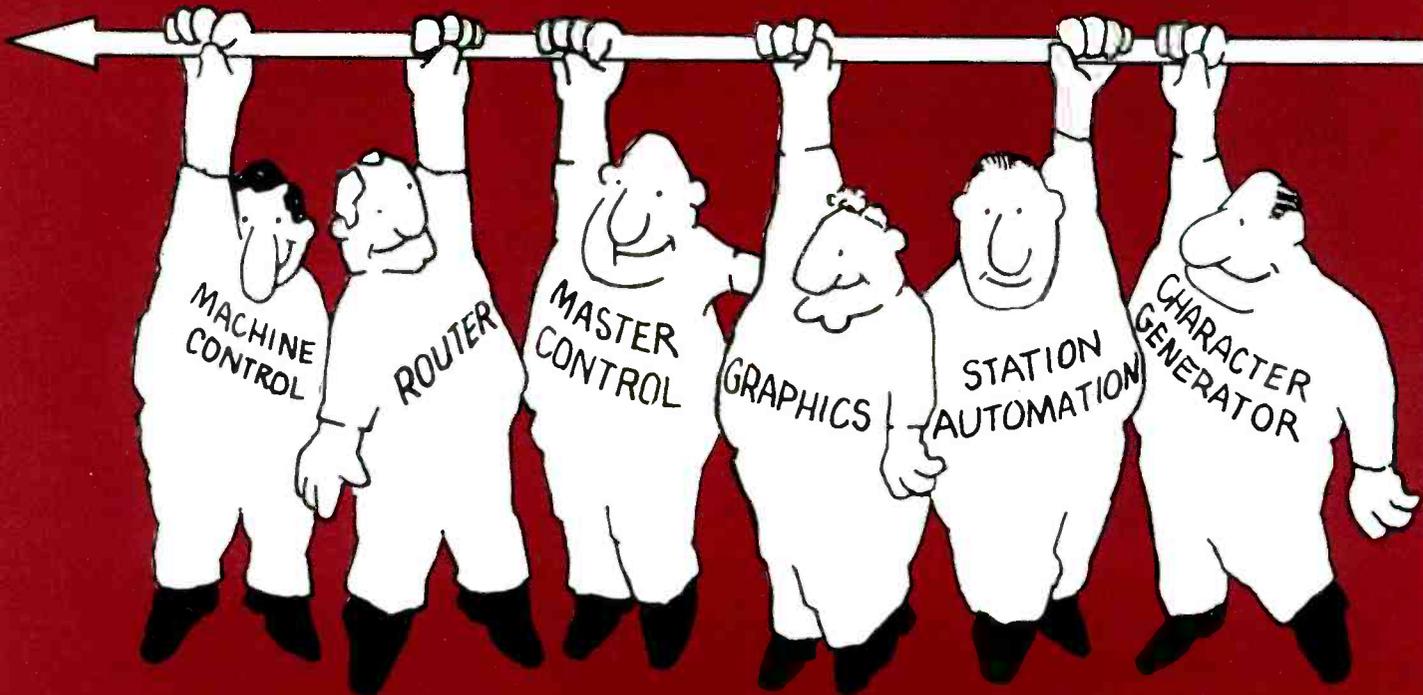
Circle (820)

See ad on page 121

### Studio Technologies

- RCU-1 unit: recognition controller; senses stereo presence for simulator system.
- AN-2 stereo simulator/synthesizer.

Circle (821)



• Up to 5000 messages/second • No central processor, no central failure point • SMPTE interface

#### Swintek Enterprises

- Mark QDC/2: wireless mic receiver for video cameras; dual frequency unit.
- RFSD: live-audio diversity switching system.

Circle (822)

#### Switchcraft

- E series: XLR audio receptacles.
- BNC receptacles: PCB-mount; straight, right angles.
- DIN plugs: 5-pin molded cable assemblies.
- Phone plugs: ¼-inch plugs, jacks.
- Q.G. connectors: on-reflective; gold contacts.

Circle (823)

See ad on page 111

#### Symetrix

- 528 voice-track processor.
- 544 quad expander and gate.

Circle (824)

#### Symtec/One Pass Video Systems

- Symtec PGS IIIA: Upgrade of the PGS III graphics system.
- Model 200, 400: character-generator systems.
- Dunn, Sharp cameras.

Circle (825)

#### System Associates

- Equipment broker services; used video, editing, VTR equipment.

Circle (826)

#### Systemation

- XLV716: live-assist radio automation; screen-touch control.

- X3710: satellite automation unit.
- Multiterminal automation.

Circle (827)

#### TASCAM/Teac Professional

- ATR-60/series:
  - 2N, 2-track, 2-piece console-type ¼-inch ATR.
  - 2T, center time-code track.
  - 2HS, 2-piece console style, 2-track, 15/30ips ATR.
  - 4HS, ½-inch, 4-track, 2-piece, 15/30ips ATR.
  - 8, ½-inch, 8-track ATR.
- Studio 8 system: 8-track recorder with 8-input, 8-bus mixer in a single console frame.

Circle (828)

See ad on page 161

#### TFT

- 8610 remote control: smart multichannel control system.
- 851 monitor: BTSC TV stereo modulation, compatible with TEK 1450 demod.
- 860 analyzer: make distortion measurements in conjunction with 850 TV monitor.
- 8303 STL: 250kHz composite narrow- or wideband system.
- 855: BTSC SAP and pro channel modulation monitor.
- 8600 STL: single-channel or dual-mono system.

Circle (829)

See ad on page 49

#### TOA Electronics

- Audio mixers.

Circle (830)

#### TWR Lighting

- L-866: medium-intensity white beacon for tower obstruction lighting; 20,000 candelas day, 2,000 candelas night.

Circle (831)

#### TVI

- Studio, stage equipment; lighting equipment; cyncs, tracks.

Circle (832)

#### Taber Manufacturing/Engineering

- SMPTE center-track head for the SSI center-track system.

Circle (833)

#### Tapcaster

- Series 1000 console: stereo from six to 16 mixing channels, three inputs per channel, mic or line; transformerless; VCA fading; dc logic switching.

Circle (834)

#### Tamron

- FOTOVIX: convert photos to TV images; negative, positive, color or B/W; 6X zoom.

Circle (835)

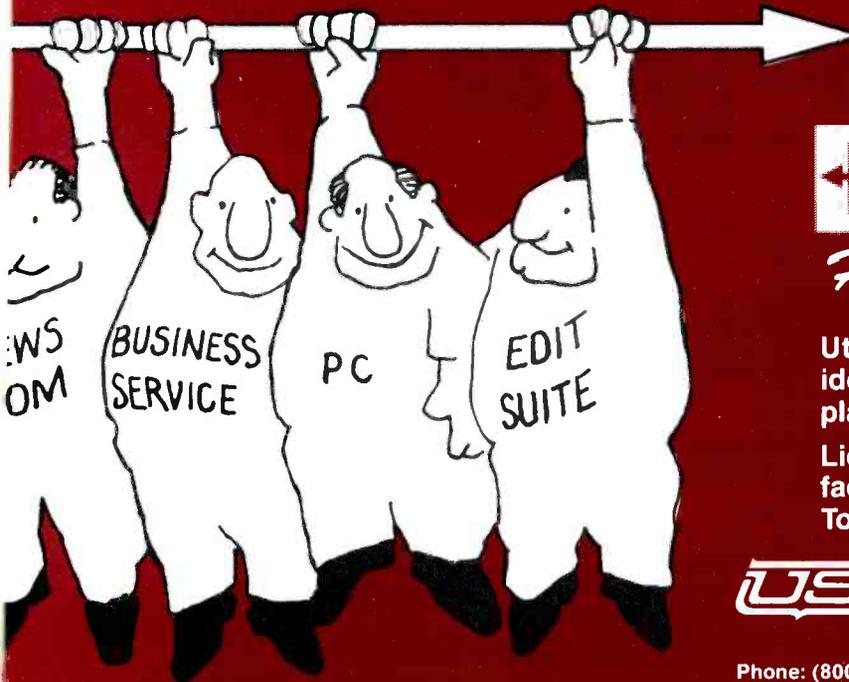
#### Tannoy

- NFM-8: near-field monitors.
- SR-840: power amplifiers.

Circle (836)

#### Teatronics

- Tech Director: remote control, manual analog lighting console.
- Producer: computer-assisted manual



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## High Speed Data Net

Utah Scientific's new DYNABUS™ is the ideal medium for current and future in-plant data communications.

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• Super rugged tap-off buffers data, automatically disconnects failed devices • Complete diagnostics

Circle (116) on Reply Card

### *Teatronics, continued*

console; expandable to 48 control channels.

**Circle (837)**

### **Techron**

- TEF system 12: acoustic analyzer; documents acoustic measurements through time-delay spectrometry; time and frequency domain measurements.

**Circle (838)**

### **Technov**

- JNB-400: edit controller expander for Sony type 5 U-matic VCRs.
- CSG-110: sync, blackburst generator.
- EBG-110: blackburst generator.
- MDA-310: video/stereo DA.

**Circle (839)**

### **Tekno**

- VU-1000: Balcar video head; FEL, FEP HMI lamps; 120Vac and 240Vac.
- Balcar Galaxy system: modular lighting based on Galaxy Box, 4x4 light box.

**Circle (840)**

### **Tekskil Industries**

- Lens adapter: 45° for Fujinon lens.
- Model 909DC: portable prompter system; 12Vdc or 120Vac powering.

**Circle (841)**

### **Tektronix**

- 1730/1720: waveform and companion vector monitor; complete line select; front-panel recall button; X-Y inputs for stereo phase; simultaneous channel A & B display; dual filter display.
- 751: BTSC aural modulation monitor/decoder; 10-parameter bar-graph display.
- 760: stereo audio monitor.
- AVC-20: stereo audio monitor display on any NTSC vectorscope.
- TSG-300: component analog test generator; digital; all commonly used component formats.
- WFM-300: component analog video waveform monitor; Lightning, Bowtie and other displays.
- SPG-170A: NTSC sync generator.

**Circle (842)** [See ad on page 113](#)

### **Telemet**

- 3713-A1 TV demod: wideband stereo and quadrature outputs; integral demod tester; dual trace switch; useful for ICPM measurements.

**Circle (843)**

### **Telemetrics**

- TM-8505: remote camera-control system; up to 2,000 feet of coax; 2.5-pound adapter; for HL-95, BVP-30.
- TM-900: pan/tilt camera-control system, miniaturized.

**Circle (844)**

### **Telepak San Diego**

- T-mini GAF: small gaffer pack.
- T-15: for BVU-150.
- T-25: for BVW-25.
- T-21: for BVW-21.

**Circle (845)**

### **Telescript**

- Software: C-64 networking prompter; word processing with underline, immediate insert, edit; script order feature.
- 8088/8086 software: PC prompter program; font editor selects 12, 19, 23

characters per line.

- 1,150-line monitor/prompter: separate enhancement; video inversion switch.

**Circle (846)**

### **Television Engineering**

- Production vehicle: 14 feet; on-board power; four cameras, audio mixer, video switcher, titler; U-matic, C VTRs, slow motion; intercom, IFB; microwave mast.

**Circle (847)**

### **Television Equipment Associates**

- Matthey delay lines: low and zero loss.
- Matthey filters: sharp cut, phase-equalized for analog, digital video; 30.4MHz passband for HDTV.
- Elcon EA254, EA750: 1-, 3/4-inch videotape cleaners, evaluators.
- Freedom-1: Racal adjustable single muff headset with electret mic on boom.

**Circle (848)**

### **Television Technology/TTC**

- AM, FM transmitters; FM exciters; UHF TV, LPTV transmitters; reel, cart audio recorders.

**Circle (849)**

### **Telex Communications**

- ENG-4: compact wireless mic receiver; 4-channel, 165MHz-216MHz; external, internal Vdc; as system with WT-400, SLM-100/200 mic/transmitters.

**Circle (850)**

### **Tennaplex Systems**

- ALPHA: multistation FM combiner; 400kW prime power.
- FM/TV antennas: vertical null fill with cosecant characteristics.

**Circle (851)**

### **Tentel**

- T2-H7-AC: audio cart machine tension gauge.
- HPG-C gauge: head protrusion, eccentricity measurements for type C VTRs.

**Circle (852)**

### **Texar**

- Audio processing, compressors, limiters.

**Circle (853)**

### **Texscan/Compuvid**

- Character generators/titlers: CCTV, CATV on-screen message systems.

**Circle (854)**

### **Theatre Service & Supply**

- Studio cyclorama drapes, tracks; lighting, control equipment.

**Circle (855)**

### **Thermodyne International**

- Equipment cases, containers; ATA specifications.

**Circle (856)**

### **Thomson-CSF Broadcast**

#### **Thomson Video Equipment**

- TTV1530: 3/8-inch studio camera; compact; full auto setup; full bandwidth RGB.
- CA-83: adapt TTV1623/1624 cameras to 1530 control panel; auto-setup not included.
- TTV1525pc: portable companion to TTV1525c studio camera.
- TTV2710: CCD digital slide scanner.
- Vidifont V Weather: dial-up graphics from WSI, ESD, Accu-Weather; Winchester

disk storage.

- Viditext II: title generator.
- Graphic Store: graphic generator; pen drawing; painting; 2000-image hard disk storage.

**Circle (857)** [See ads on pages 105, 109](#)

### **Thomson-CSF/Components**

- TH 563 tetrode: single-tube 50kW capability for UHF TV, combines a pyrolytic graphite grid with vapor-phase cooling.
- TH 298/361/371: ceramic-metal coaxial tetrodes dissipate 5kW, 12kW and 18kW respectively in CW oscillator and ground-grid circuits to 300MHz; 18dB gain in VHF TV coaxial amplifier cavities.
- TH 582/18582: UHF tetrode delivers 22kW output power in 18582 cavity.

**Circle (858)**

### **Thomson-LGT**

- EVHF 30000S: solid-state VHF TV transmitter; 30kW visual rating from six RF modules.

**Circle (859)** [See ad on page 107](#)

### **Tiffen**

- Special effects viewing filter kits; an aid to selecting special effect optical filters.
- 105C: direct screw-in filters for J18x9 and J8x6B Canon lens.

**Circle (860)**

### **TimeLine**

- LYNX/VSI: video systems interface; allows full control of ATRs from editing systems; CMX, Ampex, GVG compatible.
- System controller: keyboard and computer; for multiple transports through LYNX interfaces; multi-event.
- Office automation: recording, broadcast studio applications.

**Circle (861)**

### **Titus Technological Labs**

- The Last Word: auto detection, correction of stereo channel loss, out-of-phase audio and mono program.

**Circle (862)**

### **Torpey Controls**

- PC14 clocks; analog precision impulse; 12- or 24-hour face; secondhand steps, hour/minute creep; CLK-2/CLK-5 master units.

**Circle (863)**

### **Toshiba**

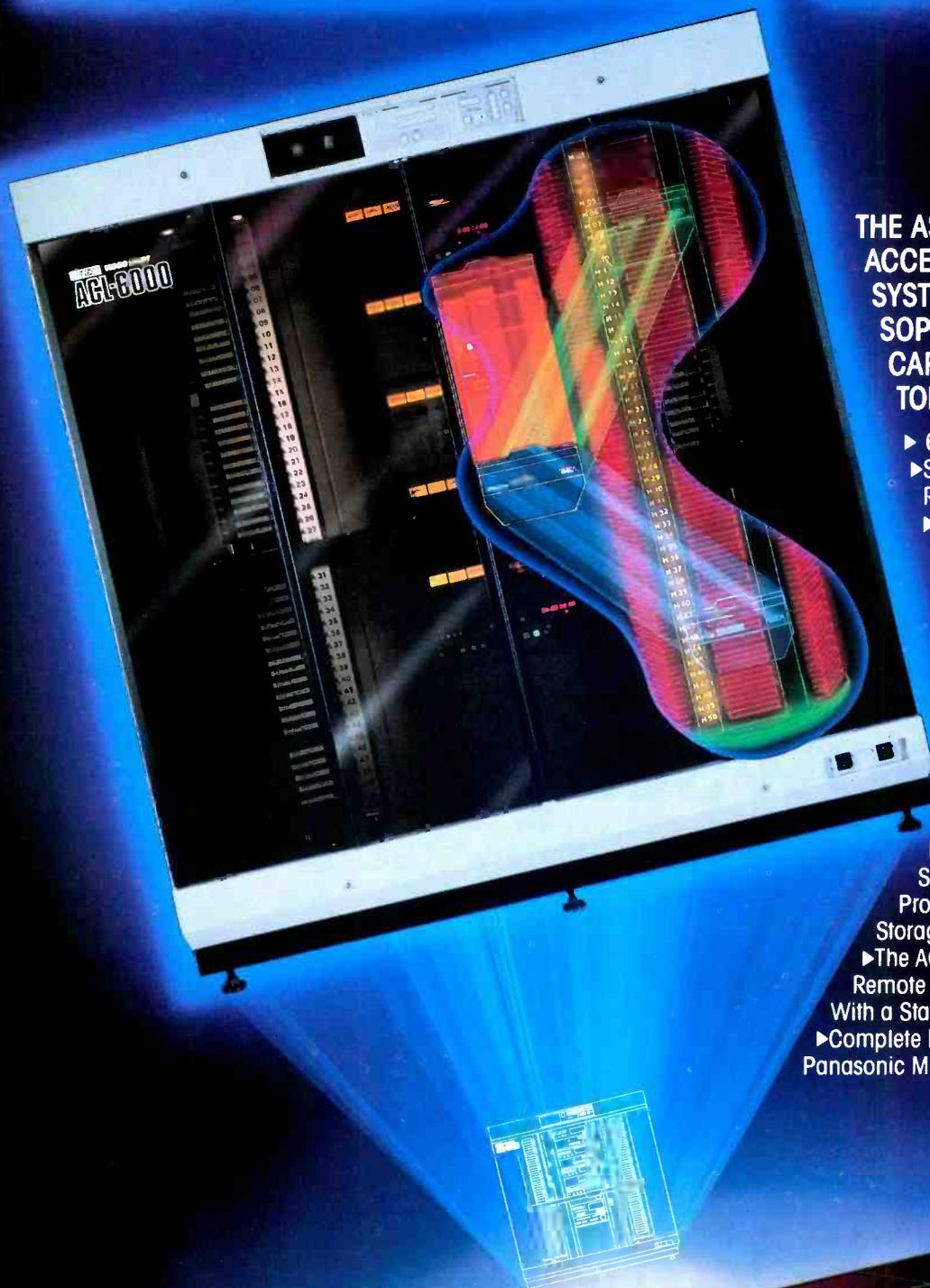
- ADM-QPSK modem.
- 12/14GHz fixed station 5m parabolic antenna.
- 12GHz low-noise block converter.
- Up/down frequency converter.
- Microminiature camera: 1-CCD color system, surveillance and investigative applications.

**Circle (864)**

### **Total Spectrum Manufacturing**

- FSC-30 title stand: upgrade includes color camera; 3,200°K lighting, for graphics systems.
- HS-100P: enhanced 4-camera remote pan/tilt control; multiple operation control points possible.
- MultiController: operates HS-100P servo pan/tilt systems; provides motion learn and complete recall; Tandem system allows file dump between two units.

# EVERY SECOND COUNTS!!



**THE ASACA ACL-6000C RANDOM ACCESS AUTOMATIC VIDEO CART SYSTEM IS THE MOST SOPHISTICATED AND VERSATILE CART SYSTEM IN THE WORLD TODAY**

- ▶ 600 ½" Cassette Capacity
- ▶ Sophisticated Bar Code Reader/ Identification System
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Circle (117) on Reply Card

[www.americanradiohistory.com](http://www.americanradiohistory.com)

*Total Spectrum, continued*

- VS-CB-T: single camera controller.
- Circle (865) **See ad on page 115**

**Townsend Associates**

- UHF, VHF TV transmitters; klystron pulsers; transmitting antennas.
- Circle (866)

**Transimage International**

- TBC time-sharer system features: automation interface, balanced audio option.
  - Deluxe remote A/V control with LED audio monitoring.
  - Component video TBC capability.
- Circle (867)

**Transmission Structures**

- Towers, tower accessories, services.
- Circle (868)

**Trimm**

- Components, coax cable and connectors.
- Circle (869)

**Trinity**

- RMC-200/RLC-200/RMC-50: remote-control systems for 1/2-inch tape duplicators.
  - MMC-200/MLC-200: automatic monitoring control for 1/2-inch duplicator systems.
  - QC station: remote VCR control, signal sequence switching, A/V monitoring and operator controls.
  - AVD-10: A/V DAs.
  - SR2-10: source routing system.
- Circle (870)

**Trompeter**

- Component TV connectors; for miniature cables; bulkhead connectors in D-subminiature envelope.
- Circle (871)

**Ultimate Support Systems**

- RE-22P/-12P: large, small rack extensions.
  - RR-48P/-36P: large, small rack-mount packages.
  - RS-22P/-12P: large, small rack-stand package for electronic panels; A-frame, T-leg construction.
- Circle (872)

**Ultimatte**

- Compositing enhancement: application of Faroudja CTE-N/CFD-N encoder/decoder with Ultimatte-4 key/compositing equipment.
- Circle (873)

**Unicol Products**

- Support stands for audio, video equipment.
- Circle (874)

**Union Connector**

- StagePro 2.0: Unicontrol lighting-control system; updated version.
  - PDC 100-6: 12kW electrical distribution center.
- Circle (875)

**Uni-Set**

- Studio scenery, set pieces; modular system.
- Circle (876)

**United Media**

- Comm-ette: A/B roll videotape editor control automatic editing by use of pictures, time code or control track; 3-VTR system, 250-event memory, EDL management, disk control, variable-speed search, jog; integral interfaces for 1/2-, 3/4- and 1-inch VTRs.
  - Mini-Comm: A/B/C roll editor; 500-event memory, split edits, clean list option.
- Circle (877)

**United Ropeworks**

- Electrically transparent tower guy material, Phillystran.
- Circle (879)

**Universal Elecon**

- EM-7700: videotape editor controller.
  - ERC-240: time-code reader, coincidence comparator; 6-event system.
  - ESS-300: sequential switcher; 10-input, 2-output; manual, auto, remote-control modes; 64s interval maximum.
  - EMS-380: routing switcher; 10x8 video/stereo audio; LED status of switch matrix.
  - ETK-420: title keyer; edge, color-character effects; background colors; fade-in/out.
  - ESE-500: effects generator; 5-input, 14-wipe, keys; soft, sharp edges.
  - EFS-680: frame synchronizer; 1-frame correction; direct, heterodyne VCRs; internal sync generator, hue adjustment.
- Circle (880)

# Showstopper!

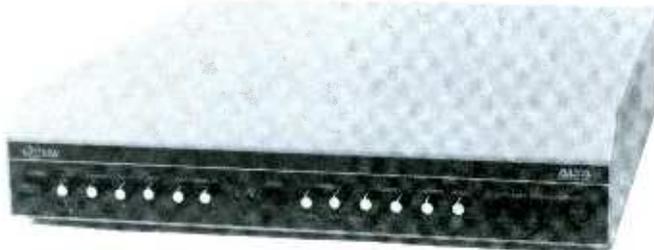
## Digital Picture Freeze & "Infinite Window" TBC/Synchronizer

4x1 Audio & Video  
Switcher... Built In!

H & V Image  
Enhancement

D.O.C.

Meets Broadcast  
RS170 Video  
Specifications



Digital Video Effects

- Mosaic
- Freeze
- Posterization
- Colorization
- Picture Strobe

# Cygnus

## Video Production System

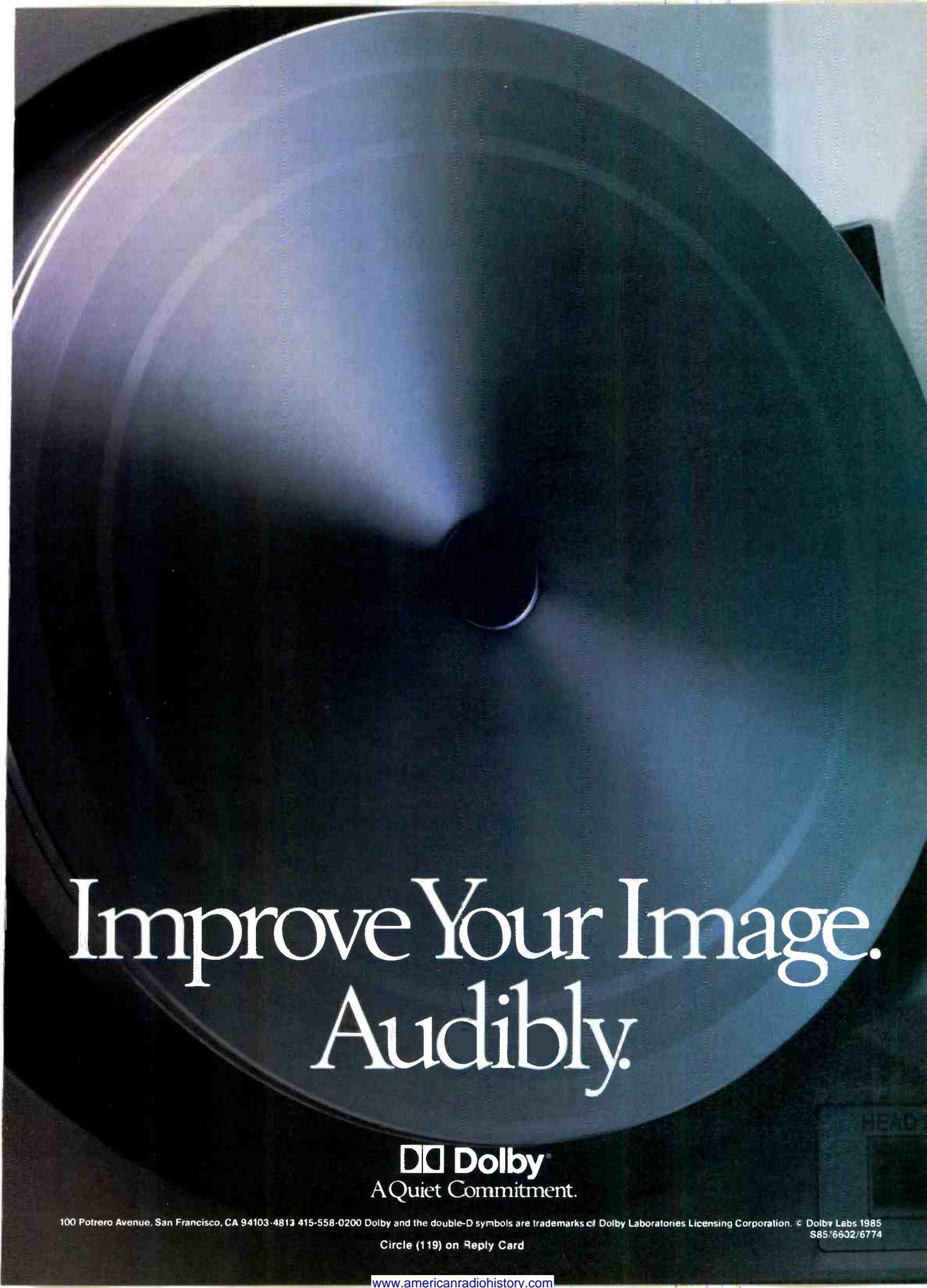
**\$4990.** List Price

Phone or write for full particulars

The ALTA Group, Inc. 535 Race Street, Suite 230 San Jose, CA 95126 (408) 297-2582

**ALTA  
GROUP, INC**

Circle (118) on Reply Card



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S85/6632/6774

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# STANTRON

# VIDEO CENTER



for • VIDEO PRODUCTION  
• POST-PRODUCTION  
• EDITING • ENG • EFP

- CABINET CONSOLES
- DESK CONSOLES
- VTR/VCR RACKS
- DUBBING RACKS

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Designed for YOUR VIDEO EQUIPMENT has modular "add-on" features that allow maximum flexibility and versatility in designing console arrangements for professional, industrial, communication and educational VIDEO CENTERS.

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or call Toll Free: 1-800-821-0019  
No. Calif. Toll Free: 1-800-821-0020  
So. Calif. please call 1-213-875-0800  
TWX: 910-499-2177

# STANTRON

Unit of Zero Corporation

factory:  
6900-6918 Beck Ave.  
No. Hollywood, CA 91605

Circle (130) on Reply Card

## Utah Scientific

- Dynabus: high-speed data net; LAN with carrier sense multiple-access, collision detection; RS-422 at 1MHz rate.
- Dynaport: data modem; interconnects Dynabus to controlled devices.
- VDA-4x2: two 4-output VDAs per card; 20 VDAs with redundant power supply in 5.5-inch cage.
- VDA-9B/DL: 9-output VDA; four with normal delay; five with adjustable delay.
- VDA-8B: 8-output VDA with backporch clamp and 1,000-foot cable EQ.
- MC-502 upgrades: enhanced CRT screens to simplify operation and reduce errors; new manual override functions.
- CSP-30/4: single-bus control panel; 4-level, 30-button/source.
- CX-30/4: CSP expansion to 60 sources.
- AVS-1B programmability.

Circle (881)

See ad on pages 140-141

## Utility Tower

- Towers for AM, FM, TV, TW, CATV and microwave applications.

Circle (882)

## VEAM/Litton Systems

- CIR-FO: fiber-optics accessories; splices, connectors, control links.
- Underwater and specialty connectors.

Circle (883)

## Valley People/US Audio

- 415: dual dynamic sibilance processor (DSP).
- 815: single-channel DSP.
- 400: single-channel audio processor, mic-level input.
- PR-2, PR-10: 2-/10-position powered racks for 800-series modules.
- 904: single-channel Gatex noise gate.
- Levele: 2-channel signal-range control.

Circle (884)

See ad on page 133

## Varian/EIMAC

- 4CX25,000A: VHF TV tetrode, 15kW-30kW.
- 4CM400,000G: 500kW-600kW AM/SW power-grid tube; multiphase cooling anode.
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See ads on pages 33, 179

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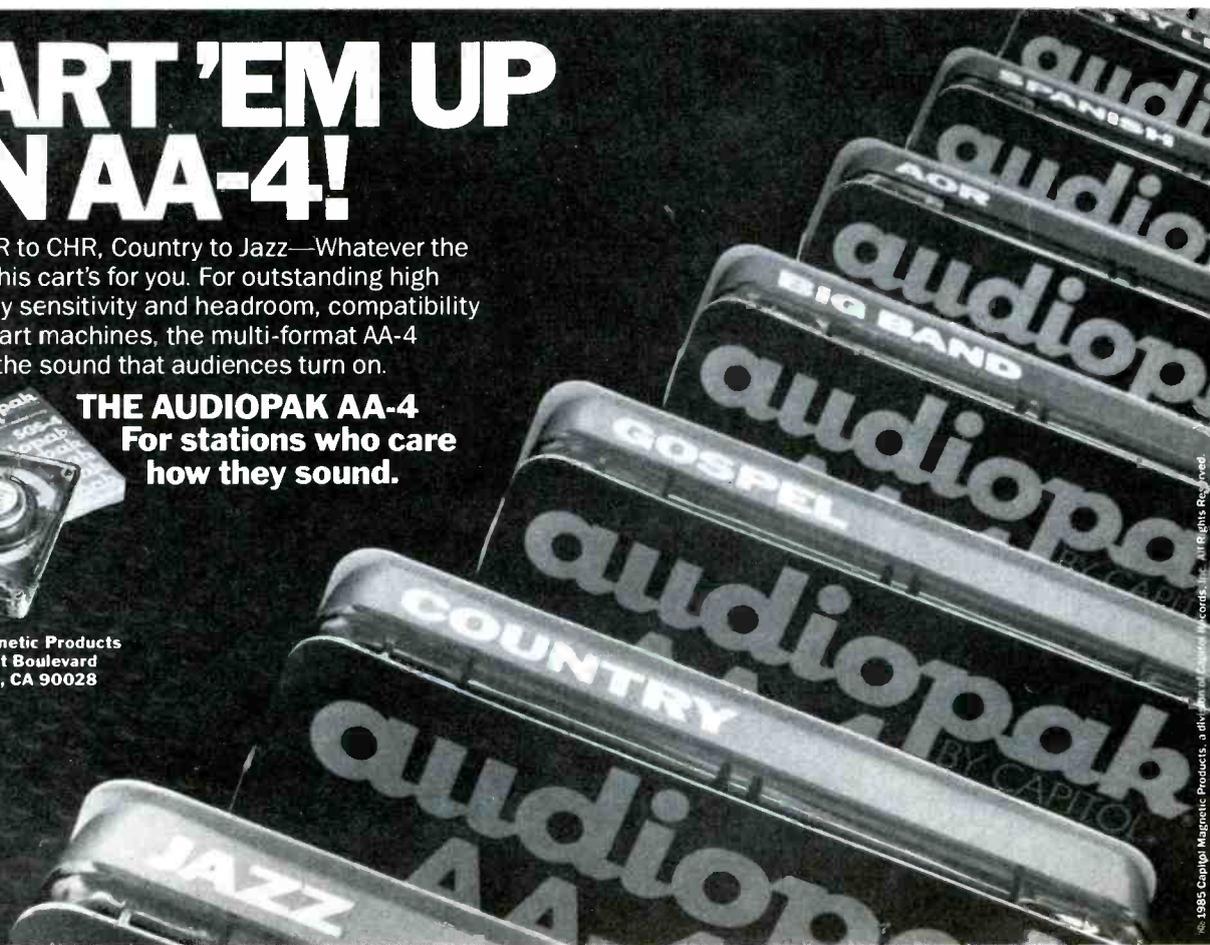
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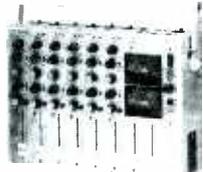
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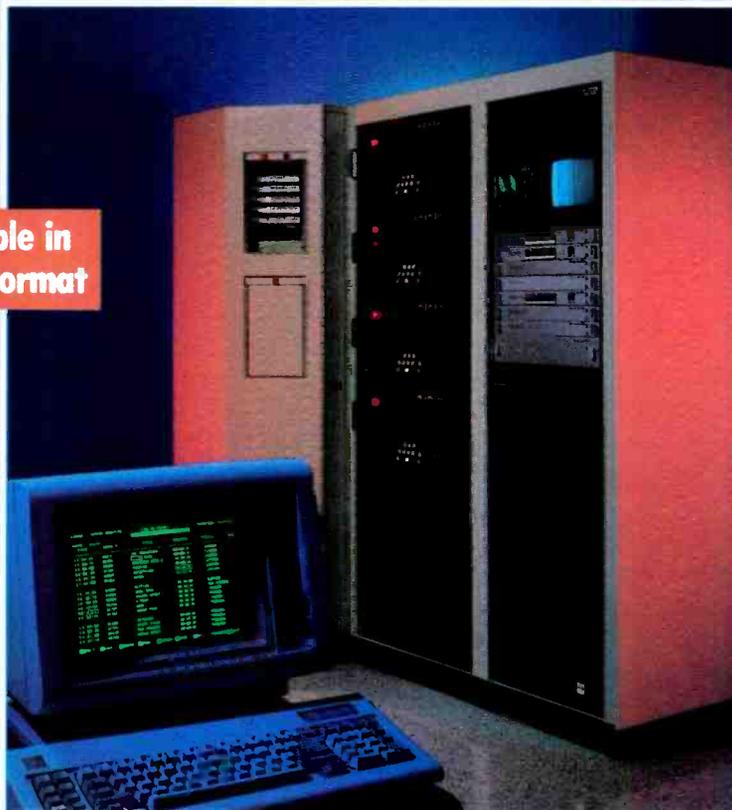
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See ad on page 108

#### Wireworks

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#### News

Continued from page 4

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### IEEE announces call for papers

The 36th annual Broadcast Symposium, sponsored by the IEEE, has announced its call for papers on current subjects related to broadcasting.

Papers will be delivered on the latest technical developments in radio and TV broadcasting and related fields such as satellite technology, digital techniques, industry standards and regulations. The symposium will be held Sept. 19 and 20, in Washington, DC.

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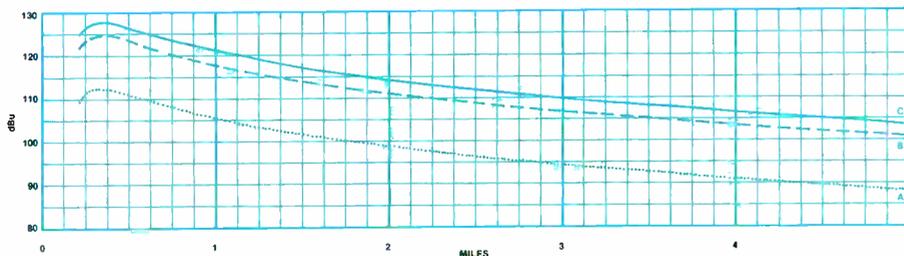
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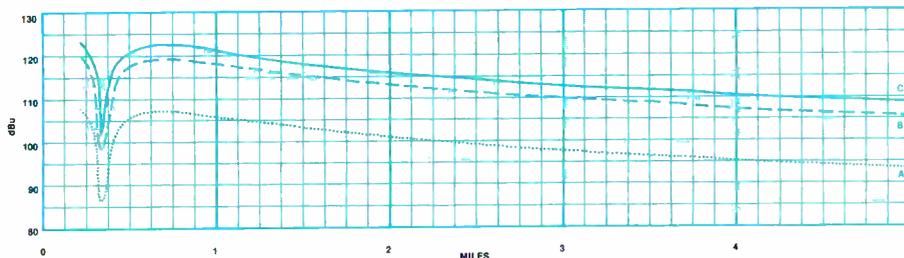
# New FM blanketing rules

By Don Markley

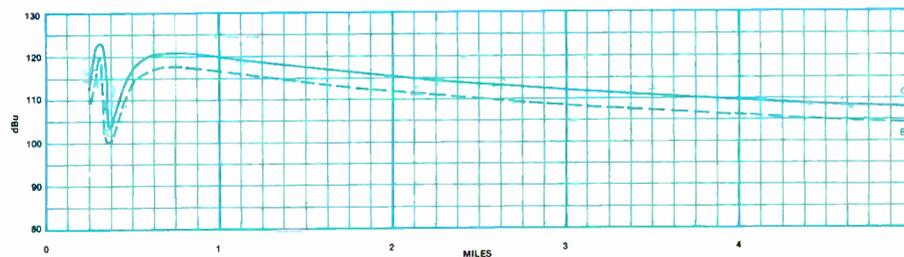
**New FCC regulations address an interference problem that has plagued and confused FM broadcasters for years.**



**Figure 1.** FM signal field strengths from 3-bay antenna at 300 feet from Class A, B and C transmissions.



**Figure 2.** FM signal field strengths from 6-bay antenna at 300 feet from Class A, B and C transmissions.



**Figure 3.** FM signal field strengths, 3-bay antenna at 700 feet from Class B and C transmissions.

Almost every FM station has probably experienced some trouble associated with FM blanketing. *Blanketing* occurs when an FM station's signal strength, or signal power density, causes receivers near the transmitting antenna to be partially or completely blocked from receiving other FM broadcast stations. The phenomenon exists, at least in part, because of consumer receiver designs that strive for increased sensitivity at the expense of selectivity.

Attempts to resolve blanketing complaints have presented difficulties to FM broadcasters. First, there has been no real definition of the signal strengths at which blanketing occurs. Second, there has been no clear-cut statement of the licensee's liability or responsibility to respond to the complaints. The result has been a vast gray area in which the broadcaster is expected to respond somehow, but isn't sure how or even for how long.

### The contour

A new FCC regulation now exists to aid the FM broadcast engineer in dealing with FM blanketing problems. The rulemaking resulted from a petition presented by the Association of Federal Communications Consulting Engineers (AFCCE). AFCCE requested the commission to define the blanketing area, giving all parties a reference with which they could work. The power density level,

Markley, BE's consultant on transmission facilities, is president of D. L. Markley & Associates consulting engineers, Peoria, IL.

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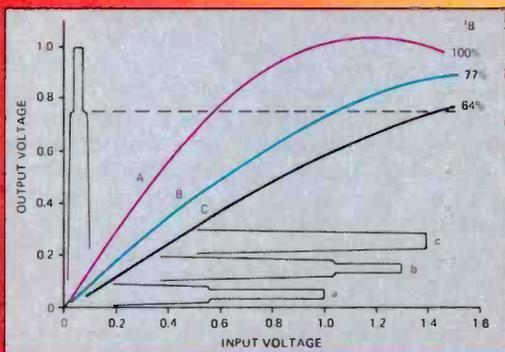
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Klystron output voltage versus input voltage (relative values)



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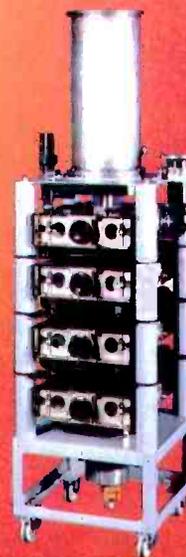
\*Station name supplied on request.

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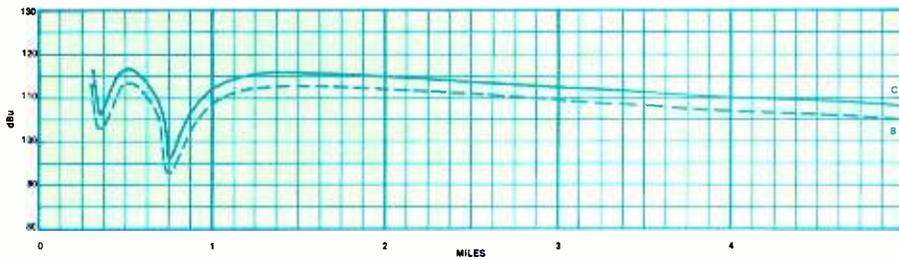


Figure 4. FM signal field strengths, 6-bay antenna at 700 feet from Class B and C transmissions.

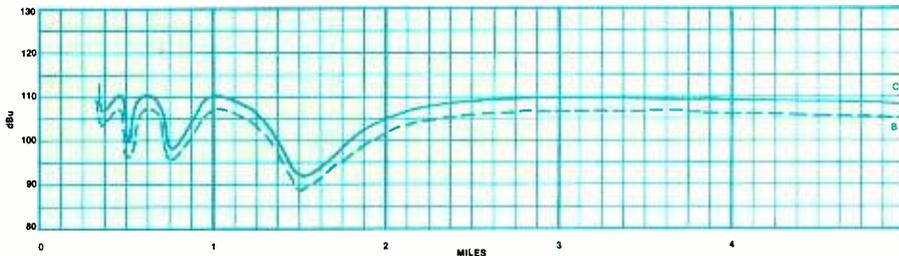


Figure 5. FM signal field strengths from 12-bay antenna at 700 feet from Class B and C transmissions.

originally proposed to define the blanketing area, was the 115dBu contour. This contour was finally selected by the commission, but it is not to be calculated in the manner suggested by the AFCCE.

The suggestion offered by the AFCCE would have used the free space propagation from the antenna and would have included the actual vertical radiation characteristic of the antenna itself. By the AFCCE method, an FM station would be designed to prevent a signal strength on the ground from reaching the 115dBu level. Appropriate antenna system designs would permit the broadcaster to essentially eliminate blanketing interference on the ground in densely populated areas. This would have eliminated liabilities to the broadcaster for blanketing interference.

Figures 1 through 5 demonstrate field-strength levels on the ground for antennas at 300- and 500-foot heights and of various configurations. At each height, power levels (in ERP) of 3kW, 50kW and 100kW correspond to Class A, B and C stations.

The ruling uses a non-engineering solution that does not consider the antenna pattern. Instead, a simplified approach determines the location of the 115dBu contour. The FCC ruling places the contour at a distance (D) to be determined by the maximum effective radiated power (P) in any vertical plane at each horizontal angle. The equation to be used is:

$$D \text{ (in kilometers)} = 0.394(P)^{1/2}$$

$$\text{or } D \text{ (in miles)} = 0.245(P)^{1/2}.$$

#### An analysis

Although this approach may seem unrealistic from an engineering point of

view, it is preferable to the previous condition of no rules at all. All participants now understand where the area of their responsibility will exist.

Existing stations will have no financial responsibility to eliminate blanketing interference complaints within their 115dBu contour. They must, however, cooperate with affected parties, providing technical assistance to determine the cause of the problem. The broadcaster is expected to suggest corrective measures, but not to incur financial obligations to eliminate the interference.

New stations or stations making facilities changes that require a construction permit will have a financial responsibility to eliminate all complaints of blanketing interference within the 115dBu contour for a period of one year. After the 1-year period, the financial obligation ends. The station will revert to the status of an existing station with only technical assistance being required.

It should be emphasized that these special responsibilities occur only for stations making modifications that require a construction permit. Such changes include relocating the transmitter site or increasing the radiated power. An existing station that changes its transmitting antenna is protected under existing station requirements and does not assume financial obligations.

A second point in the ruling specifically states exclusions from the requirement of satisfying blanketing interference complaints. Excluded are "those complaints outside the realm of reasonableness, such as malfunctioning or mistuned receivers, improperly installed antenna systems, use of high-gain antennas or antenna booster amplifiers and non-RF devices, such as tape recorders or hi-fi amplifiers and phonographs." This may

be the most helpful part of the new rule in that it will give the broadcaster a basis upon which to respond to all complaints.

#### Joint tenants

One problem that has concerned many broadcasters is the matter of responsibility among stations involved at a joint site. The commission has treated this matter carefully and has determined that a station that decides to co-locate with existing FM stations will be fully responsible for eliminating the *new* interference complaints. If two or more new stations co-locate and go on the air at the same time, they will assume joint responsibility to eliminate blanketing interference complaints.

The commission has further pointed out that the blanketing contours shall be considered to exist to a specified distance for each of the individual stations. The powers shall not be added together for stations that are co-located.

#### Beyond blanketing

The commission has placed restrictions on the broadcaster to base plant design upon the main lobe of the radiated signal. The ruling does not account for real vertical characteristics (side lobes) of the antenna, with which financial responsibility for blanketing is most likely related. However, good engineering practices dictate that the antenna and transmitter system be designed to minimize the signal strength on the ground in those areas of significant population density surrounding the antenna system. This corresponds with the requirements of reasonable design necessary to reduce non-ionizing radiation levels on the ground.

The broadcaster can, by design, reduce the probability of extensive blanketing interference complaints by a significant degree. This, in turn, should reduce the possibility of significant expense in dealing with blanketing complaints.

Although it is unfortunate that the commission did not choose actual antenna performance as a reference, the regulations will give assistance to new and existing broadcast stations. The new rules will be especially meaningful for the broadcaster who located away from highly populated areas, only to have the area around the transmitter site subdivided with new homes constructed up to the edge of the tower guy points. The rules clearly eliminate any liability on the part of the broadcaster in remedying blanketing interference complaints in such instances.

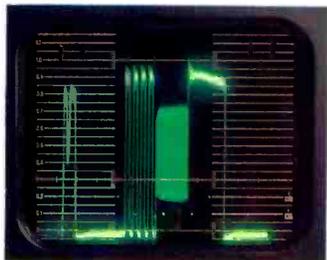
The new FM blanketing regulation is a definite improvement over the previous lack of rules and definitions. It remains to be seen what moves local communities will make toward establishing standards of their own.

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## EEV Camera Tubes

Circle (153) on Reply Card

# The birth of the VTR

By Peter Hammar

The NAB convention marked the 30th anniversary of the videotape recorder's debut, a milestone in the TV industry.

If you like birthdays, you'll love the event that's being marked this year: the 30th anniversary of the videotape recorder. It symbolizes three decades of progress in magnetic TV recording. The videotape recorder (VTR) has done more to change the face of television than any other single invention since Zworykin, Baird, von Ardenne, Takayanagi and others first showed the world how to make *vision radio*.

Although many of us in broadcasting take video recording for granted, it was not always with us. The early days of television were solidly intertwined with film and film processing and live programming. The widespread use of videotape recording technology completely changed the TV industry.

## The early days

By the late 1940s, TV engineers had already developed a whole new field within broadcasting and teleproduction: TV recording. Today, there are thousands of video recording specialists in the world, but back in the late '40s only a few could lay claim to that remarkable title. To understand the impact—the revolution—of the videotape recorder on the TV broadcaster, we'll begin with a look at life before the VTR, in the days when video recording meant *kinescope*.

The kinescope dominated TV recording for time delay in the early 1950s. A kinescope recorder was basically a special 16mm or 35mm film camera mounted in a large box aimed at a high-quality monochrome video monitor called a kinescope. (See Figure 1.) The kinescope made pretty reliable TV recordings. Most engineers called the process "kine" (pronounced "kinney") for short.

The kinescope was quite a clever device. Its film camera ran at a speed of 24 frames per second. Because the TV

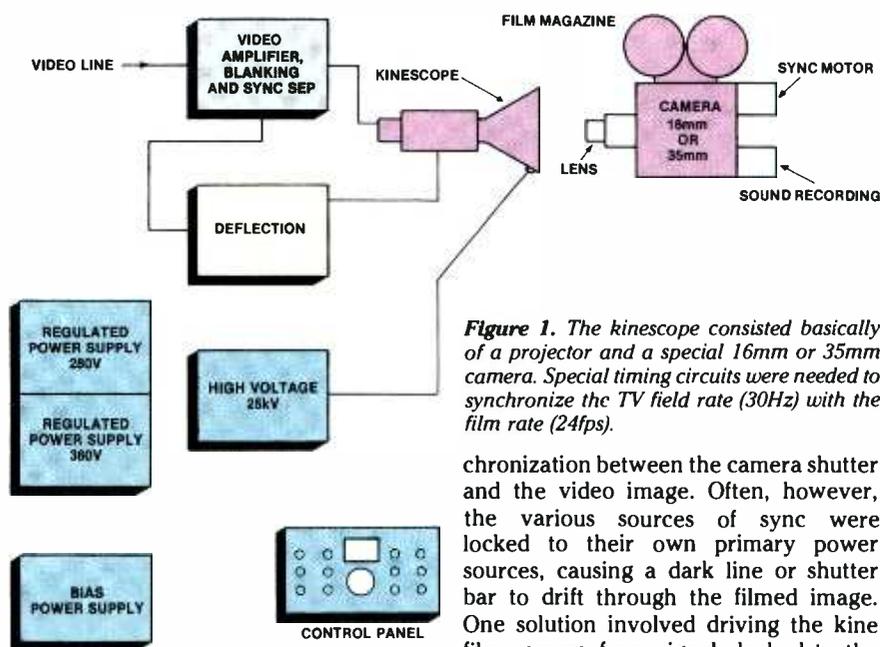


Figure 1. The kinescope consisted basically of a projector and a special 16mm or 35mm camera. Special timing circuits were needed to synchronize the TV field rate (30Hz) with the film rate (24fps).

chronization between the camera shutter and the video image. Often, however, the various sources of sync were locked to their own primary power sources, causing a dark line or shutter bar to drift through the filmed image. One solution involved driving the kine film camera from signals locked to the sync that was coming in with the video source, and then stripping the sync a moment later.

Another problem with kine quality was the gray scale. It was difficult to match the non-linear gray scale characteristics. Often when engineers were able to get a good film *look* on a kine recording, the image just didn't reproduce well on the Iconoscope cameras used in film chains. Engineers were continually fighting problems with kinescope phosphors, blooming on white-colored objects, gamma transfer characteristics, and variable film sensitivity and chemical processing.

The kine's image and optical audio quality often left something to be desired, but the broadcast industry had no choice. All three networks were using kines to make up for the time difference between the East Coast and West Coast.

By 1954, the cost of kinescoping for time delay had gone sky-high. American TV operations used more raw film for kines than all the Hollywood film studios combined. It was estimated that NBC

image repeated at 60 fields or 30 frames per second, the film had to move intermittently between video frames, and then be rock-steady during exposure. Theoretically, the pulldown period for the film frame should be during the video vertical interval of less than 2ms, something no mechanical contraption could do.

Several kine makers, such as RCA, Acme, General Precision, Eastman Kodak and Palmer Films found various ways around the problem. They developed novel shutter mechanisms that used the extra six frames of the video's 30 frames to move the film. This action integrated the video half-images into what seemed like smooth 24-frame-per-second film pictures. Of course, the kines were played back on the air using regular 24-frame-per-second film chains, so the conversion to film was complete.

The toughest operational problem with kines was the shutter bar. Recording engineers always tried to get precise syn-

Hammar is consulting curator at the Ampex Museum of Magnetic Recording, Redwood City, CA.

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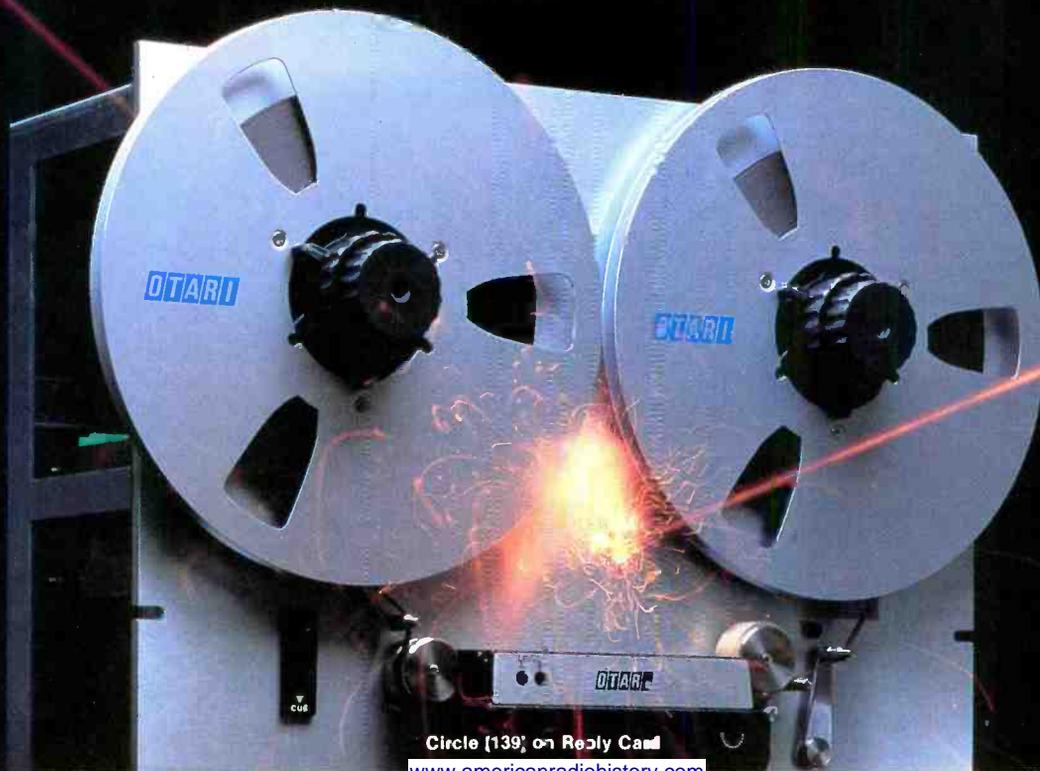


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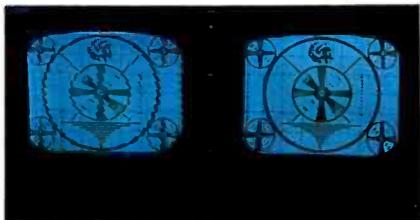
The world's first practical videotape recorder, the Ampex-Mark IV prototype VTR, was unveiled in April 1956 at the National Association of Radio and Television Broadcasters convention.

used more than one million feet of film a month in its New York facility alone to time-shift programs. The networks would have gladly paid a king's ransom for an alternative TV recording method. Enter magnetic recording.

#### Magnetic recording

As early as 1950, Jack Mullin, Bing Crosby's recordist and chief engineer, began working at the newly established electronics division of Crosby Enterprises to develop a magnetic TV recorder. Jack and colleague Wayne Johnson developed some interesting prototype recorders that used fixed heads and high tape speeds to achieve the high head-to-tape velocities needed for TV recording.

The Mullin-Crosby machine started out with 12 tracks at 120ips on 1-inch tape. Ten tracks carried the monochrome video information, a clock track provided control synchronization and an FM audio track completed the format. By 1955, Mullin had the machine recording color video using only five tracks total: three for recording RGB information, one for the vertical and horizontal sync, and one for the FM audio track. The 1/2-inch-wide tape ran at 240ips. People who saw the Crosby video prototype machine say the picture quality was pretty good, except for a fuzzy screen-door look over the image.



Early VTR engineers constantly had to cope with Venetian blinding (shown at left), caused either by inadequate tip penetration or incorrect head spacing (quadrature error).

Meanwhile, General Sarnoff, the head of RCA, expected his engineers to come up with a magnetic TV recorder. Sarnoff reportedly wanted the machine and a few other innovations from RCA as a present for the upcoming anniversary of his 50th year in the radio business. RCA had already demonstrated a working prototype TV recorder. It was even used for about two minutes on the air in 1955. However, the tape reels were 17 inches in diameter and they stored only three minutes or so of program material on a reel, about what would be expected with a tape speed of 30 feet per second.

With the Ampex exhibition at the 1956 NAB, the VTR was born. Engineers who witnessed the event still remark about its historical significance. A lot of work, however, remained to be done. The early machines were not the modern miracles we know today. They suffered from a number of shortcomings.

#### The VTR grows up

The introduction of the VTR was only the beginning. Over the following few years Ampex and RCA continued to modify and enhance their recorders. By 1957 many stations had received their first VTRs, VR-1000s, with KING-TV in Seattle getting serial No. 1. CBS in Hollywood received the first production prototype, the VRX-1000. Both ABC and NBC also received early VRXs.

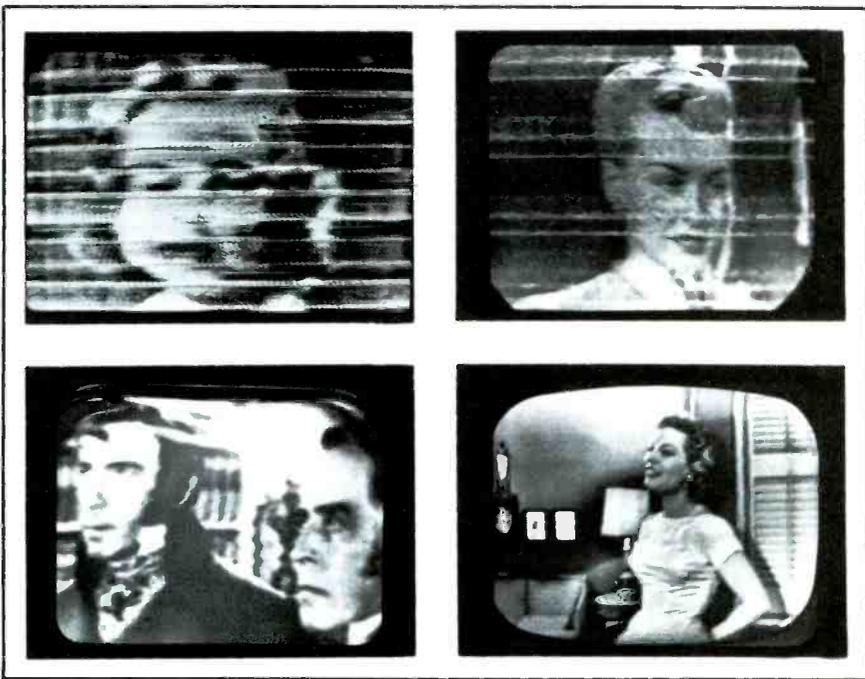
number of problems. Skewing, scalloping, Venetian blind effect and incorrect quadrature became common terms among the new breed of video engineers. As the industry became aware of the problems, solutions were developed, one at a time.

A serious problem was the lack of interchangeability among VTRs. The same head assembly used to record a program had to be used for playback. Therefore, the record machine's head assembly had to be shipped along with the tape just so the tape could be properly reproduced.

#### Recording tape

By 1957, most of the TV industry was using 3M's No. 179 videotape. It was the first commercially produced videotape. Ampex actually used a prototype of it for the first demonstration at the 1956 NAB. The early tapes suffered from dropouts. At some stations, all incoming reels of tape were checked prior to use. An engineer would load a reel of new tape and record black video for the entire length of the tape, then watch the entire tape on playback, looking for dropouts.

Compared to kines, videotape was amazingly cheap. A 1-hour reel of 3M No. 179 cost approximately \$300. Compared to the many millions spent each year on kinescope film and processing, the networks would have gladly paid more than four or five times the original



A composite of the progress of the videotape recorder from 1953 to 1956. Clockwise from top left: Shirley Temple, recorded late 1953 using AM signal processing; the Bob Crosby Show, 1954, using FM signal processing; an FM videotape picture of a kinescope broadcast, mid-1954; and FM recording, early 1956.

It took a while for the VTR to overtake the kinescope. Stations did not completely trust the new technology and most engineers were unfamiliar with its circuits. The kinescope, although crude, was simple and got the job done.

The early VTRs suffered from a

\$50,000 price of the VRX-1000.

#### RCA VTR

RCA unveiled its version of the VTR, the TRT-1A, in 1957. The machine used the same head and video systems as the Ampex VR-1000. RCA began marketing



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An Ampex VR-1000C VTR with the model 1010 Color Accessory Kit. Note the differences between the VR-1000C and the earliest machine.

the VTR process as *quadruplex* recording, based on the fact that the machine had four video heads. The industry soon adopted the shortened version of the name, terming it *quad*.

#### Editing videotape

By 1958, networks and stations were still using the recorders primarily for time-delay broadcasts. True editing

## Acknowledgments

*These acknowledgments are, in themselves, a bit of history. The author would like to thank video pioneer Joe Roizen of Telegen, Palo Alto, CA, who created an excellent factual and technical framework for the article. Noted TV historian Albert Abramson also provided much detailed information. Abramson has just completed the most comprehensive history of early TV technology ever written, titled "History of Television: 1880-1941" (published by McFarland and Co. and due out in September). Abramson also wrote "Electronic Motion Pictures," a pre-VTR history from the University of California Press, 1955.*

*Two other sources the author used and recommends are the Tim Brooks/Earle Marsh book from Ballantine titled, "The Complete Directory to Prime Time Network TV Shows, 1946—Present," and an upcoming book, "Fast Forward," by James Lardner, on the evolution of the videocassette recorder.*

*John Radis, the first regular VTR operator at CBS Television City in Hollywood (and in the world) and recently retired from the network, provided valuable insight into day-to-day life in the CBS recording department.*

*Film and magnetic recording pioneer Bill Palmer, of Palmer Films in San Carlos, CA, contributed additional background material on kinescope recording techniques and Crosby video, while John DeMuth filled in the gaps covering the operational side of videotape recorders.*

*As always, plenty of insight into the history of technology—kines to VTRs—came from a great friend, Jack Mullin. Ampex engineers Charles Ginsburg (the original VTR development team leader), Bo Bohunicky and Bob Wheeler provided information on early VTR developments from Redwood City.*

capability was not yet a reality. Simple mechanical edits could be performed, but the process was complex and difficult. The edits were often jumpy, but even so, CBS aired the first totally VTR-produced program, "Playhouse 90," in 1958.

The early editing process required steady hands and special tools. The video and audio signals were recorded on different sections of the tape. Therefore, if the audio was important or dialogue was involved, extra time was required to layback and resync the audio track.

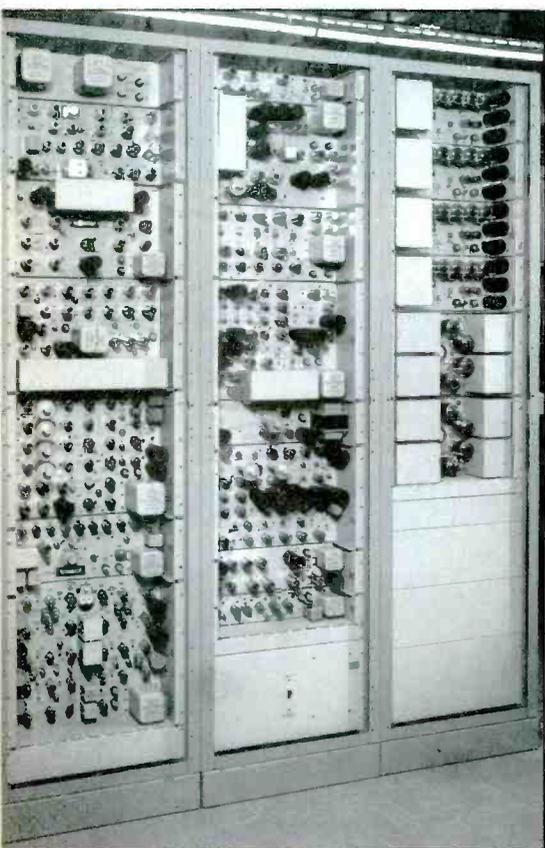
The required tools included a special microscope or magnifying glass, a cutting block, magnetic developing fluid and degaussed razor blades. The tape had to be cut during the video vertical interval between frames. The early machines often added special edit pulses in the control track along the bottom edge of the tape to help identify the possible edit points.

The first step in making an edit was to locate the proper video point by viewing the tape. Then, the tape oxide was painted with a special developing solution (Ampex called it *Edivue*). The material contained carbonyl iron so its iron powder lined up with the magnetic scan lines and the edit pulses. Through this process, the engineer could locate the vertical intervals on the tape.

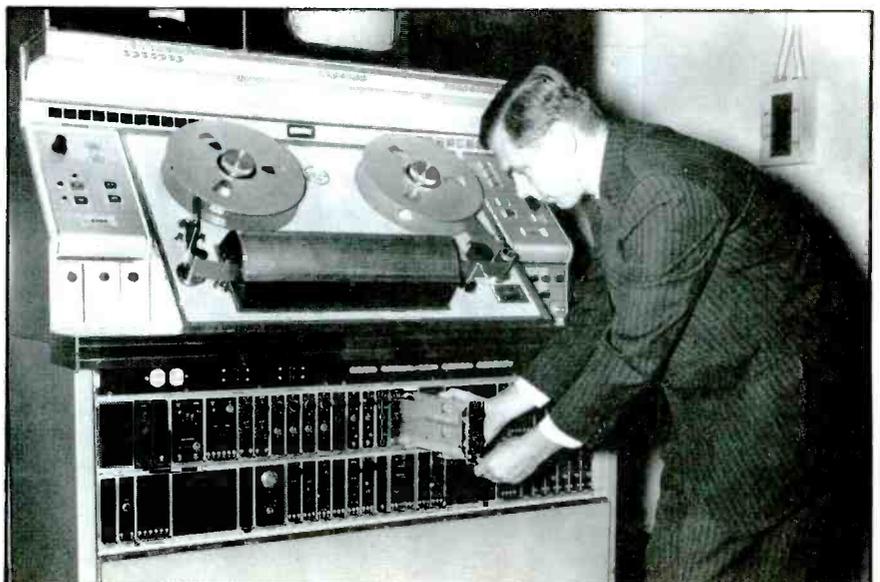
The editing process caused the loss of one-half of a second of audio. The missing audio then had to be replaced by re-recording the audio back on the spliced videotape using a second machine.

#### Color recorders

At the 1958 NAB convention, Ampex unveiled a modified VR-1000, which produced color pictures. At the convention, actors Ronald Reagan and Red Skelton were the demonstration hosts. RCA followed later that year with a modifica-



The early machines required three racks of tube-fill chassis—and a lot of maintenance.



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# Making history

By John Battison, P.E.

**We've seen a lot of changes in the past four decades. If history proves anything, the next few years will bring dramatic changes.**

*There are a number of veteran engineers who have contributed much to the broadcast industry. John Battison is one of those engineers. Battison has been an active broadcast professional for more than 40 years. He has seen the industry grow from a struggling infant to the powerhouse that it is today.*

*As evidence of his hard work in broadcasting, the Society of Broadcast Engineers honored him with an SBE fellowship at this year's NAB convention. Battison conceived the idea of SBE in 1961 and was its first president. He became well known for his annual technical symposium at Ohio State University's WOSU, recognized throughout the industry as a must-attend event.*

*Battison is now a part of the SBE's first national convention, to be held Oct. 14 to 16 in St. Louis. He will once again organize a must-attend technical symposium under the auspices of the SBE and **Broadcast Engineering**. In the following article, Battison reminisces about the past 40 years of broadcast technology and offers his view of what might develop in the next 15 years.*

I began my career in broadcasting 40 years ago last October. In those days the engineering staff was an important part of the station operation. Now, many stations don't even have engineers. The first class license used to be a highly prized piece of paper. Today, the new general class license, which is guaranteed for life (provided you applied for it before the first of the year), is worth about as much as the paper it's printed on, at least in my estimation.

What are we going to see in the next 15 years?

I entered U.S. broadcasting the hard way—through the British military. King George VI was my first boss while I was a daredevil ace aviator in the RAF. I

Battison, BE's consultant on antennas and radiation, owns a radio engineering consulting company in Columbus, OH.



*Film chains, such as that shown above were commonplace 30 years ago. Today, TV stations may have only one, and seldom use it.*

turned in my helmet and goggles in October 1945 and received a soldering iron and volt-ohmmeter in exchange. My father-in-law owned KMBC in Kansas City, MO. Shortly after he had another mouth to feed (mine) he built KFRM in Concordia, KS. I was fortunate to be associated with such a fine man as Arthur Church.

At that time, broadcasting in England was confined to the BBC. Even today, England's broadcasting system has only a fraction of the benefits that we enjoy in the United States. Luckily, I was trained as an electronics engineer, so my transition to the unlimited vista of U.S. broadcasting was not too difficult.

Immediately following World War II, the FCC implemented the change from lowband to highband FM. My first job was to design and build a composite high-power/highband FM transmitter for KMBC. We obtained a couple of experimental tubes from EIMAC and managed to put out about 1,100W at 99.9MHz. The station's coverage wasn't too bad from the Kansas City Power and Light building. I was able to detect our signal even at Hannibal, MO, about 40 miles away.

In conjunction with Midland Radio

Schools, KMBC also had an experimental TV transmitter on the building. Because this was where I worked, I was able to play with the TV transmitter and learn a lot about television.

In 1946, television was just starting in New York and a few other major markets. The *whirling disk* color system was approaching its heyday and I was sent to CBS for six months to work with the late Dr. Peter Goldmark on color television, CBS style. UHF broadcasting was in its infancy. I spent many hours traveling around in a truck with a field-intensity measuring set and a receiver observing field strengths around metropolitan New York.

The AM clear-channel situation began to rear its inquisitive head in 1946, and that year, the commission held its first hearing on the usefulness of AM clear channels. Arthur Church sent me to work with the consulting firm of Jansky and Bailey in Washington, DC, to learn more about U.S. broadcast consulting methods. Jansky and Bailey and other consulting engineers filed voluminous reports to show how overrated the clear channels really were.

The best suggestion to result from all of this came from consultant Oscar Reed.

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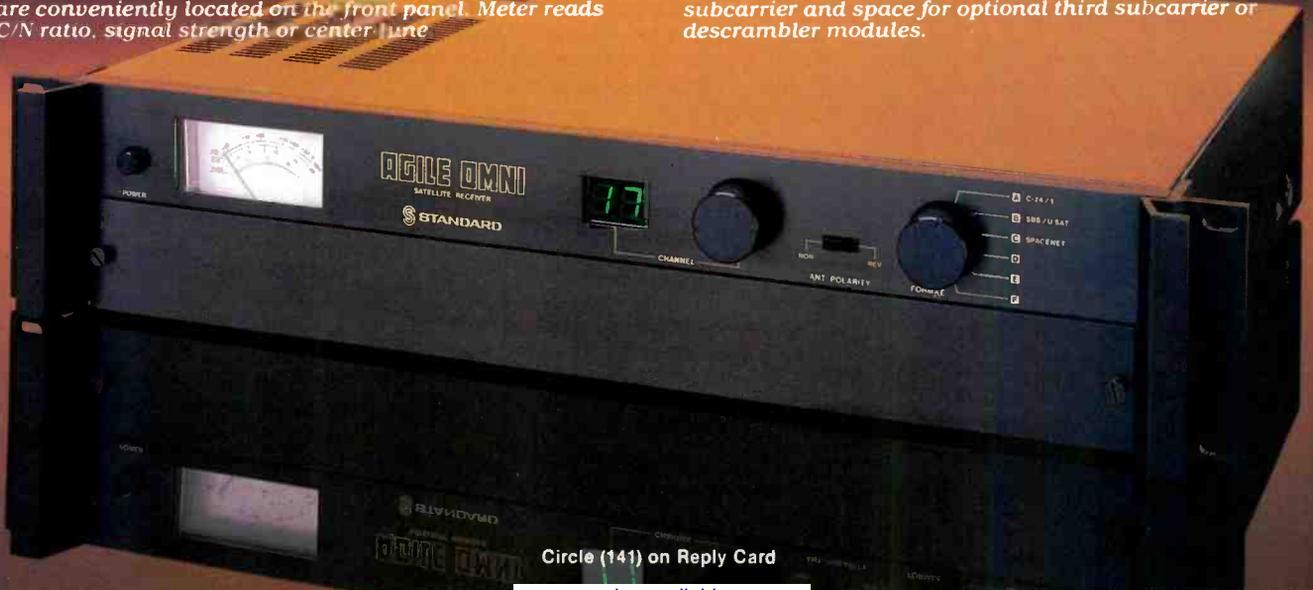
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*Format control enables selections of desired satellite system. Direct-reading channel selector displays transponder-assigned channel. Second selectable, subcarrier and space for optional third subcarrier or descrambler modules.*



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He suggested that clear-channel stations should be limited to an interference-free contour that took into account atmospheric noise. In most cases this suggestion would have raised the clear-channel stations' night limit from the half-mile 50% skywave contour to 1mV/m or more. (I know it would certainly have helped me many years later to design the night antenna pattern for WOSU on 820kHz.)

### TV grows up

In 1947 I was fortunate to join the ABC engineering staff department in New York. Working from small, shared offices in the RCA building, we put WJZ-TV (now WABC-TV) on the air. Unfortunately, in transmitting from our location on the roof of the Pierre Hotel we received a horrendous ghost, caused by the RCA building, which covered the whole of Westchester.

ABC then purchased some old stables on West 67th Street. When we took possession there were still piles of horse manure in the stables and many birds flying around inside the buildings.

All the other TV stations in New York were suffering by comparison to the beautiful coverage from WNBC (channel 4), which was located on the Empire State Building. Just before briefs were to be filed with the FCC requesting that NBC make space available to other stations, NBC did make it possible for other transmitters to locate on top of the building.

Shortly thereafter, the new TV antenna tower mast was added to the top of the Empire State Building. Mayor O'Dwyer pounded in the last rivet, a gold one, to signify the completion of the project. Unfortunately, the rivet he pounded in was an ordinary iron rivet painted gold. Someone, in the true tradition of New York, had stolen the real gold rivet.

During this time, CBS had been pushing the whirling disk color system. In an about-face that surprised most of us in the broadcast industry, the commission reversed itself and made the whirling disk the standard color system. Unfortunately for CBS, the commission had waited far too long and the whirling disk never made it.

Many different types of color CRTs were proposed, and some were built during that time. Meanwhile, Paramount introduced a projection system for large-screen television at the Paramount Theater in New York. It was really the original Baird TV system that the BBC had tried in the early 1930s. In effect, it was a large-screen kinescope recording. The 35mm film was exposed in front of a CRT, rapidly processed and, 60 seconds later, passed through the gate of the film projector.

Eidophor, a Swiss company, displayed a large-screen black-and-white TV projector, using a viscous film. The film's surface was actually indented by the energy



*The turntable and reel-to-reel tape recorder were primary sources for radio programming in 1955. Modern radio stations seldom rely on reel-to-reel tape recorders, and digital CDs provide much of the high-quality music used by many stations.*

of the electron stream. The primary light source passed through the resulting picture and was capable of illuminating reasonably large screens just as a film projector does. Today the same idea is used for large-screen color TV systems.

Skiatron, also known as Ecophony, was pushing its mechanical scanning system. The system used a Kerr cell as a *light valve* to modulate the light beam together with a primary source. Two sets of revolving mirrors provided the vertical and horizontal scanning. As was the case with all mechanical systems, synchronization proved to be the biggest hurdle. Passing adequate light through the Kerr cell was also a problem.

### Enter NTSC

In 1948, the commission imposed a freeze on TV grants pending a complete review of the whole allocation system. For about three years no new applications were filed. However, during this time the industry was not idle and the National Television System Committee (NTSC), composed of engineers from all the major and some of the minor electronic companies, was engaged in developing a color TV system.

The basic requirements were high quality and compatibility with the existing monochrome system. Most of the committee work was performed on Long Island. If my memory serves me correctly, it was at Hazeltine or Sperry that I spent many an evening working on this project. All the engineers on the project were tested for color blindness to ensure that all saw the same color at the same time. There were certain slides that were used for test purposes. One, I think, was a bowl of fruit; another was a beautiful

girl. The bowl of fruit and later activities at NBC in Washington are well described by Dr. George H. Brown, former vice president at RCA Labs, in his book's *Blue Banana* episode.

Finally the FCC approved the NTSC system and things began to move much faster in the broadcasting field. Early problems caused somewhat unusual changes in the color of the received picture. These problems led, of course, to the well-known description of our NTSC color system: *never twice the same color*.

In France, Germany and other countries, engineers were hard at work trying to improve upon our system. France developed the SECAM (sequential couleurs a memoir) system and Germany produced the PAL (phase alternating lines) system. Proponents of these three systems still debate their advantages today. Some things never change.

In 1956, broadcasters saw what has been called the eighth wonder of the world: the Ampex 2-inch tape machine. I was at NAB that year in Chicago, and was one of the thousands who managed to squeeze into the demonstration, which was breathtaking. It was a magnificent achievement and, regardless of the changes that have occurred with 1-inch, ¾-inch, ½-inch, ¼-inch, ⅛-inch and now 8mm tape, Ampex led the way and pioneered videotape recording.

### UHF comes of age

In 1952, the FCC's revised allocation table introduced UHF TV broadcasting for the first time. Many people went bankrupt building UHF TV stations, however, because there were no receivers available to the public. UHF converters soon became popular. The

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zation for comprehensive signal control and modular construction for reliability and easy maintenance. Along with the phenomenal sonic performance with which the name "Sony" has been synonymous for decades.

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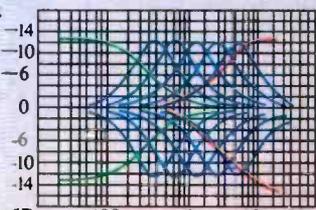
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EQ characteristics of the MX-P61.

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the SL 6000 E Series makes innovative stereo programming practical on a daily basis.

Only SSL has triple stereo mix buses for stereo music, dialogue and effects, plus rapid mix-minus matrixing for Second Audio Program creation. Only SSL provides compressor/limiters, parametric equalizers, expanders and noise gates on every channel — plus balance and image width controls for all stereo sources. And only SSL provides such time-saving operational features as patch-free audio subgrouping and pushbutton signal processor routing. For post-production efficiency, even the multitrack electronics remotes are built right in. And that's just the new line standard equipment!



Options include Total Recall™ — an SSL exclusive, completely independent of the audio path, which allows any operator to recreate the most intricate console setups for any programme with rapid accuracy, week after week. Programmable dynamic stereo equalisation and panning may also be added, along with

*matchbox type* was good for one channel only. The other type mounted on top of the TV receiver and was tunable.

Finally, the commission issued an edict that *all* TV receiver manufacturers had to include UHF tuning in their receivers. This opened the doors for the UHF telecaster. I feel sure that without this requirement, UHF broadcasting would still be in the dark ages.

The UHF edict raises an interesting point in connection with the current argument between channel 6 telecasters and non-commercial FM broadcasters. The FCC has the power to require TV receiver manufacturers to incorporate an adequate antenna input filter in their receivers to remove this problem. Unfortunately, it has not seen fit to use that power. Maybe in the next 15 years it will.

Cable has come a long way, and has prospered using the product of the broadcaster. I won't say cable operators are actually freeloading, but they certainly used to depend on the broadcasters for most of their programming.

Here is an example of hindsight, or lack of foresight. In 1949, when I was with ABC, I was asked how a small village at the bottom of a mountain in Pennsylvania could receive channel 7 from New York. I replied that there were three possible ways. A large static reflector could be mounted at the top of the

mountain with receiving antennas oriented toward it. Or a small local transmitter rebroadcasting the signal on the same, or a different, channel could serve only the people in the valley.

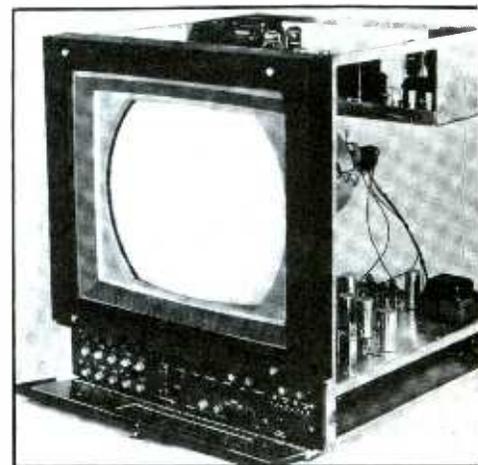
Finally, I suggested the installation of a receiving antenna and a long piece of a coaxial cable running from the top of the mountain down to the individual houses. Of course, I said, this approach would be so expensive that it would be impracticable.

I think that the two biggest changes that have come in the life of this broadcast engineer during the past 40 years are the satellite and the transistor, not necessarily in that order. Without the transistor, the satellite certainly could not be as efficient as it is today.

Frankly, I don't like transistors. With a tube, you can always short a screwdriver from the grid or plate to ground and see what happens. If you do that with a transistor, you might destroy it. I'm not going to dwell on the transistor or the satellite, because today they are far better known to most of us than some of the other things I've been discussing, and which many of us have forgotten.

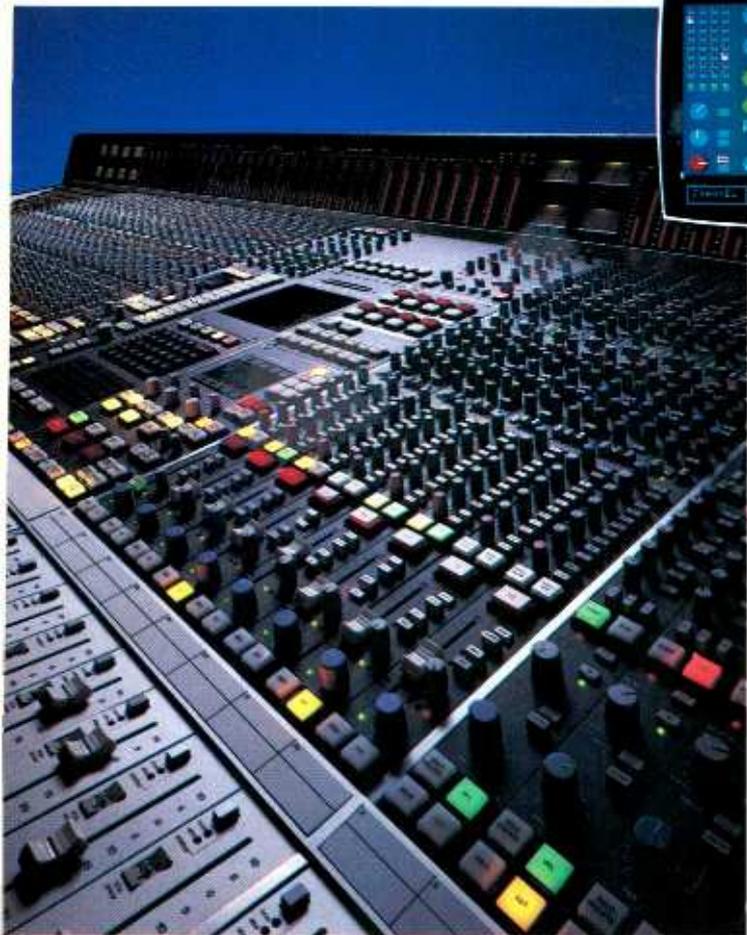
### The future

So what's in view for the years that will take us to the end of this century? Here are some thoughts:



*Early color monitors were large, heavy and required constant adjustment (notice all of the front panel knobs). Today, digital technology provides us with automatic adjusting monitors, and they hold their settings for long periods of time.*

- **Portable telephones:** Cellular telephones are obviously going to play an increasingly large part in our lives and in the development of personal portable telephones. These phones have been available for years, and many engineers have had 2-meter rigs in their cars for some time. However, cellular radio will make phones far more efficient and attractive to the general public.



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- DBS (direct broadcast satellites): Plans are afoot for various systems to provide direct satellite broadcasting service to all or part of this and other countries. In fact, Europe is further ahead with DBS than we are.
- On the surface, DBS looks appealing because one satellite can cover so much of the United States that local stations would not be required. But what's going to happen to the local services we've come to expect? I don't think satellites will replace the local TV stations, at least not by the end of this century. They will, however, provide additional services and play an important role in the U.S. broadcasting system.
- Stereo broadcasting: We've heard quad stereo and I, for one, have been unimpressed by it. Now we have stereo AM. That technology seems a little more impressive, but I can't help wondering how far it will go in the future. Will it really do that much to boost sagging AM radio ratings? Stereo TV sound is here to some degree, and probably to stay.
- Subcarriers: SCAs are old hat by now. The only recent change is that the commission has now increased the number of channels that may be carried on an FM carrier. Similar control systems can be carried on AM. AM still cannot do as much as FM in the way of providing ancillary services on a carrier, but AM-SCA

- can certainly provide a means of increased revenue for an astute operator.
- Radio control: Children are now playing with radio-controlled airplanes, and I recently saw an ad for a radio-controlled submarine. UHF propagation is so much better understood than it was 30 years ago, and is being used in ways undreamed of in 1950. Unfortunately, the mobile radio interests are dreaming of unused UHF channels for communication purposes. This is something that all UHF operators should watch closely.
- Pocket television: Dick Tracy's watch television has finally come into being, in many variations. Thirty years ago we were talking about flat screens for television and Paramount demonstrated one in New York. Now, we are promised a commercial-version flat-screen device from one of the Japanese companies. Transistors have shrunk and it's becoming unusual to find discrete transistors on a circuit board. Integrated circuits, half the size of a transistor, performing 1,000 or more operations, are the norm today.
- CCD cameras: New technology TV cameras provide vastly improved displays. With charged-coupled devices, there are no more comet tails or smears. Modern cameras are lightweight and easily transported. They are a far cry from the mammoth units we used to call portable.

- Fiber optics: Light wave information exchange is now firmly entrenched. Fiber-optic systems are free from interference and do not radiate. We've only scratched the surface of this technology. Laser transmission, both fiber optics and free space, offer an alternative to overcrowded microwave frequencies.
- Digital: The catchword today is *digital*, and everyone is climbing on the bandwagon. Digital techniques certainly offer freedom from noise and allow international compatibility. As the industry develops additional standards, further use of the technology will take place.
- Computers are almost commonplace today. We have passed the era when people saw the computer as a *vade mecum*, or a universal panacea, and purchased thousands in high hopes of gaining a third hand. However, as the wild enthusiasm levels off, computers are becoming more and more a part of our daily lives. Self-repairing and operating equipment and robots are also on the horizon.

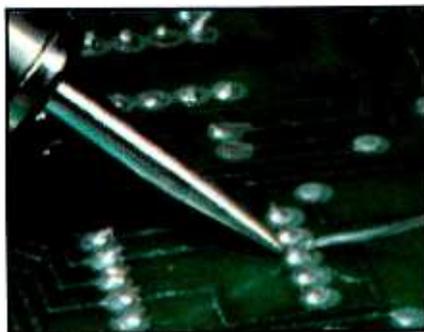
### Stay tuned

In 40 years we've come a long, long way. By the year 2,000, we shall surpass what we've done in the past four decades and I hope we're all here to see it.

!:->)))

## VTC simplifies video signal timing

By Jay McGaughey



The importance of proper video signal timing at switches is generally well known. If two video signals are slightly out of time, hue shifts and horizontal shifts can occur during switching and special-effects operations.

One common method of monitoring video signal timing uses a waveform monitor and a vectorscope connected to the switcher output. The two monitors are first switched to the external reference mode and a reference signal (usually the internally generated color black from the switcher) is applied. The relative position of other sources is then compared to this reference and the horizontal and subcarrier timing is adjusted as necessary.

An improved display method would simultaneously show the two signals on the waveform monitor and vectorscope. Any differences would clearly be seen. The signal timings could then be adjusted until the two signals merged into one. Other parameters such as video levels, sync width, burst level and position, chroma level and phase also could be compared.

To simulate this dual trace display, a video timing comparator (VTC) can be constructed. The device is a 2-input video switch operating at the field rate of 30Hz. As shown in Figure 1, the two video signals are provided by the *program* and *preview* switcher outputs. If these two signals are not in time, a delay line will need to be installed in the ad-

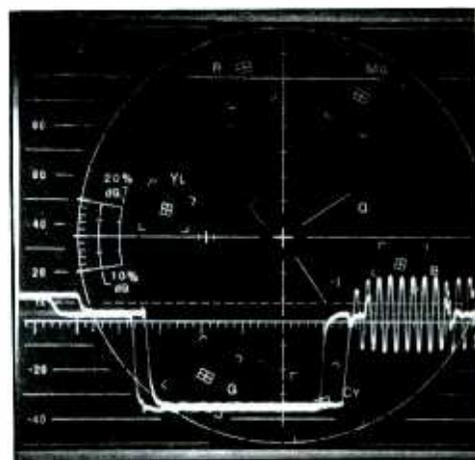
vanced signal. If the outputs are in time, connect them to the VTC with equal cable lengths. The VTC also requires a sync feed, which can be obtained from the switcher loop-through. The video output of the VTC is connected to the waveform monitor and vectorscope. Each of the monitors must be switched to external reference sync and subcarrier for proper operation.

### Circuit detail

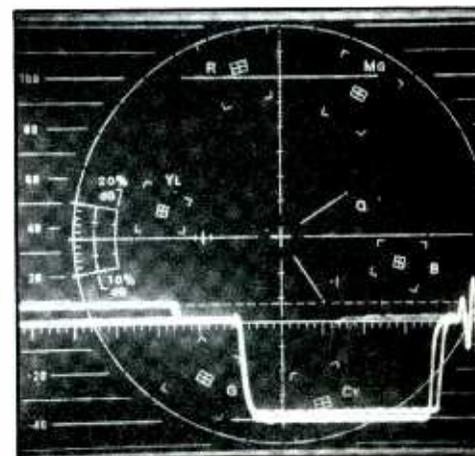
The schematic diagram of the VTC is shown in Figure 2. The sync is used to create two signals: the 30Hz switching pulse and a backporch sample pulse for the video clamp circuits. Each input signal connects to a backporch feedback clamp circuit. These clamps are required to match the dc blanking level for the two signals so that they are properly superimposed on the waveform monitor. A U2 analog switch contains three separate switches. Two are used as sample switches for the sample-and-hold sector of the feedback clamps. The third switch is the actual video switch operating at the 30Hz rate.

The video output alternates between fields from video A and B. This rate is sufficient to prevent flicker on the oscilloscope display. The video switch output feeds a high-impedance input video line driver. The output can drive two standard 75Ω video feeds.

When constructing the device, be sure to observe good engineering practice on grounding. The power supplies must be sufficiently bypassed and the op-amps properly decoupled. The circuit provides



The VTC allows two signals to be superimposed for easy comparison of timing. Above, the difference in horizontal timing of the two video signals can be easily observed.



The VTC output now shows the two video signals are properly timed with the leading edge of the sync signal.

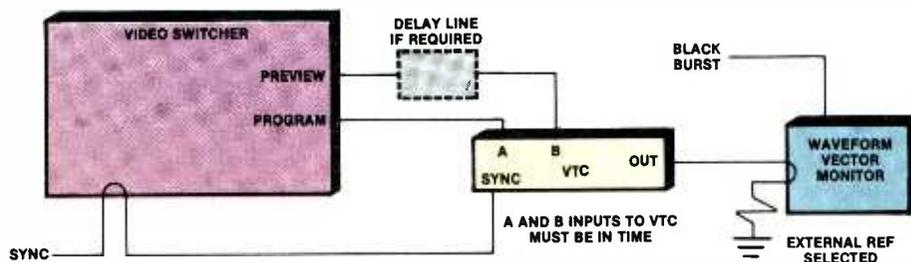


Figure 1. The video timing comparator connects between the switcher outputs and the waveform monitor and vectorscope inputs.

an operator switch that permits observing each video input separately in addition to the normal superimposed mode of operation.

This system has been in use for more than six months. It greatly simplifies system timing adjustments and even enables non-engineering personnel to set up system timing.

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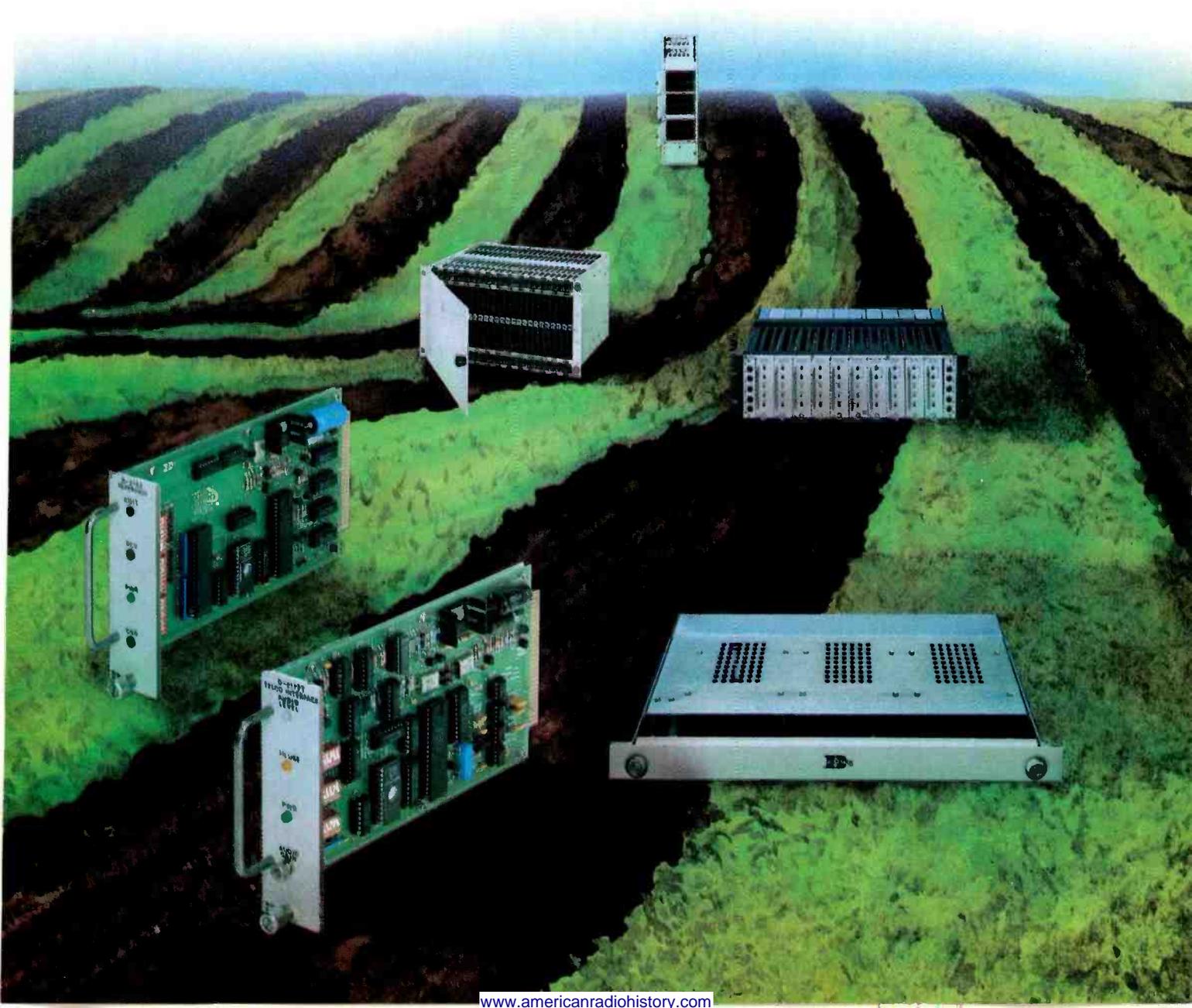
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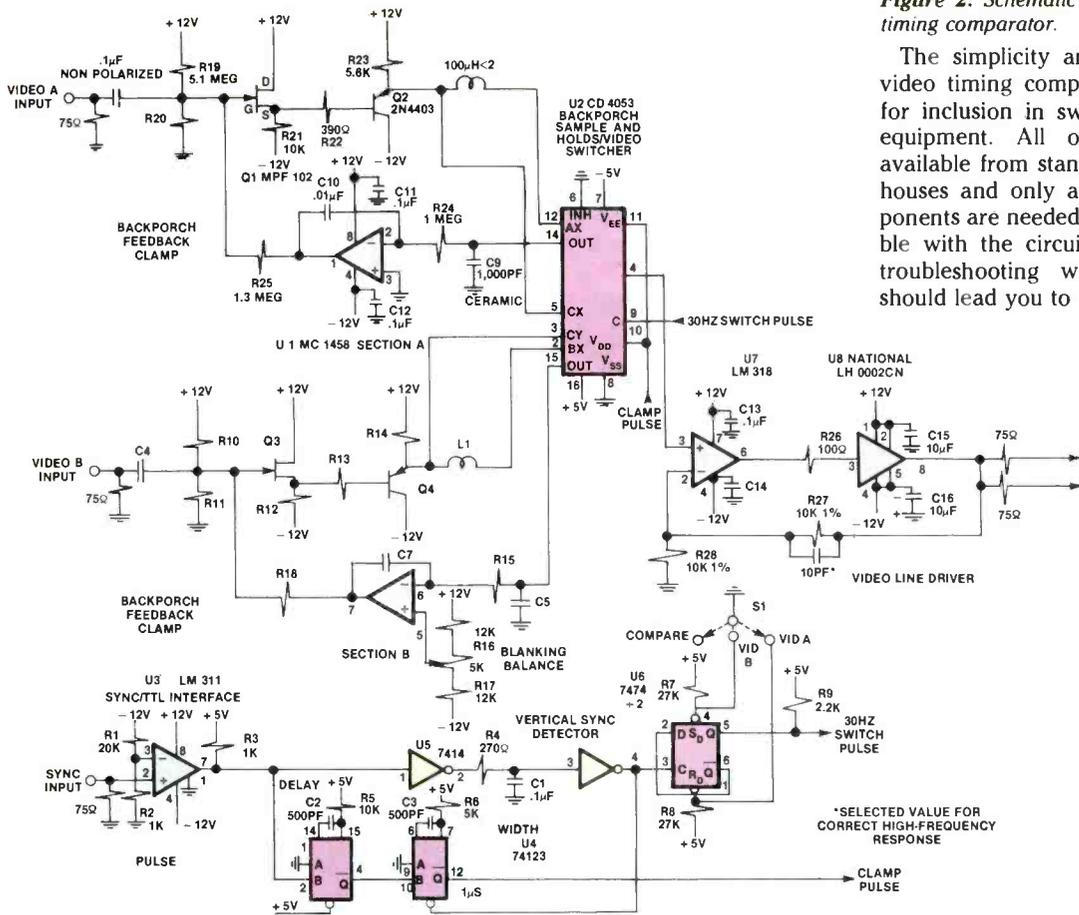


Figure 2. Schematic diagram for the video timing comparator.

The simplicity and versatility of the video timing comparator make it ideal for inclusion in switchers or even test equipment. All of the devices are available from standard electronic parts houses and only a few precision components are needed. If you run into trouble with the circuit, a few minutes of troubleshooting with an oscilloscope should lead you to the problem.

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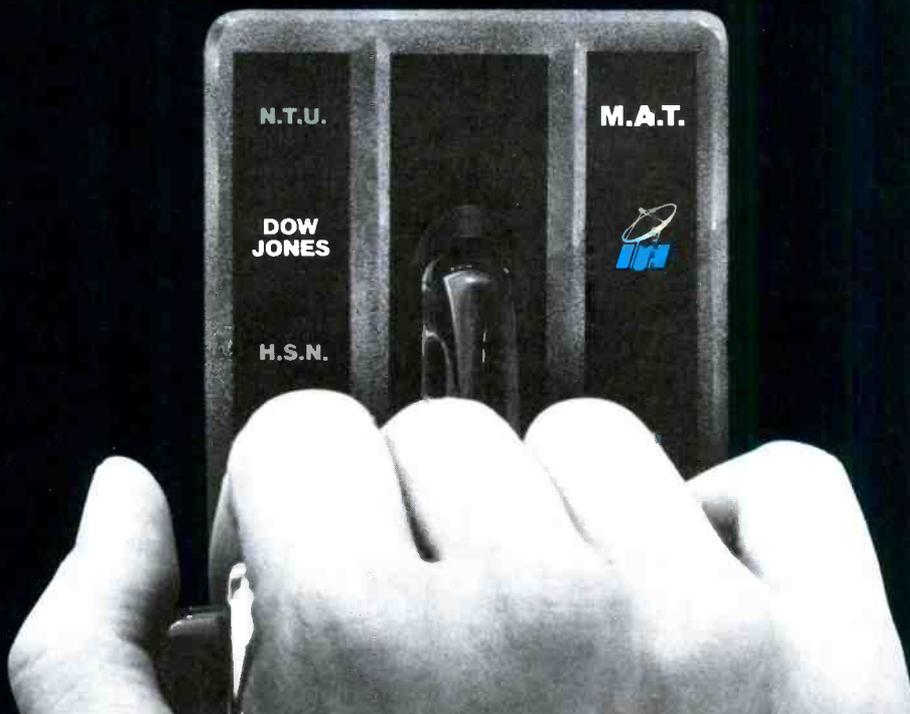


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June 1986 *Broadcast Engineering* 175

## Audio Precision System One

By Gerry Kaufhold II



Radio engineers have focused on audio quality for years. Now, TV and video production engineers also are finding it necessary to improve their facilities' audio quality. One important key to maintaining top quality audio is modern, efficient test equipment.

Our TV facility uses almost 60 audio distribution amplifiers with approximately 50 audio sources. Because almost everything in the facility can be routed on-air through master control, there are more than 100 different audio paths. In addition to this total, there are aural STLs, 12 instructional TV transmitters, our broadcast transmitter and ENG equipment. To properly maintain just the audio portion of our facility required a great deal of time and effort. With the advent of stereo television, we had to improve our audio-testing program.

Last year, Pat Porter, KAET-TV transmission supervisor, began searching for new audio test equipment. We wanted a test system that could provide high-quality automated testing features. The test system needed to be easy to use and provide hard copy of the test results. Finally, the selected test equipment needed to be cost-effective. After looking at the test equipment market, we selected the Audio Precision System One.

### Construction

The System One is quite different from your standard audio test setup. The test system does not function alone, but uses an IBM-compatible personal computer as the control device. The test system is built around a single cabinet with slots for the addition of several optional features and front-panel input and output connections. A typical configuration consists of a signal generator, level-voltage-frequency (LVF) measurement package and a distortion analyzer. With this standard setup, options can be installed.

All tests are directed through the personal computer. The system is connected

### Performance at a glance

- Laboratory quality test system
- Operates through an IBM-compatible computer
- Provides user-specified variable equalization curves
- Can be user-customized to perform automated tests
- Performs local and split-site tests
- Plots and prints graphs automatically

to the device under test (DUT) and to the computer's serial port. The operator directs all tests through a menu displayed on the computer CRT. From this menu, frequency, level, impedance and other test parameters are selected. No manual adjustments are required on the system.

The audio-signal generator provides frequency sweeps from 20Hz through 200kHz. The matching LVF measuring module automatically tracks the generator with 0.03% accuracy. If desired, the frequency accuracy can be reduced to obtain faster sweep times.

Frequency values can be automatically selected by the software at the time the test is run. Or, the user can program (and store for future reference) a list of discrete frequencies for test purposes.

The System One provides output levels up to +24.3dBm with less than 0.01% distortion. Typical distortion levels run much lower, about 0.001%. The generator outputs can be balanced with a floating ground, unbalanced or configured for common-mode tests. All outputs are short-circuit protected. A sync output provides a scope trigger and a monitor output can be used to drive an amplifier for loudspeaker monitoring.

The LVF module provides switchable 50Ω, 600Ω or 100kΩ input impedances. Input levels can range from 1μV to more than 100V. The LVF module can be set up to read sweeps through a programmable bandpass or notch filter. Equalization curves also can be inserted into the test loop for special measurements. This feature allows RIAA, 50μs, 150μs or user-specified pre-emphasis curves to be used.

| GEN1      |                             | LVF1       |             | SWEEP TEST DEFINITIONS<br>(press F9 to sweep) |             |      |
|-----------|-----------------------------|------------|-------------|---|-------------|------|
| WAVEFORM  | SINE                        | MEASURE    | A THD+M     | DATA-1  | LUF1        | RDNG |
| AMPLITUDE | +8.00 dBm                   | READING    | 8.00077 %   | GRAPH TOP                                     | 1.00000 %   |      |
| FREQUENCY | 1.00000 kHz                 | LEVEL      | +14.37 dBm  | BOTTOM  | 8.00050 %   |      |
| IM-FREQ   | 60.0000 Hz                  | FREQUENCY  | .999991 kHz | # TICS  | 0           |      |
| OUTPUT    | A&B<br>BAL<br>600Ω<br>FLOAT | PHASE      | +0.2 deg    | TYPE  | LOG         |      |
| AMPSTEP   | 0.010 +                     | BP/BR FREQ | AUTO        | STEREO  | LUF1        | RDNG |
| FREQSTEP  | 1.260 *                     | DETECTOR   | 4/sec RMS   | GRAPH TOP                                     | 1.00000 %   |      |
| dBr REF   | 307.3 mVrms                 | BANDWIDTH  | 22Hz 80kHz  | BOTTOM  | 8.00050 %   |      |
| dBm/W REF | 600.0 Ω                     | FILTER     | OFF         | # TICS  | 0           |      |
|           |                             | CHANNEL-A  | INPUT       | TYPE  | LOG         |      |
|           |                             | TERM       | 100kΩ       | SOURCE-1                                      | GEN1        | FREQ |
|           |                             | RANGE      | AUTO        | START   | 20.0000 kHz |      |
|           |                             | CHANNEL-B  | GEN-MONITOR | STOP  | 20.0000 Hz  |      |
|           |                             | TERM       | 100kΩ       | # STEPS                                       | 30          |      |
|           |                             | RANGE      | AUTO        | STEP TYPE                                     | LOG         |      |
|           |                             | Freq REF   | 1.00000 kHz | STEP TABLE                                    | OFF         |      |
|           |                             | dBr REF    | +27.90 dBm  |   |             |      |
|           |                             | dBm/W REF  | 600.0 Ω     | DISPLAY                                       | MONO-GRAPH  |      |

BAL UNBAL CMTST  
Output configuration

To change setting, use SPACE bar.  
To return to menu, press the Esc key.

Figure 1. All of the analyzer's functions are directed through the menu shown above.

Kaufhold is an engineer with KAET-TV, Tempe, AZ.

# EIGHT QUESTIONS YOU SHOULD ASK WHEN BUYING WEATHER RADAR.

## 1. Where does the data come from?

The National Weather Service is now fully operational with a series of radar transmitters called RRWDS: it's their primary precipitation detection tool. The Alden C2000R is the color radar display system which allows its subscribers to access any of these RRWDS transmitters, on a direct line or dial-up basis.

## 2. What if I only want three or four sites?

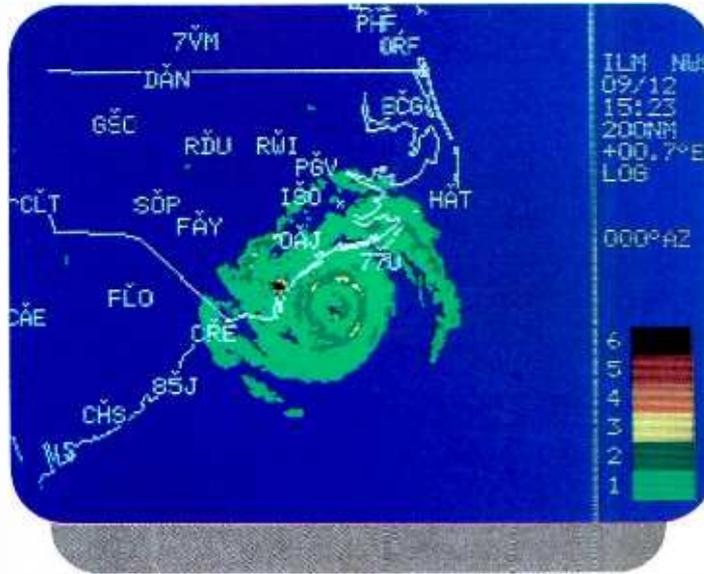
With the Alden system, there's no need to pay for access to the whole country if you only need data from a few radars. You specify the sites you want, and we program your auto-dialer phone to receive these sites. You pay only for the sites you need.

## 3. Will I get busy signals?

Probably not. The system is designed so multiple users can call simultaneously. And because we know who has access to each radar, we can expand the system as subscribers increase.

## 4. What about service?

Of course the transmitters are maintained by on-site government technicians. And for Alden equipment, we maintain a nationwide



compatibility, time lapse and level flashing are included in the standard C2000R. And there's no hookup charge to connect to any radar.

## 6. Are there options?

You can add additional memory, clutter blanker, alarm, customized backgrounds—even a high-resolution printer for color print or transparency. And for a surprisingly small additional cost, you can convert the C2000R

service network for reliable operation.

## 5. What features are included?

The Alden C2000R has a number of built-in features that are costly options in other radar display systems. Zoom, range rings, sweep line, NTSC/RGB

to the C2000R/S, which lets you receive color weather graphics from private data bases.

## 7. Can we afford it?

The Alden C2000R is far less expensive than other similarly equipped radar display systems. If you don't need all the features of the C2000R, the cost is even less for our C2000M radar monitoring system. If you've looked at weather display systems in the past, you will be pleasantly surprised at the cost, lease or purchase, of an Alden system.

## 8. How do I find out more?

Just fill in the coupon, or call Alden, and we'll be happy to set up a demonstration.

Alden Electronics, 127 Washington Street,  
Westborough, MA 01581, (617) 366-8851  
Please send information on:  
 C2000R     C2000M     C2000R/S

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Title \_\_\_\_\_  
Company \_\_\_\_\_  
Street \_\_\_\_\_  
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Add weather graphics capability at a surprisingly low cost with our C2000R/S



## ALDEN ELECTRONICS

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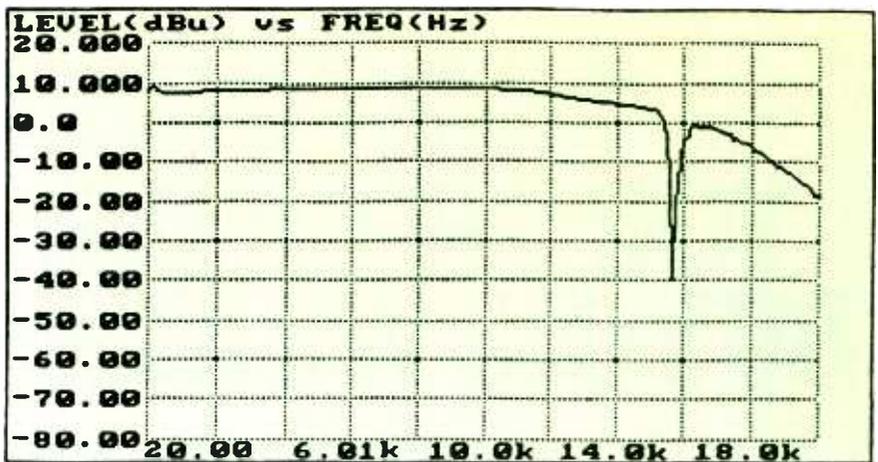
The distortion analyzer will measure distortion accurately down to 0.001%. The notch filter in the analyzer automatically tracks the incoming test frequency. In this way, distortion readings can be made at the same time frequency response and phase are being measured. Any engineer who has spent many lonely nights manually adjusting a distortion analyzer and plotting points on a graph for an audio proof will quickly recognize the value of this feature.

#### Other features

The key to the versatility of the measuring system lies in its interface to a personal computer. This aspect allows the computer to perform varied tests through software-controlled circuits. Because the tests are directed through software routines rather than a set of manual controls, automatic tests can be easily implemented.

The tests are directed through a menu that is displayed on the computer CRT. (See Figure 1.) The test settings and options are listed and can be changed by simply moving the cursor around on the screen.

The graphics capability of the test unit makes record keeping almost a snap. It's no longer necessary to run a test and then laboriously plot a number of points on a graph to see what is happening. The system will display the results of any test



Date: \_\_\_\_\_  
 Time: \_\_\_\_\_  
 Initials: \_\_\_\_\_  
 Unit being tested \_\_\_\_\_  
 Input impedance to unit being tested \_\_\_\_\_ ohms.  
 Output impedance from unit being tested \_\_\_\_\_ ohms.  
 Tones fed to left channel at 0dBu, sweeping from 20Hz to 20,000Hz.  
 This graph presents Channel "A" into Channel "B" (right) crosstalk.

Figure 2. The results of the test and operator notes can be printed out in seconds.

in the form of a graph at the touch of a few buttons on the computer keyboard. The graphs are plotted quickly so you can make changes if needed. They also can be printed for future reference. (See Figure 2.)

#### Automated tests

Automated tests can be easily performed with specific parameters related to various routines under user control. For example, user-specified upper and lower frequency limits can be established.

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The PROFESSIONAL FILM AND VIDEO EQUIPMENT ASSOCIATION has developed a computer compilation of stolen, missing and misappropriated film and video production/post-production equipment. This computerized listing reflects an accurate and continually updated reference on equipment of questionable origin, including serial number, manufacturer and product category.

These listings will protect industry professionals from inadvertently purchasing lost or stolen equipment, and can aid in the recovery of equipment. One may also report lost or stolen equipment to be included in these reports at no charge.

To receive a free copy of the missing equipment listings or to report lost equipment, contact the PFVEA Administrative Office, 2037 Granville Ave., #C, Los Angeles, CA 90025; (213) 479-2549.

# The ingredients of Varian's new S-Tube bring super-high efficiency.

Varian's new "S-Tube" klystron operates at super-high efficiency—translating to significant savings in electric utility costs for UHF-TV broadcasters. The new S-Series, 5-cavity klystron provides significant improvement in operating efficiency through a unique configuration of tuning and cavity loading.

## **Efficiency-tuned for 10% improvement.**

The new S-Series klystrons are tuned to maximize efficiency while maintaining useful gain. The Q of the second cavity is reduced by external loading and the output cavity is optimized by use of a variable visual coupler. These tubes will provide efficiency improvement of up to 10 percentage points over current high efficiency types when used under equivalent conditions.

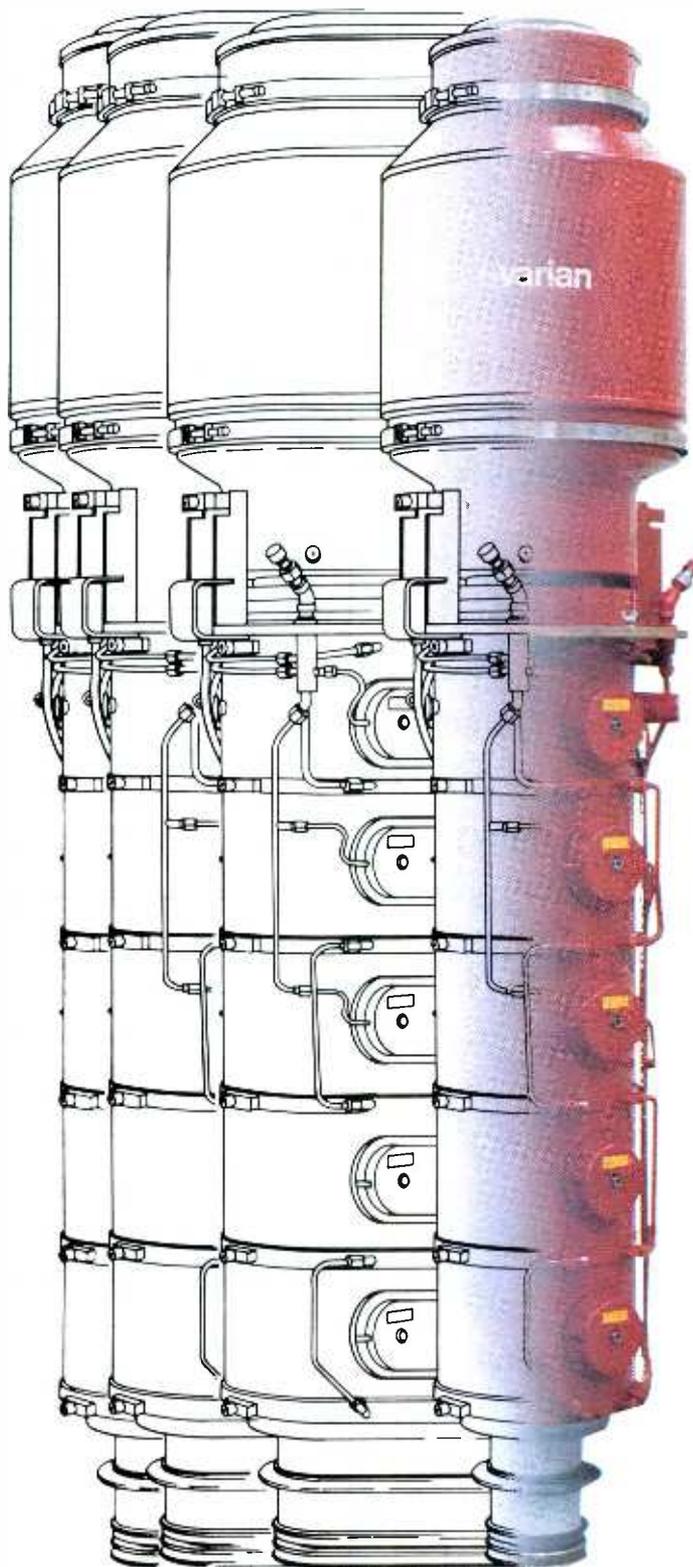
## **Interchangeable with Varian H-tubes.**

The most practical aspect of the new S-Series tubes is the complete interchangeability with the Varian VA-953H-Series tubes, providing broadcasters maximum flexibility in planning new equipment acquisitions.

More information on Varian's new S-Tube is available from Varian Microwave Tube Division, or any Electron Device Group worldwide sales organization.

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Palo Alto, California 94303  
Telephone: 415-424-5675

Varian AG  
Steinhauserstrasse  
CH-6300 Zug, Switzerland  
Telephone: 042-23 25 75



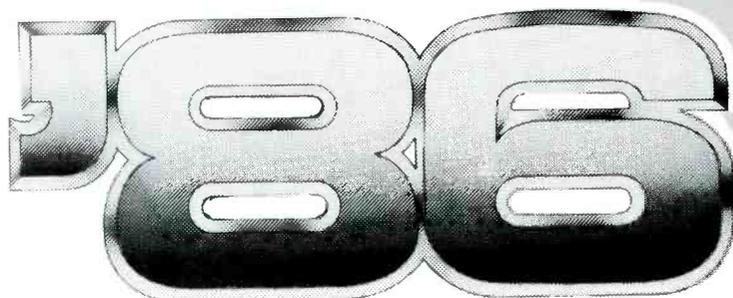
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June 1986 *Broadcast Engineering* 179

# ***Don't miss it: The first annual SBE National Convention and Broadcast Engineering Conference***

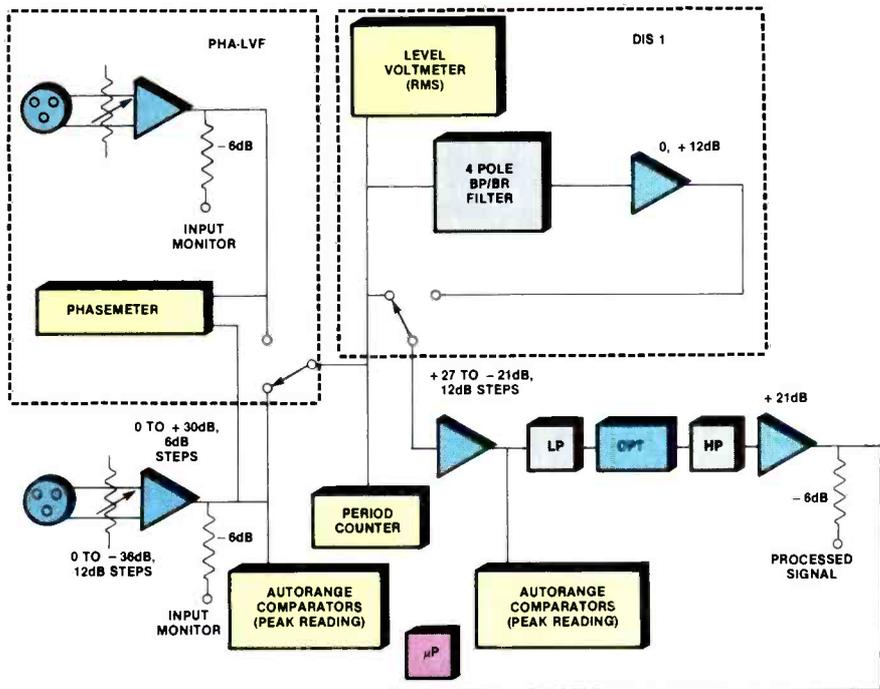
Plan now to attend the *working engineer's* convention. View the latest in broadcast equipment from leading manufacturers. Attend technical sessions — organized by John Battison — that answer the on-the-job needs of radio and TV engineers.

The SBE National Convention and **Broadcast Engineering Conference**, the *must attend* event this Fall.

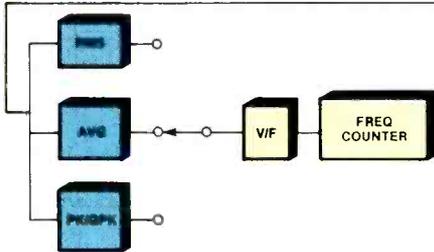


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Block diagram of the System One.



Out-of-bounds readings can be stored in a disk file or immediately printed. Proof-of-performance tests can be executed by less trained technicians with the error analysis performed later by a qualified engineer.

The software is easy to use. The operator-specified tests can all be combined into an automated-test sequence, which requires the operator to press only three keys. In less than eight minutes, on-screen plots and hard-copy printouts are produced.

A noise floor sweep is accomplished by using the LVF sweep-mode. The test sweeps across the audio spectrum measuring the residual output voltage of the DUT. This technique quickly notes any 60Hz to 120Hz noise that may be present in the device. The test also helps locate other interference or noise that might be difficult to identify.

#### Other features

The system is not limited to standard audio equipment. The test set also can perform thorough tests on tape recorders and satellite links. Standard alignment tapes can be used and the setup is similar to any other test run on the System One.

Because the test set is controlled by a personal computer, special routines can be saved to disk for later recall. This feature allows a station to develop custom test procedures for its facility.

It also helps ensure that all tests are conducted in the same way to provide consistent results.

The test unit can be rack-mounted if desired. In this configuration, the signals are routed to the device through patch panels. Some stations may prefer to mount the test set on a roll-type cart. However, because a computer must accompany the device, I don't consider it portable.

#### User tests

Shortly after we received the measurement system, we decided to conduct a thorough proof on our TV aural STL system. During the tests, we developed more than 20 graphs showing different effects produced by varying the input and output levels through the STL. From these graphs, we developed a set of optimal settings for our PBS-type programming. We even discovered that there was a direct tradeoff between the STL input level and its phase response.

One problem was encountered in the early stages of learning to use the test set. At one point, we were consistently obtaining input readings that looked about 6dB too high. When we couldn't solve the dilemma we called the factory. With their assistance, we discovered that we had forgotten to terminate the input terminals of the device under test. Sure enough, once we had properly matched the impedances, everything else went smoothly. Now, whenever we start a test procedure, the video screen always warns the operator to verify that the impedances are properly matched.

Several tests were conducted at our transmitter site. We wanted to see how the measurement system would react in

*Continued on page 184*

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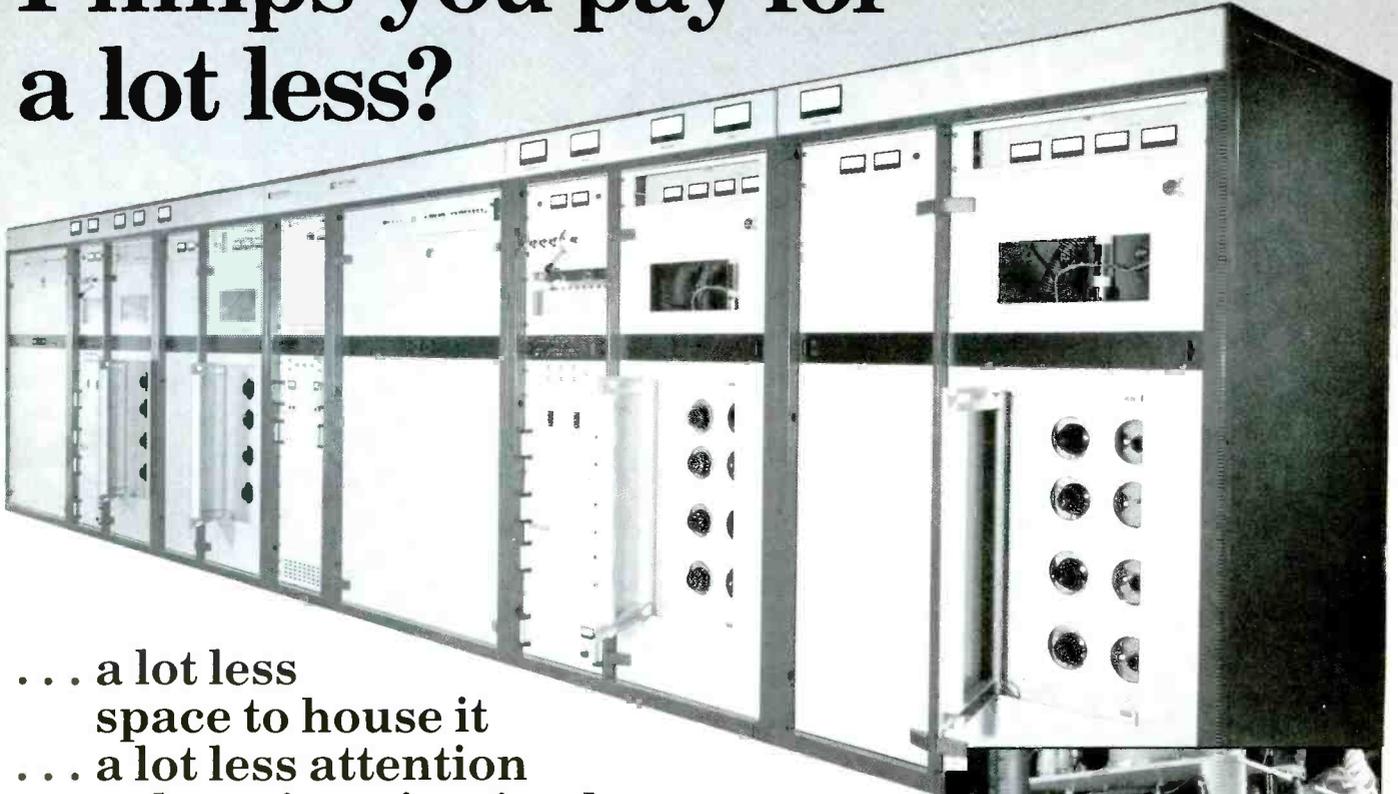


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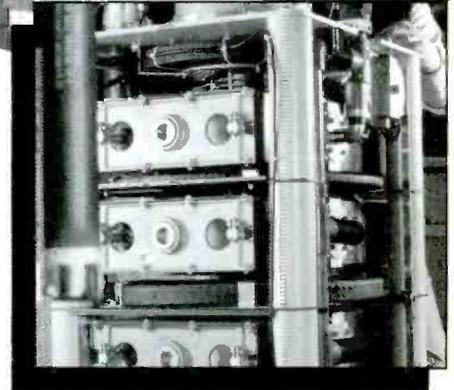
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## Philips UHF television transmitters



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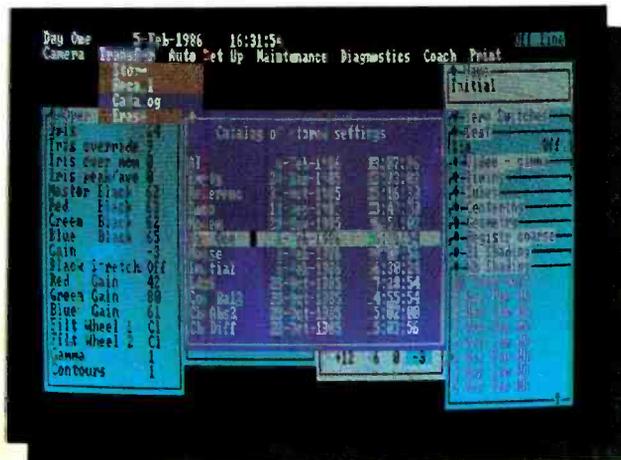
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- remote control and monitoring of LDK 6 family camera systems



COACH display

- flexible retrieval, storage and control of camera data with greatly expanded and highly protected memories to warn of approaching end of range and unusual changes in camera set-up
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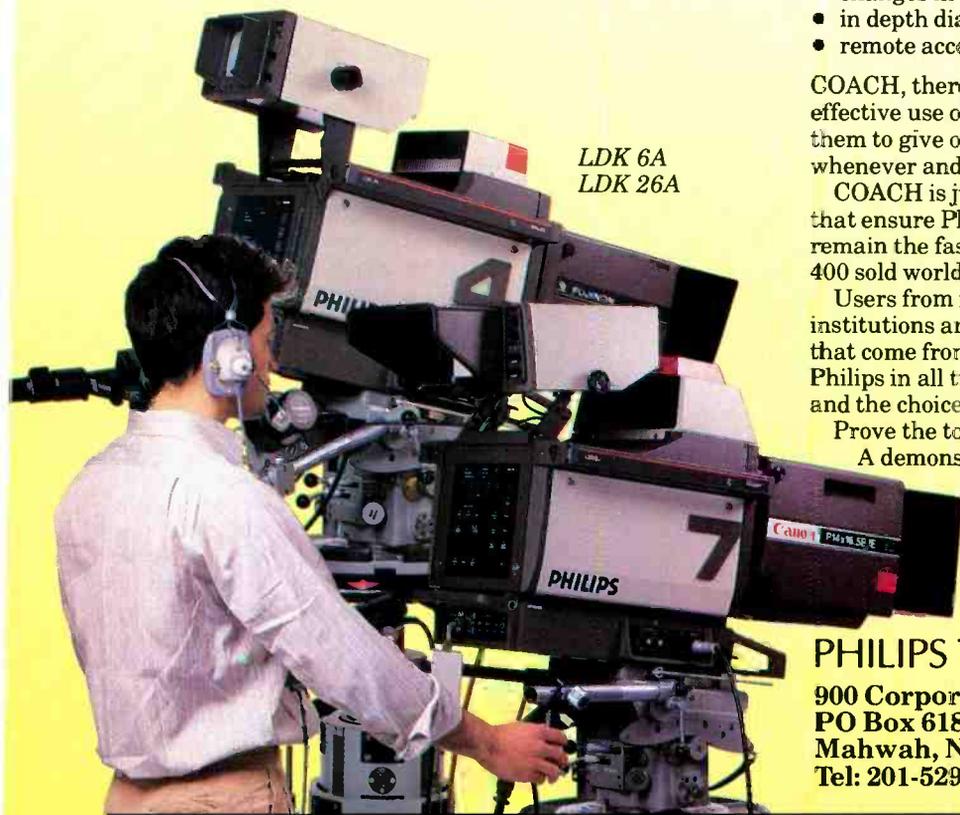
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Continued from page 181

a high-RF environment. Several audio cables were run around the transmitter building and connected to the test set. The unit's cover was removed to simulate even worse conditions.

During the tests, the worst case interference was approximately  $20\mu\text{V}$  of 60Hz induced hum. At this site, analog voltmeters regularly peg to full scale because of the high RF levels. We were, therefore, all surprised by the performance of the test set at this location.

### Manual

The system is supplied with an entire automatic self-test and proof-of-performance program. The circuit boards are easy to access and the company guarantees 24-hour repair.

The instruction manual provides a *quick start primer* to get you up and testing. After you have completed a few tests, it becomes easy to switch between the menu and test graphs. The manual is more than 100 pages long and contains detailed hints and instructions on how to use the test set. In a couple of cases, we had to call the factory for help. In each case, they were quick to provide assistance.

Although not available at the time this report was prepared, Audio Precision announced at the 1986 NAB a split-site measuring system. With the new system, the generator and LVF detector portion of the analyzer can be separated by any distance. The generator can be placed at a studio and the LVF at the transmitter site.

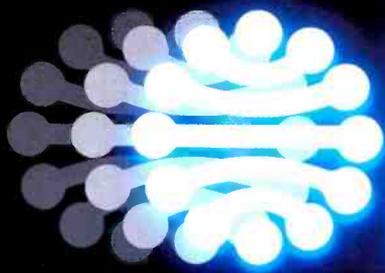
Using a separate loop or dial-up telephone line and a pair of modems, the operator can perform any desired test from the studio. In fact, the new software includes a complete FM stereo proof-of-performance routine that can be completed in a little more than two minutes. The equipment also can be used on satellite links or other dual-location installations.

For our station, the System One has proven to be an extremely useful device. It not only makes equipment testing easier, but also helps ensure more consistent results among engineers. The unit's rapid response and versatility helps the engineer perform more tests in less time than might otherwise be possible. In our station, this means better performance from our equipment. In today's competitive marketplace, that extra ounce of audio quality is important.

**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 firm.

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, whether positive or negative. No report should be considered an endorsement or disapproval by **Broadcast Engineering** magazine. [:-:~)]!!!



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- \* number of lines
- \* horizontal sync width
- \* number of cycles in burst
- \* breezeway
- \* number of vertical sync pulses
- \* equalizer width
- \* vertical pulse width
- \* SC/H phase up to two degrees
- \* SC frequency error up to 0.2 Hz

#### Timer:

- \* H and V lock
- \* PAL lock
- \* H delay and SC phase delay between inputs A and B
- \* Sync
- \* Watcher
- \* Analyzer
- \* Timer



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## Ennis fund supports SBE educational goals

By Bob Van Buhler

Three chapters have been recognized for their membership growth. Chapter 18 was recognized for the largest growth in 1984. Chapters 15 and 47 tied for the largest membership growth in 1985.

Several other awards were presented at the annual meeting. Jack McKain, vice president, and Gerry Dalton, frequency-coordination chairman, received service awards for their work on the national office computer system. Jim Hurley was recognized for his many years of work on the certification committee. Past president Roger Johnson and past treasurer Ed Karl received SBE Fellowships for their service to the society. John Battison, the society's originator and first president, also was recognized with an SBE Fellowship. Battison, recently retired from the WOSU station, continues his work for the SBE as technical session coordinator for the SBE national convention.

### Other board action

Additional action was taken by the board of directors in Dallas. Outgoing board member Andy Butler was appointed to serve as SBE's first executive director. Butler will coordinate SBE's national convention activities as well as assist the St. Louis chapter with the first national convention.

Chuck Kelly will fill the unexpired term of Zaven "Doc" Masoomian. He recently retired from WQXR AM-FM. Kelly will continue to serve as a member of the executive committee and chair the chapter liaison committee.

### Election results

The recent election brought six new faces to the board. They include: Joe Manning, KAET-TV, Phoenix, AZ; Jim Wulliman, WTMJ-TV, Milwaukee; Warren Pritchard, KING-TV, Spokane, WA; Bill Harris, KMJI-KRZN, Denver; Mary Beth Leidman, WIUP-FM, Indiana, PA; and Jeff Baker, Lin Broadcasting, Rochester, NY.

### Frequency coordination

SBE president Richard A. Rudman announced the appointment of Gerry Dalton, former regional co-chairman of the National Frequency Coordination



Committee (NFCC) as the new NFCC chairman. This move came in recognition of Dalton's many successful efforts with the NFCC, and will permit Dalton to play a key role in the new National Frequency Coordination Council.

The council, first suggested by SBE, will be supported by the NAB and have representatives from all national networks. Through the council, a uniform database system will be developed. Most importantly, a truly national frequency-coordination committee will expand frequency coordination to include all those important frequency spectrum users. This kind of representation will continue to help SBE address the needs of local stations by involving national users in the coordination effort.

As a part of SBE's effort, Dalton and the national board solicit the support of all local coordinators to make the new organization successful. The project's goal is to assure full and successful coordination while providing access to the needed spectrum for all stations. The continued hard work by local coordinators is the key to success.

### Scholarships

SBE has long recognized the need to provide educational opportunities and minority employment within the broadcast industry. Unfortunately, until now there was little the society could do to improve the situation.

In an effort to increase educational opportunities, the SBE board of directors unanimously adopted a resolution forming the Harold E. Ennis Educational Foundation at the April board meeting. The foundation will provide an organizational umbrella for all of the SBE's educational projects. These projects currently include republishing several of the Ennis technical books and awarding scholarships for broadcast-related education.

One problem with this worthy goal, however, is money. The society, until now, has been unable to generate sufficient support to expand these projects. The formation of a separate foundation will now free the society to seek the funds and complete these goals.

This year, the SBE has awarded two Ennis Fund \$1,000 scholarships to students in broadcast engineering-related fields.

Amateur radio operator Carl H. Puckett, Great Falls, MT, received one of the scholarships and will attend Northern Montana College. He plans on entering the school's BSEE program this fall. Puckett was senior engineer at the university FM station, KNMC, and also was contract engineer at stations KMON AM and FM. He constructed his own ham repeater and serves as chairman for the Northern Montana Amateur Radio Club. In his spare time, Puckett maintains 2-way radio equipment.

The second Ennis Scholarship candidate is Jay Manon, Kirkland, WA. Manon, a high school senior, seeks a career in major market TV engineering and looks forward to working as a behind-the-scenes engineer. Manon, a licensed radio amateur, works in his family's land mobile engineering business and will attend Washington State University.

SBE chapters have continued to support the Ennis fund with yearly contributions. This year, Mort Miller, representing Chapter 22 of central New York, presented a check for \$1,000 to the Ennis Fund at the annual membership meeting.

### Training and recruitment

The society would like to help increase opportunities for training minority and women workers in broadcast engineering-related fields. For years broadcasters have grappled with the problem of low percentages of women and minorities in broadcasting's top four employment categories.

While the problem may be related to the nationwide shortage of skilled engineering personnel, SBE may still be able to help. Many major market chief engineers will agree that it is difficult to recruit and hire experienced technicians, particularly those specializing in RF. SBE can help by providing internships and special training for those people who want to enter broadcast engineering.

The SBE's Ennis Foundation hopes to address this industrywide need by providing the financial assistance and training opportunities that will allow more people to adopt broadcast engineering as a career.

!:-:~)))

Van Buhler is chief engineer for WBAL-AM and WIYY-FM, Baltimore.

# 23 GHz? Simplex

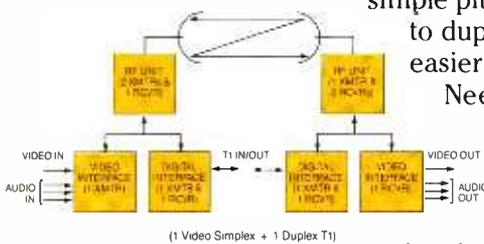


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**Tom Weems** has joined the staff of National TeleConsultants, Glendale, CA, as director of marketing for the broadcast facility design company. Weems is responsible for national and international marketing. He is currently serving on the national board of directors of the Society of Broadcast Engineers. He also has been appointed chairman of the SBE awards committee.

**Jim Rhodes** has been named audio product manager for Lenco's electronics division. Rhodes has been holding a part-time advisory position to the audio section since September, while working as an independent media producer and consultant. Rhodes came to Lenco with 25 years of experience in audio-media.

**Shelley A. Herman** has joined BGW Systems, Hawthorne, CA, as sales manager. Herman is a former vice president of Coast Recording Equipment Supply. He has more than 35 years of experience in the audio industry.

The following sales and management personnel have joined Dielectric Communications Antennas. **E. Noel Luddy** is manager of broadcast consultant relations. **Charles Koriwchak Jr.** is Eastern regional sales manager and is headquartered in Pittsburgh. **James R. Kelly III** is Southern regional sales manager operating out of Atlanta. **Daniel G. Schulte** is central regional sales manager located in Minneapolis.

**George A. Bell** has been named to a position with Scientific Atlanta, Atlanta. He is general manager of the digital video systems division in Toronto. Bell is responsible for engineering, sales and marketing. He is a former vice president of sales and marketing for the Cable Home Group for M/A-Com.

**Kenny Shewmake, Thomas Sabiston and Russ Abernathy** have been appointed positions with Gray Communications, Albany, GA. Shewmake has been promoted to national sales manager. He is the former New Orleans region manager. Sabiston is system sales manager. He is responsible for coordinating sales of ENG/EFP/SNG production trucks. Abernathy has been promoted to director of engineering for the systems division and for its subsidiary TV stations, WALB, Albany; KTVE, Monroe; and WJHG, Panama City.

**Michael Wuellner** has been appointed product specialist for Nakamichi professional audio division, Torrance, CA. Wuellner's primary responsibilities include product training and technical support for professional products. He has been an audio engineer for the past eight years, most recently at Hollywood Sound Recorders.

**Paula E. Zanow** has been appointed marketing communications manager for Nurad, Baltimore. She writes press releases, coordinates advertising and assists in the production of product catalogues. Zanow is a former associate editor for *Heat Management* magazine.

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**POST STRIPE**

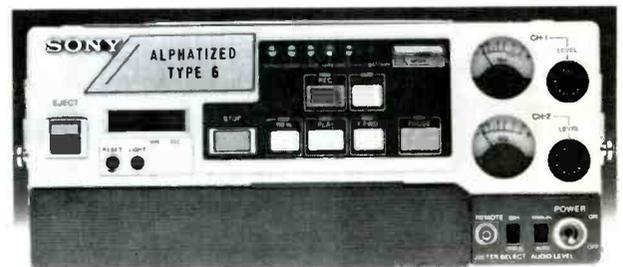
- NEW AND RETROFIT

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**Chris Smith** has been appointed director of marketing for Microtime, Bloomfield, CT. He is responsible for market definition and new product planning, as well as advertising, technical publications, customer service and product management.

**Steven J. Hebrock** and **Philip J. Lantry** have been appointed positions at Audio-Technica, Stow, OH. Hebrock has been promoted to engineering manager, a new position. He is responsible for engineering project coordination, the quality assurance program and procurement and allocation of engineering equipment. He is a former design engineer for the company. Lantry is regional sales manager for professional products. He will coordinate sales efforts with the national sales representatives.

**Ken Meyer** and **Gary Rosen** have been appointed positions with Sony professional audio division. Meyer is Western regional manager and is responsible for sales and marketing of professional audio equipment. He has been with Sony since 1979. Rosen is Eastern regional manager of digital audio. He is responsible for sales and marketing of the digital audio products. He came to Sony with 10 years of experience in the recording industry.

**Henry Kazmierski Jr.** and **Tom McKeivitt** have been appointed positions with Sharp Electronic professional products division, Mahwah, NJ. Kazmierski is Southeastern district manager and is based out of the Atlanta office. McKeivitt is Midwestern district manager and is located in Chicago.

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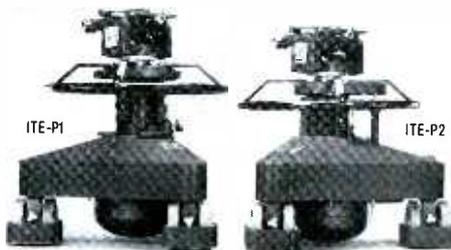
Precision engineered and manufactured to the most rigorous broadcast industry standards, our ITE-P1 studio pedestal easily accommodates camera/head loads up to 290 lbs. (130 kgs) throughout a height range of 29" to 51" (73.75cm to 127.5cm), and weighs in at 180 lbs. (81 kgs).

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Performance and price place our ITE-P1 in a class by itself. But now it has found its match. Our new ITE-P2 is a "lowboy" version of its older sibling. But with minimum height to cam head mounting surface reduced to 24.5" –

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In addition to the ITE-P1 and P2, we offer a complete line of camera heads, tripods, dollies, pedestals and accessories to suit your every need. For all broadcast, industrial, educational and closed-circuit television applications.

We know you will appreciate ITE quality performance and reasonable prices!

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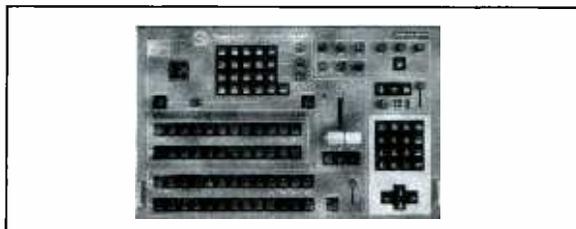


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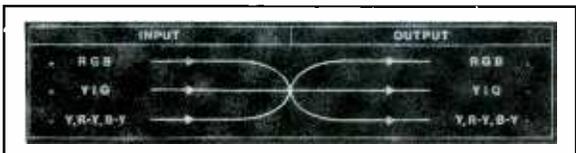
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**Alan Augusta** and **Jack Kline** have been appointed positions at Christie Electric, Torrance, CA. Augusta is director of sales and marketing for the industrial division. Kline is director of sales and marketing for the electro-optical division. **Fred Benjamin** is consultant and Southern California sales representative for dc power supplies and battery chargers for his own company, Freben International. He retired from Christie Electric in February as senior vice president of the company.

**Jim Williamson** has been appointed as field service engineer for Studer Revox America, Nashville, TN. He is based out of the company's lower Manhattan field office. Williamson came to Studer following three years of experience as maintenance engineer at Sigma Sound.

**Charles J. Gaydos** has been named vice president of marketing at Thomson-CSF Broadcast, Stamford, CT. He is responsible for domestic sales, field service, camera and graphics product management, and advertising and promotion. He is a former national sales manager.

**R. Colin Parkhill** has been appointed regional manager for the Mid-Atlantic and adjacent states for Philips Television Systems, Mahwah, NJ. Parkhill is responsible for sales of TV equipment products. He is a former product specialist with RCA's broadcast equipment division.

**Pat Preston** has been appointed vice president of communications for the Canadian Association of Broadcasters (CAB), Ottawa. She is responsible for internal and external communications, media relations and social issues.

**Ronald T. Lask**, director of engineering for WXIX-TV, Cincinnati, has resigned and will devote full time to Lask Television Systems, as president. Lask has 30 years of experience as a TV engineer and has been vice president and director of engineering at WXIX-TV for seven years.

**Jeffrey Michael, Lee Edwards, Terry Sweeney** and **Bill Laletin** have been appointed positions with Howe Audio, Boulder, CO. Michael is president and chief executive officer. He formed Howe Audio with David A. Howe in 1972. Michael has been vice president and CEO for the past two years. Edwards is vice president of sales and corporate secretary. He is a former sales manager. Sweeney is senior factory sales executive. Laletin is director of marketing.

**Bill Wohl** has joined Radio Systems, Edgemont, PA, as national sales manager. He will work with the company's dealers and promote sales of manufactured products. Wohl most recently worked in state government.

**Stephen Leader** has been appointed technical video specialist for Agfa-Gevaert magnetic tape division, Teterboro, NJ. He is responsible for providing technical support for customers, and technical training for Agfa's sales representatives. He also is responsible for investigating new technical trends in the video field.

**Michael Gold** has been named president of Integrated Technologies, Falls Church, VA. Gold is one of the original founders of the Vectrix Corporation, a manufacturer of graphics card sets for IBM personal computers. [:-?;-)]

## COMSAT links transmissions to ships

Experimental transmissions of compressed video to passenger ships has proved successful. The link to vessels at sea was made through COMSAT Maritime Services. The compressed video signals are transmitted from the COMSAT earth station at Southbury, CT, to the INMARSAT satellite system. More than 4,000 vessels are currently receiving the signals.

TV transmissions are not limited to transoceanic vessels. Drilling platforms, scientific research vessels, tanker fleets and private yachts also receive the transmissions. Opportunities for radio broadcasting to this audience also exist.

## Jampro purchases Cetec Antennas

Jampro Antennas, Sacramento, CA, has announced the purchase of what was formerly Cetec Antennas, from the Cetec Corporation, El Monte, CA. Jampro completes a return to its former name, which reaches back more than 25 years. James E. Olver is president and management remains the same.

Jampro has specialized in the development and manufacture of high-quality transmitting antennas for the broadcast industry, both television and FM, and will continue delivery and sales from 6939 Power Inn Road, Sacramento, CA.

## Ampex offers digital recorder format

Ampex, Redwood City, CA, has announced its format technology for 19mm composite digital videotape recorders to TV equipment manufacturers in order to foster a common composite digital recorder format.

Ampex has been a strong proponent of composite digital for nearly a decade, demonstrating its first such recorder in 1979. Ampex will continue its component digital recorder development based on the D-1 format. To ensure maximum commonality between its D-1 and composite digital programs, Ampex has designed both systems to share many common and expensive components. The primary differences are in signal systems and input/output circuitry.

## Rockwell radar system in operation

A groundbased, Doppler weather radar system manufactured by the Collins Air Transport division, Rockwell International, Cedar Rapids, IA, is in operation with Boston's WNEV-TV. It is the 32nd TV station in the United States to use the Collins system.

In addition to offering displays of rainfall intensity and storm signatures, the radar enables WNEV weather broadcasters to display turbulence in order to identify potentially damaging storm areas.

The radar system and associated user hardware was installed by Kavouras. The company offers the Collins radar as part of a turnkey package called the Kavouras Triton Doppler weather radar system.

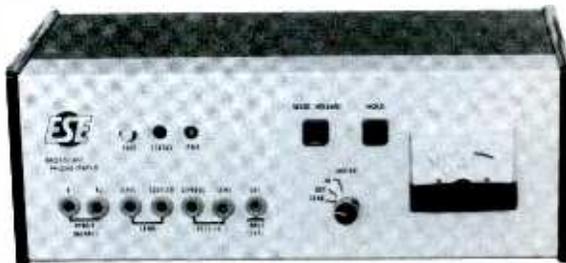
## Dielectric purchases RCA antenna

RCA and Dielectric Communications, a unit of General Signal, have completed contract negotiations for the purchase of RCA Broadcast Antenna Business.

The acquisition is a long-term growth opportunity. The consolidation will facilitate offering a package of UHF/VHF antennas, complete with transmission line and related components.

In addition to equipment and buildings located on 80 acres of land in Gibbsboro, NJ, the purchase also includes an antenna test site.

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### Radio Systems to distribute cart decks

Radio Systems, Edgemont, PA, has finalized an agreement with Keydial, Ltd., Esher, England, for distribution of its broadcast cartridge tape machines in North America and Canada.

The line, marketed under the trade name Key/Cart, includes four cart decks. The machines have been restyled and re-engineered to U.S. standards and are available from Radio Systems and its national network of broadcast dealers.

### Machine control order for Dynamic Technology

Dynamic Technology has been awarded a contract to supply WLS-TV, the Chicago studios of ABC, with vertical interval machine control equipment.

The equipment, known as Vimacs, allows the remote control of VTRs and telecines by inserting the control data onto the vertical interval of the video to and from the machines.

Similar installations have been supplied to the New York, Washington and San Francisco studios of ABC, with additional equipment that allows source identifications and time code to be sent via the vertical interval.

### Cascade Broadcasting buys Panasonic M-format equipment

The Panasonic Industrial Company, Secaucus, NJ, has announced that Cascade Broadcasting Company, Tri-Cities, WA, purchased Panasonic M-format equipment to be used for ENG and EFP applications.

Cascade Broadcasting is a 3-station group of CBS affiliates covering central and southeastern Washington and northern Idaho. The group consists of KIMA (the headquarters station), Yakima, WA; KEPR, Tri-Cities, WA; and KLEW, Lewiston, ID.

Cascade bought 60 pieces of equipment including 15 AU-300B VCRs, nine AU-TB-30 time base correctors, three AU-220 portable VTRs, 11 AU-100B recorders, 11 AU-S100 NTSC adapters, seven VC-2.5 (26P) VCR cables, and four VC-2.5 (30P) VCR cables.

### Conrac and Sony join forces with Conrac monitors

Conrac, Stamford, CT, has announced an agreement with Sony to use Trinitron technology in a line called Conrac Trinitron monitors.

One of the first products being offered is the Conrac Trinitron model 7400, an ultrahigh-resolution color monitor, designed for advanced applications in CAD/CAM/CAE and other computer-generated imaging.

### KFAI receives QEI FM exciter

QEI, Williamstown, NJ, has announced the winner of its 1986 NAB contest. In celebration of the deployment of more than 1,000 model 695 FM exciters, the company offered a new model 695 FM exciter in an NAB drawing for all owners of QEI-manufactured 675 exciters. Station KFAI-FM, Minneapolis, is the winner and will receive the exciter. The exciter provides several advanced features including demodulated FM signal metering, advanced modulation control and advanced circuitry.

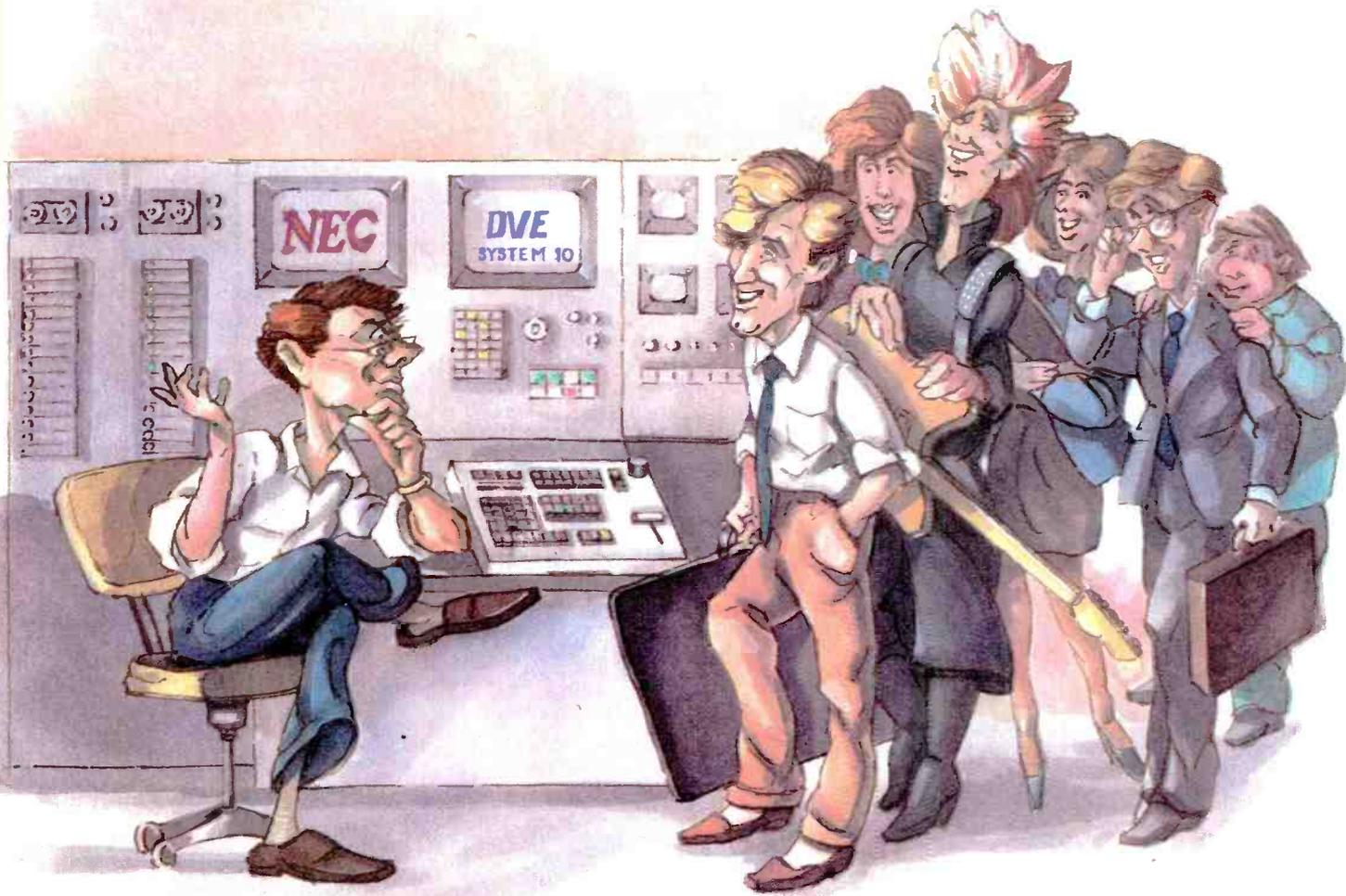
### ATR with 2-year warranty

L.J. Scully, Bridgeport, CT, has announced that its model LJ-12 reel-to-reel audiotape recorder will be warranted against wear of all parts including heads, motors and switches, under normal operating conditions, for two years.

The recorder, which is the successor to the original model 280, is a digitally controlled audio recorder.

Continued on page 200

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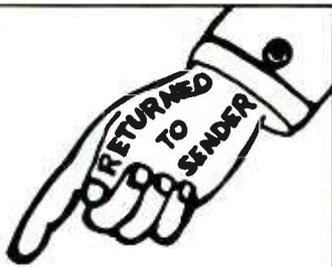
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