

# BROADCAST<sup>®</sup> engineering

January, 1980/\$3.00

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**ENG  
Emphasis**





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NEC, as the world's third largest manufacturer of semi-conductors, provides LSI and hybrid circuits for most manufacturers. Our Broadcast Equipment, which reflects the professional standards you expect from NEC, employs chips developed exclusively for our own use. Below are but a few accomplishments that reflect our dedication to tomorrow's techniques:

**LEFT**—NEC's complete color encoder as used in the ENG series of ENG/EFP cameras for long term stability and negligible power consumption.

**CENTER**—NEC's 8-input/1-output video switcher with switching logic and wideband characteristics permitting 4-channels of digital audio multiplexed with video. The heart of the NEC TKA-105 Routing Switcher.

**RIGHT**—NEC's 16K mosfet ram for high-speed applications in NEC's FS-15 Frame Synchronizer and DVE® Systems.

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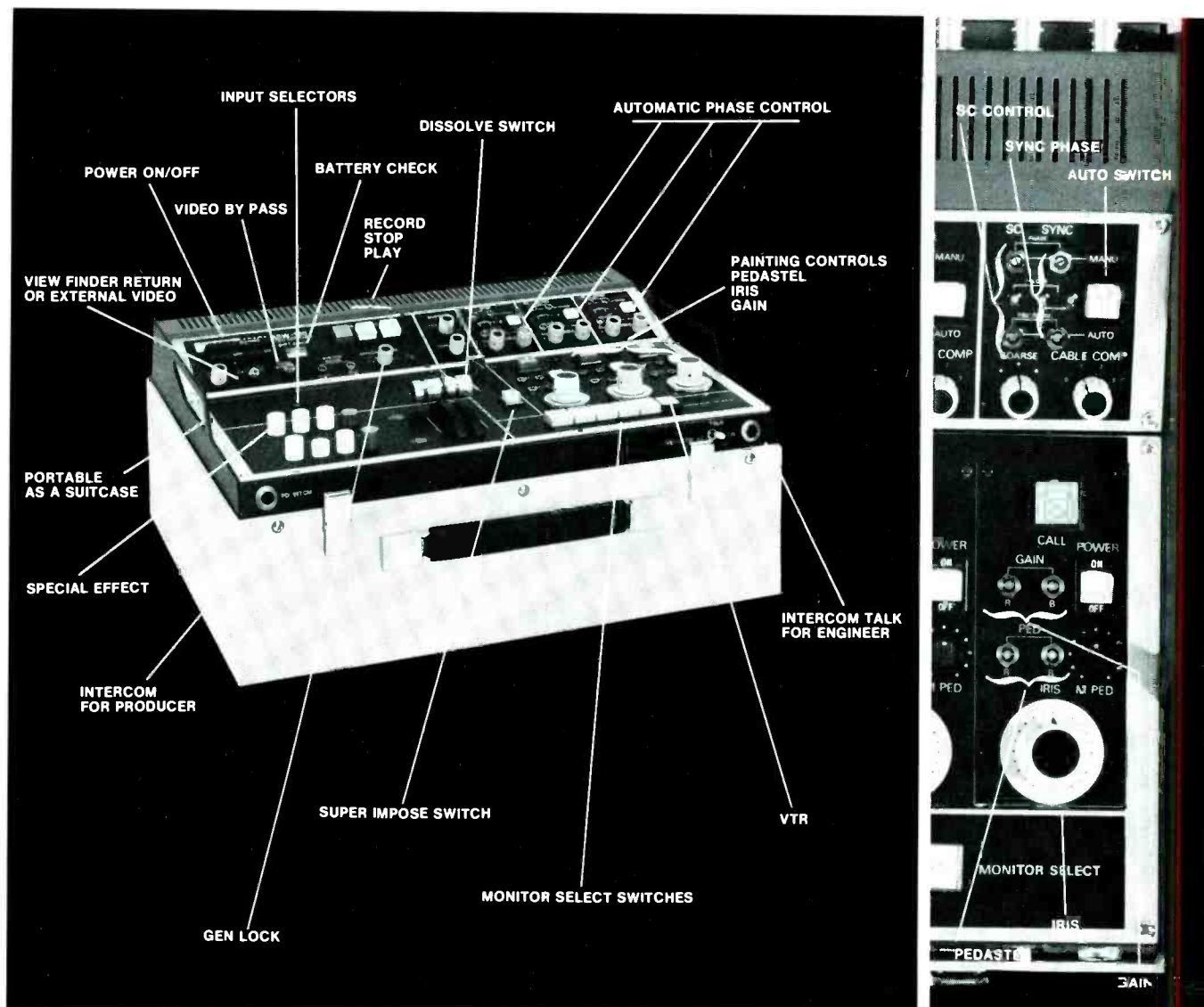
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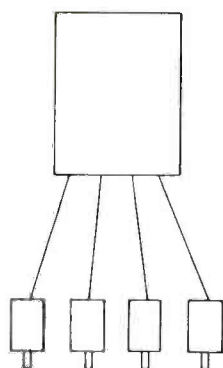
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## Camera Control Module for TK-76, HL-77, BVP-300. Portable Production System Works on Battery or 120-Volt AC Line!



**Automatic Phase Control.** No need to adjust controls on individual sync phase and sub-carrier phase for each camera. Simply plug four cameras into the switcher and the automatic phase control does the adjustments for you.

**Compatible with any camera. Customizes to your equipment. Connects to VTR.** The Asaca ASW-100 portable switcher is designed for ENG and EFP cameras, including Asaca-2000. Small and light with features ideal for field production.

Operates on battery pack, 12-volt vehicle battery, or 120-volt AC line. With the latter two, the switcher can accommodate multiple cameras with VTR. Full operations remote controls optional. Designed for use with Asaca-2000 camera. Non-Asaca cameras containing internal gen lock circuitry use black burst output, providing for each camera position. Painting control permits control of color, iris and pedastel of TK 76, HL 77 and Asaca-2000.

The ASW-100 includes a "sync" generator. Internal gen lock circuit permits VTR signals as a fourth input for editing or program modifications. Switcher is vertical

interval and processes composite video signal. Mixer-fader is included, capable of special effects.

Optional monitoring with AMB-10C monitor. Provides three or four B & W source monitors and wave form monitor for use with external color line monitor.

Here's a full production system capable of expanding your mobile operation while maintaining full broadcast quality.

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# BROADCAST engineering

*The journal of broadcast technology*

January, 1980 ☐ Volume 22 ☐ No. 1

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## BROADCAST engineering



**THE COVER** this month shows the ENG helicopter of KBTv, Channel 9, Denver, CO, in operation. The station's "Eye in the Sky" facility has greatly expanded KBTv's live coverage of breaking news and traffic tie-ups.

The inset photo is an aerial view of the pilons atop the Hancock Tower in Chicago, with Lake Michigan's shoreline in the background. To each pilon is attached a WMAQ-TV radome shielding Nurad SUPERQUAD dual-band (2GHz and 7GHz) antennas for WMAQ's ENG operations. (This picture was taken by Fred Rodey, WMAQ's manager of engineering, from the station's ENG helicopter and was provided courtesy of Nurad.)

The ENG Emphasis in this issue begins on page 20 and includes the stories behind WMAQ's and KBTv's ENG operations portrayed on the cover plus notes on how other stations are gearing up with improved electronic news gathering facilities and for more dramatic, live news coverage.

#### FEBRUARY, 1980

- Studio designs: radio & TV
- Teletext update: US and abroad

#### MARCH, 1980

- Pre-NAB Convention special



# Best In The Field

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Outside the studio, the remarkable Hitachi SK-90 does it all. For EFP, it sports a studio style 5" viewfinder. All key functions can be controlled with your choice of Remote Operating Unit (ROU) or Digital Command Unit (DCU). For ENG, slip off the SK-90's studio viewfinder, slip on the 1.5" viewfinder and shoulder mount. Your SK-90 is now a compact, lightweight self-contained portable!

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*Hitachi SK-90 portable ENG mode*



*Digital Command Unit (with coax/triax option)*



*Remote Operating Unit (features RGB out)*



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What you may *not* know is, for the past few years, we've been quietly doing the same in *video*! Testing and selecting the leading equipment for performance and reliability. And offering a wide selection of production and post-production components and packages—on rental, lease and purchase plans with our customary flexibility.

But don't take our word for it: talk to our customers. You'll see why so many people the industry depends on, depend on us.



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# DEFLECTIONLESS.

## O'Connor Hydro-Ped. Computer-designed for maximum rigidity during panning and tilting.

### VISUAL WHIPLASH.

The Hydro-Ped is the ultimate camera support, designed to replace the conventional tripod and correct the backlash problem inherent in its design.

Backlash often occurs at the end of a pan when the legs of the tripod tend to "unwind" slightly, jerking the camera the other direction. This backlash creates an image deflection subjecting audiences to a visual whiplash. The use of a telephoto lens will tremendously accelerate this problem.

### LIGHTHOUSE EXPERIMENT.

An early experiment to solve the backlash problem included the filming of a lighthouse

through a telephoto lens from a mile away using a fluid head and a conventional tripod. The deflection of the image due to tripod backlash was 32 inches on a ten foot screen.

The Hydro-Ped was later put to the same test and the image proved to be virtually deflectionless.

### SOLID AS A ROCK.

In torsion and bending,

the Hydro-Ped is four times as rigid as a conventional tripod which hinges at the top of its legs. The Hydro-Ped hinges near the ground and has short legs which lock hydraulically in both directions.

This design not only eliminates deflection, but also enables it to be used in the toughest terrain and tightest places.

### SAVES LOTS OF PRIME TIME.

When minutes really count, the Hydro-Ped takes only seconds to position, level and lock.

To adjust camera height, the center column lifts 30 inches vertically with hydraulic assistance for the heavy camera.

### BUILT TO TRAVEL.

The Hydro-Ped is made of a sturdy magnesium and aluminum construction weighing only 29 lbs. It folds to 30 inches long and 10 inches in diameter. A single centered handle with comfortable grip makes it easy to carry.

### STUDIO PROVEN.

Although the Hydro-Ped is not ordinarily used to replace a studio pedestal, quick release wheels and casters are available and many enjoy its ease of use in the studio.

### FLUID HEADS, TRIPODS AND MORE.

O'Connor makes the world's finest line of innovative camera support equipment.

If you're interested in learning more, let us know what camera you have and we'll let you know what we can do to support it.

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January 1980 *Broadcast Engineering* 5

**Some  
things are  
easily  
broken...**

**...not  
the CO90!**

The CO90 miniature condenser microphone was designed by engineers who understand the "real world" requirements of a studio microphone. They've included things like cable assemblies that can be easily and inexpensively replaced in the field. But the CO90 has one feature that no other manufacturer can offer — the Electro-Voice warranty.

Electro-Voice backs up the CO90 with the only two-year unconditional warranty in the business. That means Electro-Voice will repair or replace your CO90 when returned to Electro-Voice — *no matter what caused the damage.*

Electro-Voice can offer that type of warranty because the CO90 was designed to withstand the rigors of professional use. If your application demands a miniature condenser microphone that can take less-than-gentle treatment, the CO90 is the one you should buy.



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## **FCC update**



January, 1980

### **Subcarrier use for ENG**

The FCC (Docket 21323) is proposing the use of subcarriers in the TV aural baseband for the purposes of cuing and coordinating electronic news gathering crews. Technical standards for such transmission are also proposed. This action was initiated by a petition filed by Boston Broadcasters. Comments are due by January 7, replies by January 28.

### **Channel for helicopters**

The Commission has amended its rules to make frequency 123.025MHz available to helicopters for air-to-air communications to meet the needs of growing 'copter usage nationwide. The amendment assures greater safety and efficiency in helicopter operations, and may be significant for ENG.

### **Revised standards and procedures**

The Commission has corrected and revised both its technical standards and technical operating procedures in the broadcast rules. Among the more significant changes, the FCC:

- Consolidated into one rule the procedures for obtaining a special field test authorization for all broadcast services to conduct propagation studies, to assist in transmitter site selection, or to measure projected station coverage;
- Consolidated into a single rule the carrier frequency tolerances for AM, FM, TV and International Broadcast stations;
- Transferred tolerance standards for AM directional antenna systems from the rule on operating power limitations to a new separate rule clearly identifying its content;
- Consolidated into one rule the modulation level required for AM, FM, and TV aural transmissions;
- Added to the rule for AM directional antenna sampling systems a

listing of specific information to be included in an informal request for approval of the sampling system. By obtaining approval of the sampling system, licensees are exempt from several inspection, logging and field measurement requirements;

- Restructured and reorganized the rules for determining the operating power of FM and TV stations for ease of use and understanding; and
- Deleted by use of cross references several rules covering international broadcast radio stations that contain regulations found elsewhere. (MCI v. FCC, 515 F. 2D 385; D.C. Circ. 1975.)

### **1980 research funded**

The Commission has committed \$1.2M of its \$1.3M policy research budget for FY1980 to 25 policy research projects. This included \$300,000 for AM channel spacing research and \$225,000 for UHF comparability. Also approved were: electromagnetic propagation phenomena; low power TV; potential of spectrum band signaling; automatic transmitter identification system; remote control HF direction finding feasibility; TV translation coverage maps; structure and activities of Communications Satellite Corporation and privacy and communications security.

In choosing studies for funding, the Commission stressed those involving effects of competition on the range and quality of communications service, feasibility of alternate methods of spectrum management, assessment of alternatives to regulation and evaluating effectiveness of regulatory objectives.

### **VTR noise figure clarified**

The FCC has clarified the applicability of its UHF TV noise figure standards by amending its rules to specify that videotape recorders may have a noise figure 4dB higher than that for other UHF devices.



# CP\* provides the best TV signal. Harris provides the best CP system.

Harris' Cyclotran is the first complete TV broadcast system designed specifically for circular polarization. It's the most economical way to enjoy the benefits of CP without major expense for a new tower and transmitter building.

The system includes Harris TV transmitters with power ratings up to 100 kilowatts; Harris CP antennas designed

with low windloading specifications or multiplexed to permit multi-channel operations on the same tower; and Harris' 9100 Facilities Control, offering un-manned operation. Cyclotran improves picture quality, increases fringe area coverage and maintains maximum output without violating FCC standards.

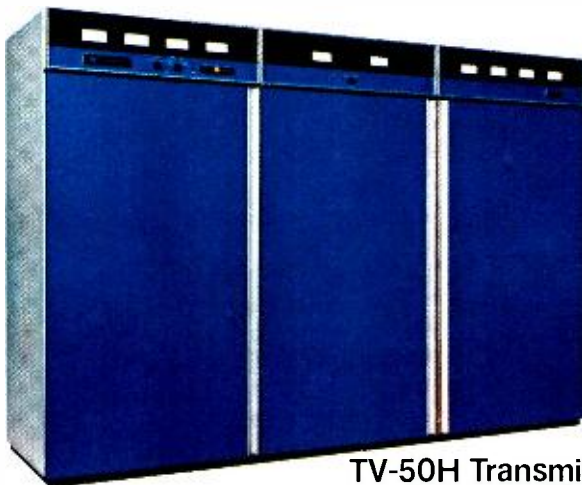
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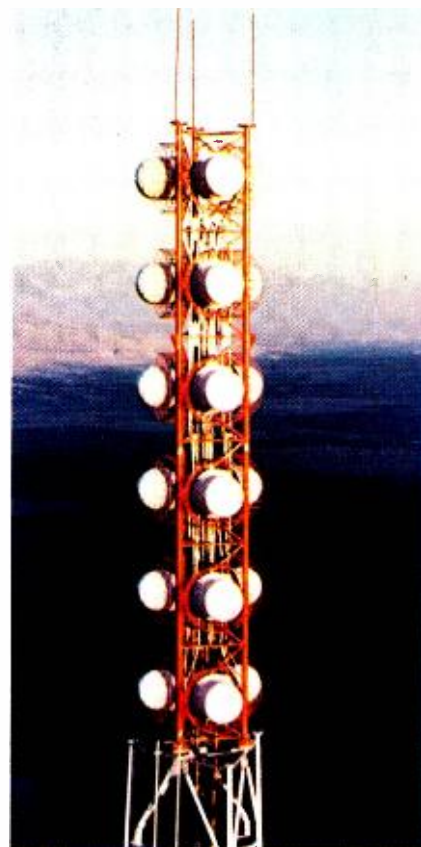
\*Circular Polarization



TV-50H Transmitter



9100 Facilities Control

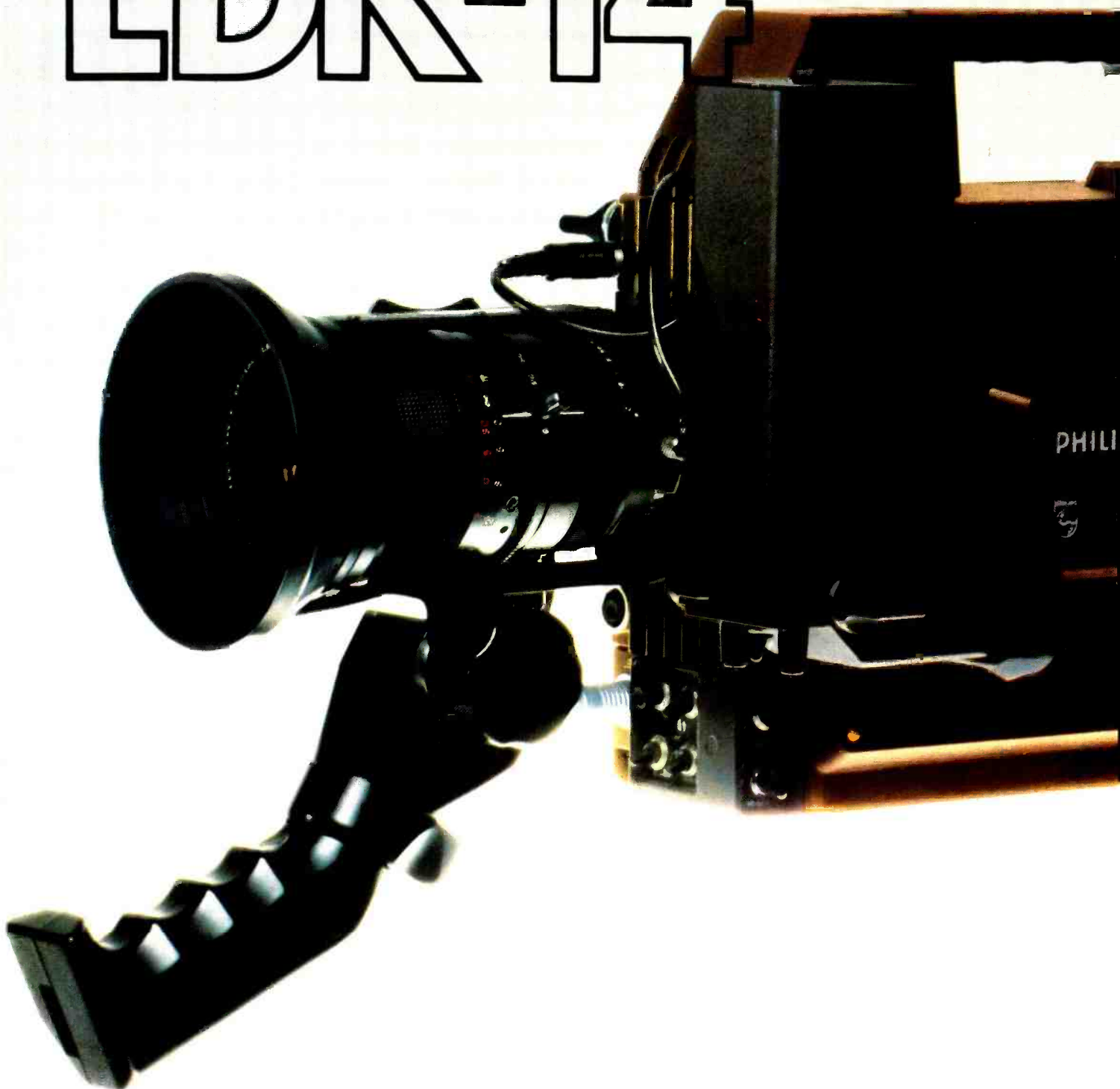


CP Antenna

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January 1980 *Broadcast Engineering* 7

# New Standard for Portables... LDK-14





## In the great tradition of Philips portables:

**1968...PCP-70** The industry's first portable. The one that started it all.

**1969...PCP-90** Step two. World famous Minicam.

**1975...LDK-15** First generation of triax field production cameras.

**1976...LDK-11** A smaller, lighter, lower cost field and studio camera.

**1977...Video 80** An innovation in lightweight camera and production system...**LDK-15L** Latest version of the LDK-15.

Evolving from this long history of portable equipment leadership, Philips' engineers have created a new concept in portable and field equipment. **The LDK-14 broadcast systems camera.**



A futurized camera offering three advanced configurations for field and studio use...all achieved without equipment repackaging:

1. **ENG**—studio quality portable; self-contained, one piece; film camera handling; weighing less than 15.5 lbs. (7 Kg) lens included; less than 12 lbs. (5.5 Kg) without lens.

2. **EFP**—studio quality portable, with remote control; timing and phase adjustable gen lock; instant convertibility to studio camera use by simple change of viewfinders.

3. **Studio**—compact, maneuverable; full broadcast quality; 5" viewfinder.



The LDK-14 combines innovative design and unique capabilities in a state-of-the-art 2/3 inch camera that is *much lighter* and *uses significantly less power* than the competitive ENG-only camera. Plus the LDK-14 gives you additional advantages in size, picture quality, stability, maintainability and cost.

Among its many other unique features for portable and studio use are:

- Only 27 watts power consumption (almost 1/3 less than the ENG-only competitive portable) gives longer continuous operation with choice of battery belt or small battery pack affixed to camera. A standby switch further conserves battery power between takes.

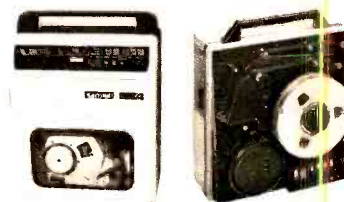


- Viewfinder displays include: contour enhanced camera picture or external video signal; status monitors for video level, color balance, bars on, battery discharge, VTR functioning, intercom call and camera tally.
- Automatics include: color balance; white and black level; centering; noise reduction when operating with extra gain; auto iris with set and hold facility.
- Externally switchable black stretch and contrast expansion.
- Dynamic Beam Control (DBC), regulates beam current to suppress comet tailing and blooming.
- Circuitry designed to maximize advanced capabilities of the latest rear-loading Plumbicons.

- Optional remote control facilities.
- Easy access for set-up and maintenance. Rear casing flips up for access to five main plug-in circuit boards.
- The rugged magnesium housing and titanium quick-release lens mounting holds all optical and electrical components in absolute registration. (Lens mount is strong enough for the heaviest extended range zoom lenses.)
- Rain, splash and RFI proofed
- Other features include electronic raster rotation for better registration; linear matrix for optimal and Philips compatible colorimetry; and 360-degree hue-selectable chroma key.
- Other competitive cameras may have some of these LDK-14 features—no one has them all.

### Camera-Recorder Systems

With this unmatched combination of performance and portability, the LDK-14 is *also the ideal camera for field recording of ENG and EFP*.



And just as Philips has always offered the widest selection of portable and studio cameras to meet your specific needs, the same policy now applies to your choice of 1" VTR's and TBC's. Offering 'C' format and 'B' format VTR's in both portable and studio configuration, Philips can provide the greatest objectivity and cost-effectiveness in packaging systems to match your requirements.

**Philips, the company that started it all, now introduces the latest portable breakthrough, the LDK-14 broadcast systems camera. It will be the industry standard for years to come. And for a camera-recorder package to match your requirements, your choice of 1" VTR formats. Only from Philips.**

For all the facts on this innovative new camera or camera-recorder system (please specify) write: Philips Broadcast Equipment Corp., 91 McKee Drive, Mahwah, N.J. 07430 (Canada: Philips Broadcast Equipment, 601 Milner Ave., Scarborough, Ontario M1B 1M8)



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Colortran's location lights are designed for ENG and film production. Their lightweight construction and compact design delivers maximum illumination for your production needs. Fill lights and variable focus spots are available in wattages from 500 to 1000 watts, 120, 220, and 240 volt lamps are available for all fixtures. Need location lighting? — Fill out the coupon for more information.

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BE180

## industry news

### KRNA increases to 100,000W

On October 26, culminating a decade of legal action before the FCC, KRNA 93, FM, Iowa City, IA, joined the ranks of the most powerful broadcasting facilities in the nation by boosting its power to 100,000W. KRNA had spent over five years in rulemaking procedures and two years in contested application procedures that were rivaled only by the marathon Boston TV decision.

### Satellite transmission to remote locations

Western Union and Video Communications, Tulsa, OK, have announced that Video Communications will transmit a variety of programs to industrial personnel in remote and isolated areas of the world. Transmission will be via Western Union's Westar III communications satellite. "We will transmit 12 hours of programming per day, initially, increasing to 24 hours per day by the end of 1980," Video Communications' president Bill Blair stated. Reception of the transmission signal will be limited to subscribers of Video Communications' services. Blair said the move could revolutionize the information needs of thousands of Americans working around the world.

### Altec diversifies product and dealer franchises

Altec has announced that recording/broadcasting is a new franchise category. Recording/broadcast products are designed for recording studios and broadcast facilities, primarily small local stations and network affiliates. This line includes mixers and amplifiers, monitors, high and low frequency speaker systems and microphones.

### Space communications

The National Aeronautics and Space Administration has assigned responsibility to the Lewis Research Center in Cleveland, OH, for efforts to retain the US world leadership in satellite communications research and technology. The general program objective is to spur more effective and increased use of the radio frequency spectrum at the geostationary orbit level. Another major goal is to develop technology that will provide for lower space communications service costs and catalyze new and innovative public services.

### Additional communications satellite

RCA American Communications has filed with the FCC an application for authority to construct an additional communications satellite to be used as a ground spare in what is planned as a four in-orbit satellite system by mid-1981. In its filing, RCA American indicates it has demonstrated to the FCC that sufficient demand exists for it to fill four in-orbit Satcom satellites, and that the company should be in a position of having a ground spare for launching in the event of a catastrophic failure of one of them.

### KCET pioneers in teletext

KCET, Channel 28, has become the first public television station and the first ultra-high frequency television station in the US to experiment with teletext, an



information system tied in to home television receivers that is now being utilized in various European countries. The hardware for KCET's teletext test was provided to the Los Angeles-based non-commercial station by Antiope Videotext Systems of Paris and Washington, DC.

#### **New division for Panasonic**

Ray Gates, executive vice president, Panasonic, has announced formation of a new division to serve the needs of the professional sound markets and more specifically of the recording and broadcasting industries. The new division will be headed by Jim Parks, assistant general manager, reporting directly to Gates.

#### **Satellite communications**

An agreement was signed by COMSAT and Micronesian Telecommunications, a subsidiary of Kentron International for COMSAT to build and to own and operate an earth station on Saipan to bring a wide range of satellite communications services to the Northern Marianas, located about 1700 miles east of the Philippines. As soon as possible COMSAT will file an application with the FCC for approval to proceed with earth station construction.

#### **Garage serves as broadcast center**

A multi-million dollar broadcast center under construction at Lake Placid, NY, will soon be the home of snowplows, dumptrucks and bulldozers. The center is being outfitted with equipment to help accredited broadcast media representatives in their coverage of the 1980 Winter Olympic Games, being held in Lake Placid this coming February. As soon as the activity is over, the facility will be turned over to the town for use as a highway garage. Nearly 300 accredited broadcast news media representatives which include cinematographers, radio and television commentators and technicians will use the 88,000 square foot structure as a base to process, edit and produce newsfilms and newscasts covering the various events.

#### **Digital technology in audio industry**

According to Michael Schulhof, Sony Industries' president, recent developments in digital technology will benefit the entire audio industry. Schulhof spoke at a recent Institute of High Fidelity seminar. He emphasized that major digital progress will first be in studio equipment. Said Schulhof, "there's no need and no reason to bring digital equipment into the home until the record companies have built up a backlog of recording sufficient enough to justify it."

#### **Ampex delivers 1000th VPR-2**

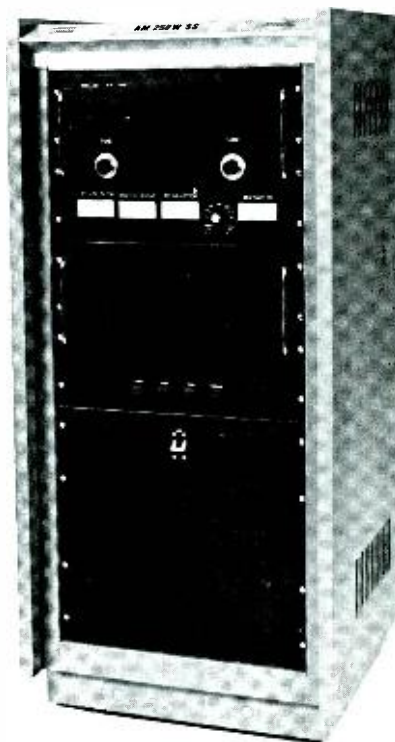
Ampex announced it has delivered the 1000th VPR-2 helical scan videotape recorder/reproducer to station WBBM-TV, Chicago. WBBM, owned and operated by the CBS Television Network, will use the system for broadcast teleproduction work, according to Donald V. Kleffman, vice president/general manager of the Ampex Audio-Video Systems Division.

#### **Production effects generator purchased**

Trans American Video has purchased a production effects generator, the DPE 5000 Plus by Quantel from Micro Consultants. According to Murray Schwartz, president of TAV, "This is a major step in our continuing technical progress program for offering the most complete post production services to the tape industry."

WILKINSON ELECTRONICS

## **AM-250SS SOLID STATE 250 WATT AM TRANSMITTER**



#### **FEATURES**

- Not Susceptible To Reacting Loads
- Low Operating Cost - Extreme Efficiency
- Drawer Construction - Extreme Accessibility
- Expandable - Combine two for 500 Watts
- Available at 125 Watts or Less
- Power Flexible - 115 or 220 volts AC
- 125% Modulation Capability
- Exceeds U.S. FCC Specifications

The Wilkinson Electronics AM-250SS is an all solid state 250 watt Am transmitter housed in an attractive 24 inch cabinet, 52 inches in height. All components are mounted in two drawers for maximum accessibility and ease of maintenance. Space is available in the cabinet for a second transmitter making it possible to combine two 250 watt units to obtain 500 watts. It is also available at any power below 250 watts at a reduced price.

**WILKINSON**  
**ELECTRONICS, INC.**

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## National Association of Broadcasters

1771 N Street, NW  
Washington, DC 20036



### Gannett Foundation approves fund

An \$85,000 grant to the NAB's Minority Investment Fund has been approved by the Frank E. Gannett Newspaper Foundation. The fund was established to assist minorities in acquiring and operating broadcast facilities. Individual and group broadcasters and networks are being contacted for contributions. It is expected that matching funds will be made by the Small Business Administration.

### NAB opposes extension

According to the NAB, an FCC proposal to broaden its ex parte

rules, is "unwise, unnecessary and unfair." Under current rules ex parte communications prior to designation of a case for hearing shall not be made after the filing of a petition to deny. Proposed regulation states the rules would also be triggered by the filing of an informal objection.

NAB said in its filing that an across-the-board extension of the rules to technically deficient pleadings "would not further the goals for which ex parte rules are promulgated, namely, to prevent one party from getting an unfair advantage over another party in an adversarial process. Instead such

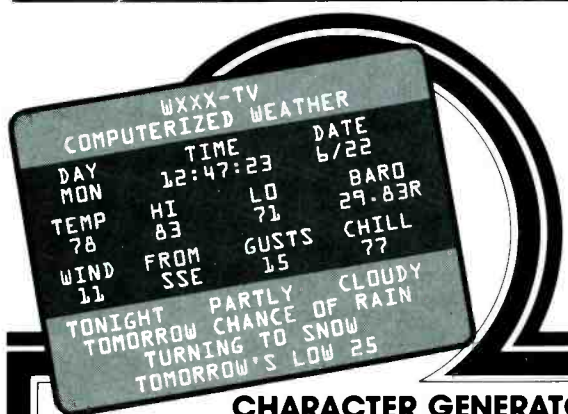
an approach would be unfair to the applicant and the public and in the process, would generate needless confusion."

### NAB fights rule change

According to NAB, the FCC's proposed rule change to accommodate home television devices such as cassette players, discs, computers and games would cause substantial interference to over-the-air TV reception. Two manufacturers have asked the commission to consider establishing regulation for stand-alone modulators for operation with such devices. The FCC responded by proposing a rule change that would also include self-contained modulators.

### Political access ruling

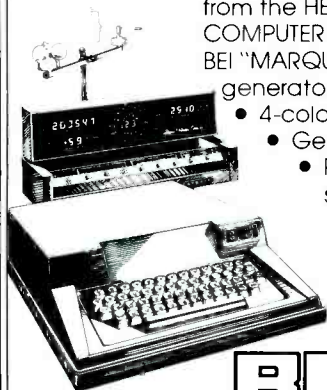
ABC, CBS and NBC have joined with the NAB in asking the FCC to stay and reconsider its order requiring the networks to provide air time to the Carter-Mondale campaign committee. According to the NAB, the commission's new interpretation of "reasonable access," based on particular candidates' assessments of their own "needs" for air time, is in direct conflict with the Communications Act.



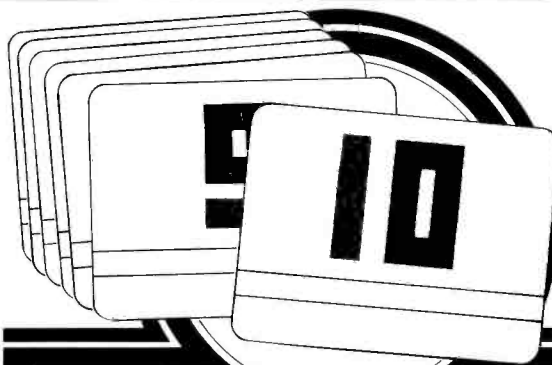
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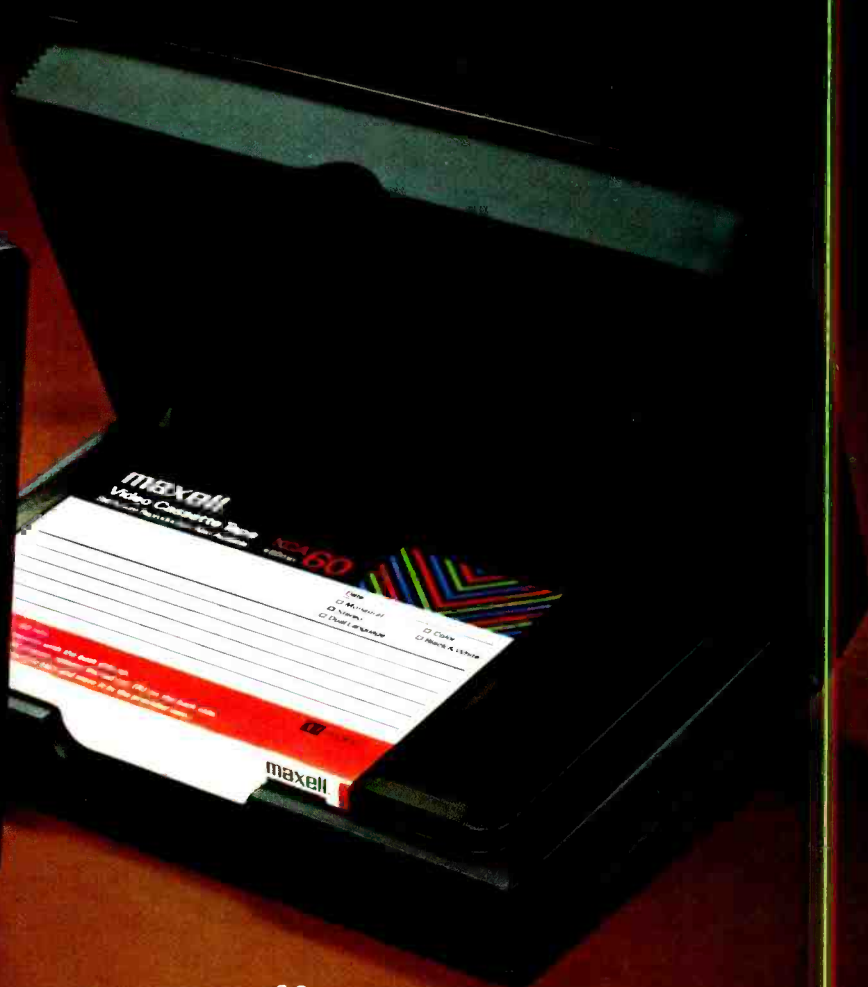
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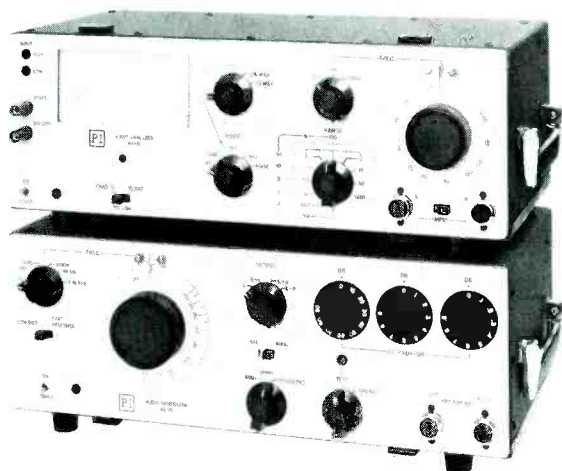
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	Combined With Analyzer	Combined With Analyzer	Separate Unit
<b>AUDIO GENERATOR</b>			
Intermodulation test signal	No	Option	Yes
Wow & Flutter test signal	No	No	Yes
Simultaneous L&R Outputs	No	No	Yes
600 ohms and 150 ohms Source	No	Yes	Yes
Stereo Matrix Switch (L,R, L+R, L-R)	No	No	Yes
Switch to remove signal and terminate line for S+N/N	No	Yes	Yes
10 dB, 1.0 dB, 0.1 dB Step Attenuators	No	Yes	Yes
<b>AUDIO ANALYZER</b>	Combined with Generator	Combined with Generator	Separate Unit
Harmonic Distortion Mode	Yes	Yes	Yes
Automatic Nulling	Yes	Yes	Yes
Automatic Set Level	Yes*	Option*	Yes
Intermodulation Distortion Mode	No	Option	Yes
AC Voltmeter Mode	Yes	Yes	Yes
Stereo Phase Meter Mode	No	No	Yes
L/R Amplitude Ratio Mode	No	No	Yes
Wow & Flutter Meter Mode	No	No	Yes

\* Limited to 10 dB capture range.



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**NRBA**

National Radio  
Broadcasters' Association

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Washington, DC 20036

## ERRATA

The November, 1979 issue of **BE** mistakenly identified WDAY as the affiliate station of Andy Laird; this should have been KDAY. Laird co-authored the NRBA '79 Replay, and **BE** commends his diligent efforts in Washington.

## Play bill

Performance royalty legislation, which would require royalty payments for every record a station airs, is being considered by the Congress. NRBA president Sis Kaplan has been scheduled to testify and is preparing formal testimony against this legislation.

The NRBA hopes that each radio broadcaster will contact their legislators and give them the facts. Stations whose representatives are members of the Subcommittee should remember that their voices carry special weight.

## Kaplan criticizes broadcaster apathy

In her first speech as NRBA president, Sis Kaplan urged America's broadcasters to use their power and influence to achieve the deregulation of radio. Addressing the New Hampshire Association of Broadcasters, Kaplan questioned radio broadcasters' reluctance to work in their own interests. The most recent display of broadcaster complacency, according to Kaplan, was the lack of active support for HR-3333.

## RAB contribution

The NRBA has announced a contribution of \$5000 to the Radio Advertising Bureau's (RAB) "Radio: It's Hot" campaign. The check was presented to RAB president Miles David and RAB executive vice president Robert Alter at the RAB headquarters in New York.



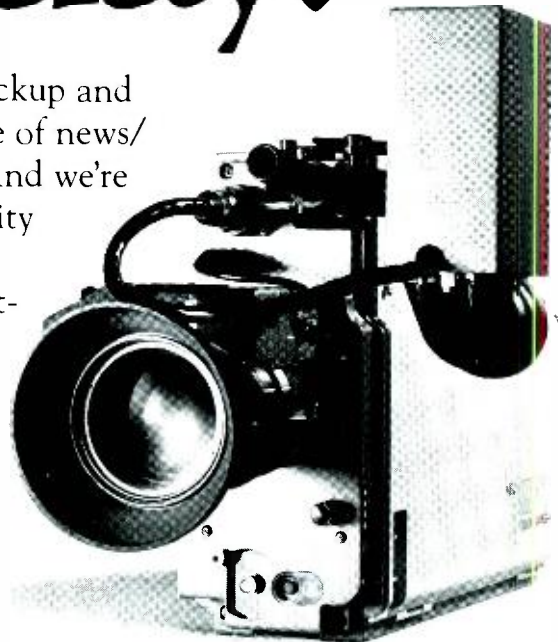
# We've got you covered... 24 hours a day. Every day!

Cinema Products wrote the book on after-sales backup and reliable service when we introduced our CP-16 line of news/documentary cameras to the television industry. And we're doing the same for our MNC-71CP broadcast-quality ENG/EFP video cameras!

When you buy an MNC-71CP, you are automatically covered by Cinema Products' outstanding around-the-clock video service program. Twenty-four hours a day. Seven days a week. Nothing offered by anyone else in the television industry even comes close!

## Note and compare:

- ☑ The MNC-71CP is covered by a full one-year warranty — unprecedented in the broadcast industry! (And there's no service charge ever for warranty work.)
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TELEVISION CAMERAMEN, INC.

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**Take 1 More on Training** (British Guild of TV Cameramen style.)

A recent column elaborated on a proposed camera training program drawn up by our counterparts in the United Kingdom. This program is based on input elicited from the membership-at-large of the guild and then further refined by the training committee set up to sift through the various contributions and then come up with a training document reflecting the collective effort.

The last article concerned itself with number nine in their manifesto, entitled: *Future Potential*. The sections selected for this issue back-track to the introduction of their program and to the portion of their program dedicated to the interview.

"Because the end product of training a cameraman must be the viewer's complete unawareness of

the camera work, it is all too often assumed that this unawareness of operation means that the role of the cameraman is an easy one; and that almost anyone can become a cameraman. This is a totally wrong and very rash assumption, as anyone will tell you who has the responsibility for engaging and training raw entrants, especially since not all applicants are mentally suitable for the work.

"The pressure on the cameraman is considerable, as there is no room for any shirking of the responsibility for doing a first class job. In some cases this results in mental stress, shown in a small way by up to a 50% increase in pulse rate after operating a camera (on the air). If the man is not of the right mental attitude to accept this frequent stress, then a breakdown can easily follow. At the other end of the scale

it would be *fatal* to engage a trainee who was wooden and unimaginative, for he would contribute nothing!

"There is no standard procedure for interviewing applicants, but the final judgment whether to engage someone should be left to a senior cameraman or department head."

During an interview, the opportunity should be taken to assess the applicant's manual dexterity by giving him the opportunity to operate a camera. The same should apply when selecting experienced cameramen. While the results from such a test are by no means infallible or conclusive, you will gain a far greater appreciation of the applicant's potential.

"The final judgment almost becomes an intuitive assessment, which mostly works. Of all areas in television the camera department is perhaps the most difficult section in which to carry a passenger! This does not mean that camera departments have the cream of operators, but the system provides a means of weeding out which can result in the camera department being among the most dedicated and conscientious of all sections in the vast majority of companies."

(Continued on page 57)

## Improve your image with the **YFI Record Booster** -rack mount or portable



A revolutionary process that puts the highest picture quality into your original cassette recordings is now available to users of U-Matic and other color-under VTRs.

The secret is in the new YFI Record Booster, an add-on device which compensates in advance for the usual picture degradation that  $\frac{3}{4}$ " and  $\frac{1}{2}$ " cassettes suffer in normal playback operation.

TV stations and production facilities that have used the Record Booster are impressed with the substantial improvement in picture quality, while liking the "non-enhanced" look the Booster gives. How is this paradox achieved? Well, this latest addition to the YFI line of image improvers crispens the small details in the picture

**without enhancing large outlines.** As a result the playback image does not have the usual flat pasty appearance with over-emphasized edges that enhancers produce. Further, the "cartoon-like" appearance of too many ENG programs is eliminated.

### THE RESULT

A sharper, crisper, more detailed image that **does not look enhanced.** It looks as if it came from a much better VTR.

It makes sense to do it this way. The Record Booster goes in your signal path **ahead of the VTR**, after the camera or high quality picture source (film, quad master, etc.).

**That means the improvement is**

**built into your original master cassette recording. So it will always be present in subsequent generations.**

### RACK OR PORTABLE CONFIGURATIONS

The Record Booster is available in rack mount form or in a portable battery-operated configuration as an add on (**less than 1½ lbs.**) to portable VTRs. **No modification of your VTR is necessary.** Easy connections.

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YFI equipment is in widespread use today. Send for our detailed data and get further improvement in picture quality with our Record Booster.

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**1979**

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today's Vega systems are designed with the latest in high-technology electronics and sophisticated audio engineering. Besides offering you the finest systems available, Vega is constantly working with the industry to further the art of audio processing. One example is Vega's F.C.C. petition which resulted in obtaining clear wireless channels for broadcasters and filmmakers last year.

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Station KFIM tower, with a Phelps Dodge Super-Power FM Broadcast Antenna (shown close up below left), overlooking El Paso, Texas.

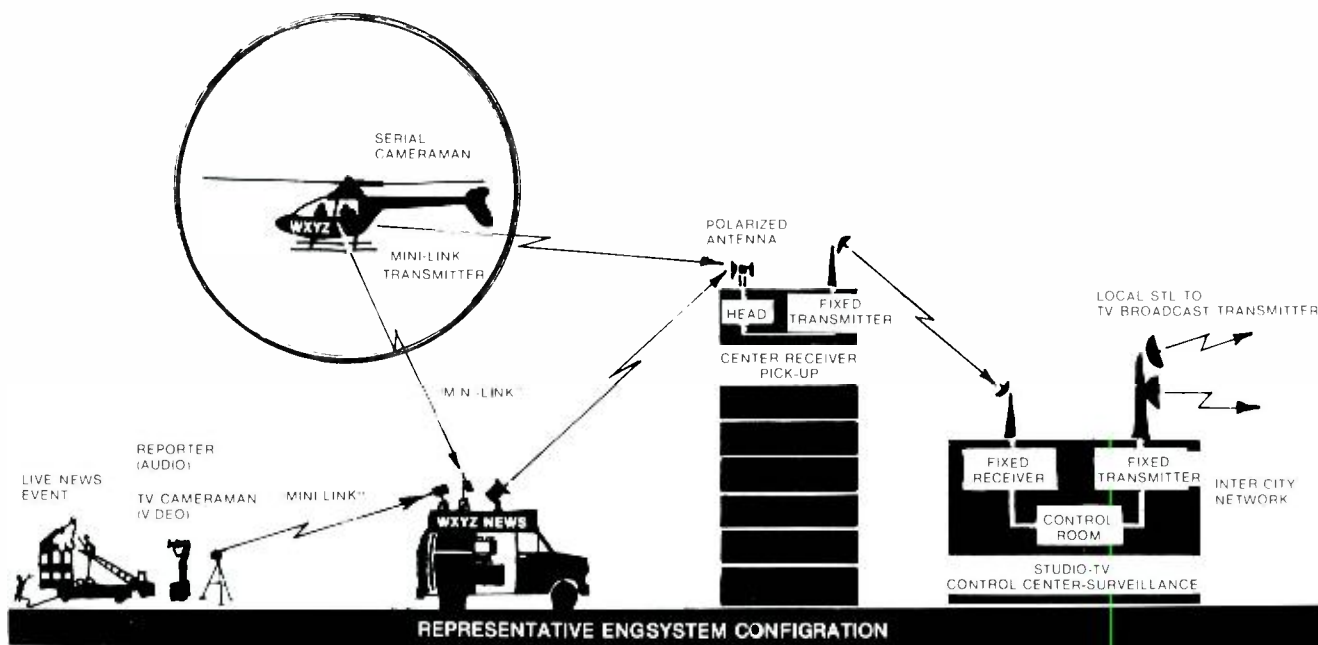


300 Park Avenue, New York, New York 10022

# The copper people from Phelps Dodge

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## ENG EMPHASIS

### Part I. Introduction

ENG—electronic news gathering—is a rather recent product of the broadcasting industry and entails many fascinating aspects. While broadcasters themselves have generated this product, manufacturers have responded admirably with a host of invaluable instruments and systems—portable cameras and power packs; communications links and cueing systems; remote pickup units and custom-designed mobile news vans; airborne-packaged systems for helicopter operations; flexible, high-gain antenna systems for field-station links; and improved

editing systems to handle the accelerated pace of news formats.

The evidence of material gains through increased demands for news in this highly-agitated world is impressive. The growth in products for broadcasters, more news and its varied formats, and international coverage with satellites has never before been so obtainable. But material gains are only a segment of the picture. The profits possible through news have revolutionized the industry. There is now a feverish clamoring to construct the finest news sets, develop the most

sophisticated and versatile mobile news systems, and staff the most productive newsrooms. While this activity has been a boon to manufacturers, it has carried with it an industry struggle for ratings supremacy.

This issue of **BE** takes a look at selected segments of this growing industry. The following articles review how some stations have responded to the ENG challenge and what they have achieved. Also, some products are interjected along the way to show selected aspects of ENG. The final article provides a roundup of color cameras for ENG/EFP that have helped revolutionize this industry.

But a note of caution: ENG is essentially a local decision for broadcasters. It involves all factors of engineering and economics and must be backed up with careful planning to be successful. Not everyone will need the same equipment—what works well in one area or market may not work elsewhere. Furthermore, some of the most intriguing design and engineering solutions are not being published—so you'll have to design yourself out of the tough corners on your own. In any event, the following articles will provide food for thought and many helpful tips to a successful ENG operation.



*ENG—CBS leads the way.* One of the 1974-75 Emmy awards for technical achievement was given to the Columbia Broadcasting System for spearheading development and realization of the Electronic News Gathering (ENG) system.

Shown here is Joseph A. Flaherty accepting the award for CBS. The pioneering work that led to this prestigious recognition was conducted at the CBS flagship station KMOX in St. Louis, MO. This station was prominent in the press for its recent, extensive tests with an experimental teletext system. (See the November, 1979 issue of **BE**, pp. 62-65.)



Facts from Fluke on low-cost DMM's

# Our new 4½-digit bench/portable: You've never seen anything like it.

Take a close look at the face of this instrument. Notice anything new? If you just realized you've never seen *words* on a low-cost DMM display before, you're on the right track.

This is the new 8050A from Fluke, the *lowest* priced 4½-digit multimeter available that uses microprocessor technology.

**The legends on the LCD are clues to what makes the 8050A unique.**

**dB:** You're right. The 8050A delivers direct readouts in dBm, referenced to any of 16 impedances. Use the "REF Z" button to scroll through the memory and locate the zero dBm reference you need,

then set it and forget it. No more tedious calculations or conversions.

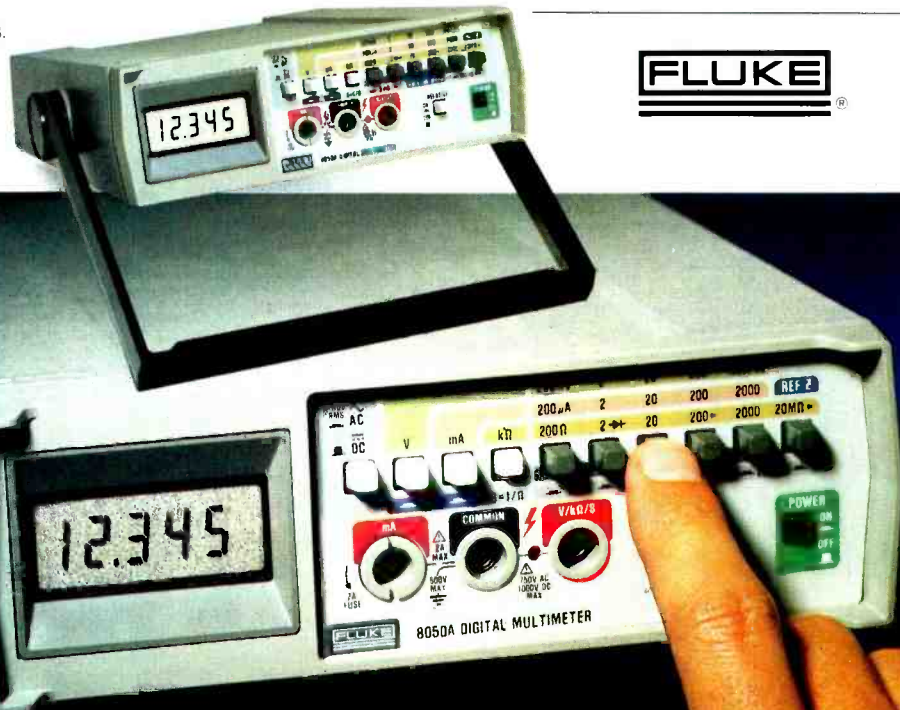
**REL:** For relative references in the dB mode or offset measurements in all other functions. Lets you store any input as a zero value against which all others are automatically displayed as the difference. Another timesaving convenience.

**HV:** Just a reminder when your input is over 40V, so you won't forget about safety while in the dB or relative modes.

Of course there's much more to the

8050A. True RMS measurements to 50 kHz. Conductance for measuring resistance to 100,000 Megohms and leakage in capacitors, pcb's, cables and insulators. Diode test, 0.03% basic dc accuracy and full input protection. Plus a large family of accessories. Just \$329 U.S.

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BE-1/80

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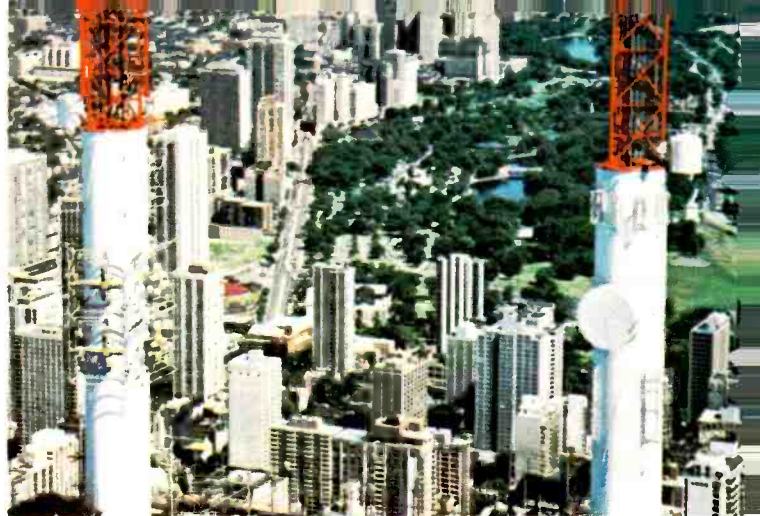
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Circle (17) on Reply Card





WMAQ's antenna systems located atop the Hancock and Sears Towers (circled in the upper left photo) dominate the Chicago skyline and provide exceptional linkage for ENG coverage. The other three views were taken from WMAQ's ENG helicopter as it flew around the Hancock Tower. One of the Nurad radome-shrouded antennas is shown circled in the lower left photo, and both are shown from different angles in the right hand pictures. (Photos taken by Fred Rodey, WMAQ manager of engineering.)

## ENG/EJ : A view of WMAQ's Windy-City experience

By Willis Marshall, director of engineering and plant management and Paul Beavers, director of news, WMAQ-TV5, Chicago.

*WMAQ-TV5's push for top ENG/EJ equipment and crews has led to an Emmy nomination. The authors give a behind-the-scene view of the work that led to this prestigious award.*

With tremendous access, multiple choices and a proliferation of sophisticated new technical equipment, today, observations and reports can be made from locations that recent TV news gathering crews could only dream of. At WMAQ-TV in Chicago, keeping ahead of the competition is serious business. Recently, the station has acquired some new tools and equipment to get the job done better.

To begin with, the station now leases, on a full time basis, a fully equipped helicopter for regular news coverage. WMAQ-TV has installed two new dual band Superquad microwave antenna systems

on top of the Hancock Towers to replace single channel horn antennas. Each receive system permits simultaneous and independent microwave ENG/EJ operations in both the 2GHz and 7GHz auxiliary broadcast bands. In addition, the Sears Tower receive location has 2GHz and 7GHz Nurad horns located in the four corners of the 104th floor for simultaneous reception on dual bands. A fleet of 13 automobiles and six vans with live capability carry crews and equipment to the scene of a story.

### Helicopter coverage

The new technology has increased the speed, mobility and range of the news gathering capability at the station. The newly acquired helicopter permits more consistent and economical use of crews and equipment. Previously, 'copters were leased only for storms, train wrecks and other disasters that seemed to

demand aerial coverage. Now with the 'copter on hand full time, good aerial pictures are feasible for normal news coverage, and reporters and crews can be carried to the scene of a breaking story in record time.

During Chicago's crippling blizzard of '79, WMAQ-TV leased a 'copter that was used extensively. In some cases, it was the only possible way to get around. It provided spectacular aerial shots and served as a relay system for the microwave feed.

At the scene of the DC-10 crash in May '79, WMAQ-TV was the first one at the scene with a leased helicopter. Though it did not have live capability, the helicopter was used to fly back and forth from the crash scene, retrieve tapes, transport personnel and shoot aeriels. With this mobility, WMAQ-TV won a national Emmy nomination for its coverage of the DC-10 crash, and





## **First World Conference & Exhibition on computerised TV based information education and entertainment**

**26-28 March 1980, Wembley Conference Centre  
London, England**

### **The Exhibition**

All the major TV manufacturers will display the latest products based on the combined use of the video TV screen and the computer. The rapidly growing electronic publishing information provider industry will have a unique opportunity to demonstrate both the commercial and home use of these video based systems.

Organisations who have already booked exhibition space include:

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Fintel ● G.E.C. ● Granada TV Rental ● ITT ●  
Langtons Information Services ● Mullard ●  
Philips Industries ● Rediffusion ● Standard  
Telephone and Cables ● The Post Office

### **The International Conference**

This will comprise multiple parallel streams of sessions which will include formal papers and informal discussion periods. Most of the speakers have now been invited but information providers may still submit papers for consideration on the following themes:

Electronic publishing and the information industry ●  
Legal aspects of electronic publishing ● Viewdata and  
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the story was carried on a number of the station's affiliates. The success of this news gathering operation convinced the station to lease its own full-time 'copter. On August 27, 1979, WMAQ-TV became the first TV station in Chicago with its own helicopter. The WMAQ-TV 'copter is permanently equipped with microwave units and is stationed at Chicago's Midway Airport. In a matter of minutes, the 'copter and TV crews can rendezvous at nearby Meigs Field and be ready to respond to a story.

Since its acquisition, the 'copter has been used for many purposes: athletic events, police surveillance and by Unit 5, WMAQ-TV's Investigative Unit, to get aerial shots of suspected chop shops in its series on auto thefts.

Covering spot news or planned stories, the 'copter becomes a useful new tool, giving the station a distinct advantage in news coverage.

#### Technological growth

The growth of microwave receiver systems, lighter minicameras, and tape recorders for field use has further altered the state of electronic news gathering, moving the deadline for news stories later and later. Now the final deadline for getting live pictures has become the end of the newscast itself. Previously, a lead time of at least an hour had to be allowed for processing film and transporting it back to the station.

Instant turn-around has forced reporters to be better backgrounded in all news issues. Where they used to work on a story during the hour it took to transport and process film to the station, they now must edit and think on their feet. The disappearance of elaborate logistics and advance planning for live coverage allows a reporter with a remote unit and crew to be live from the moment the reporter hits the street.

#### Audience response

Audiences, too, have come to expect more from the local TV newscast. No longer content to see a rehash of stories reported earlier in the day, they expect updates and advances on the late edition of the news.

Whatever is happening right now in the world is accessible immediately, electronically, locally and internationally. During the crisis in Iran, our own government got its news directly from the electronic media, as interviews with Khomeini and scenes of the siege were transmitted over satellite. Improved news



gathering systems are the broadcast engineers' responsibility, providing news departments with the latest technology support systems available.

#### Portable cameras

The biggest breakthrough at WMAQ-TV was the acquisition of the truly portable minicam in 1974. Prior to that time, and as early as 1967, WMAQ-TV experimented with limited portable tape capability. In some early exercises, the station used the Norelco PCP-70 hard wired to an RCA TR5 tape machine and experimented with vans with limited microwave capability.

The large tape machines, weighing between 500 and 700 pounds had to be kept in the van because the camera was married to the tape machine and was difficult to use unless the tape machine could be rolled out of the van and moved into the area of the news story. This inflexible system was not fully useful, except for man-on-the-street interviews, or for bringing someone up to the van to be interviewed. Until 1974, when the station purchased its first two Ikegami HL-33 cameras, it was totally dependent on film, which after being brought back to the studio, required 22 minutes for developing, before it could be edited. When the equipment became truly portable in 1974, the station began its conversion from film to tape. Completion of this conversion was realized July 1978.

During the same time, live capability was being developed with the building of microwave systems. By 1976, the original two Ikegami cameras were retired in favor of the RCA TK-76. At present, the camera equipment at the station is all RCA

Custom-designed vans for ENG are hot items among broadcasters. While helicopter coverage may not be suitable for some stations, a properly-equipped van is a must for a station active in rapid news coverage. The van shown here was displayed at NAB '79 in Dallas and sold shortly after the show opened for delivery when the show closed. (Photo courtesy of Chris C. Cave.)



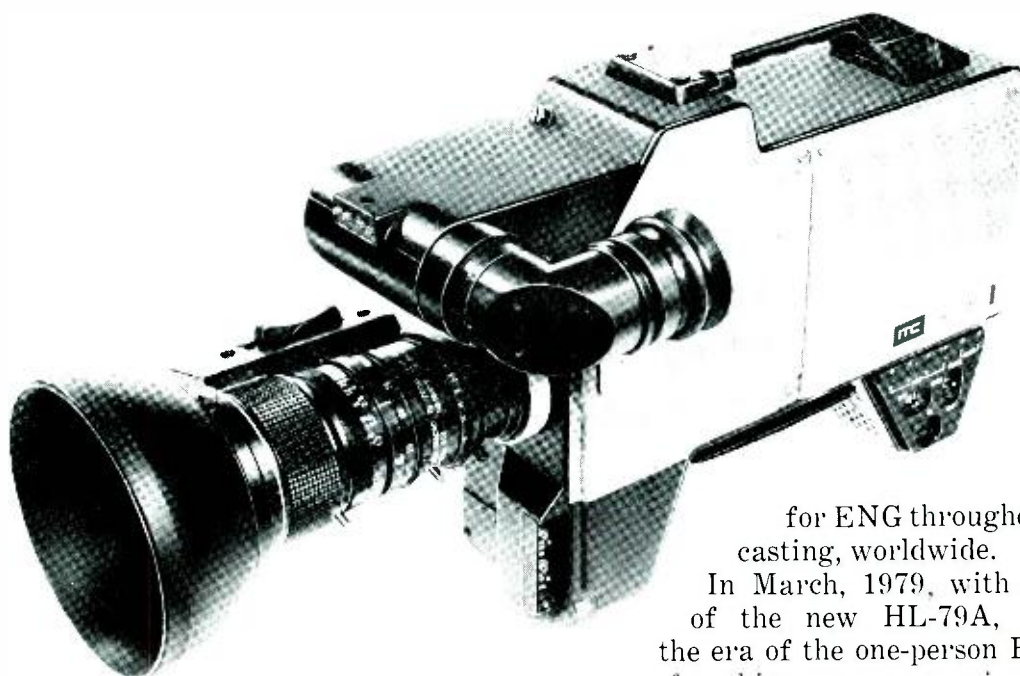
#### KOB's ENG van and camera saves the day during blackout

When a power outage hit station KOB-TV, Albuquerque, NM, the ingenuity of the station's chief engineer, F. A. Bibeau, combined with the versatile capability of KOB-TV's ENG equipment, saved the station from a 1-hour blackout and kept it on the air while its competition across the street went black.

When the power outage occurred, Bibeau backed the station's ENG van up to the back door; ran a long extension cord from the van's generator to the Telcom terminal equipment and had the station back on the air in 12 minutes. Jerry Danziger, general manager of KOB-TV, had reporter Mary Ingersoll do a stand-up news story outside the station using the ENG camera to explain to the audience what had transpired.



# Ikegami inaugurates the era of one-person ENG camera crews.



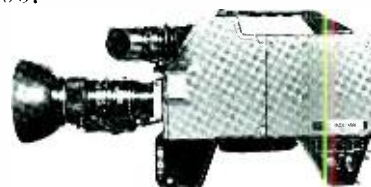
A remarkable new television camera is ready for ENG broadcasters, a new-generation camera significantly more compact, yet higher in performance than any prism-optic ENG camera now offered.

The new HL-79A is like other Ikegami cameras in its performance and reliability. This tradition is well-known in the industry. It dates back some six years to the pioneering HL-33 head-plus-backpack camera that first made broadcast-quality ENG truly feasible. The HL-33 and its successor, the HL-35, carried on this tradition of reliability. And the current HL-77A head-plus-battery camera is today's standard

for ENG throughout broadcasting, worldwide.

In March, 1979, with deliveries of the new HL-79A, we enter the era of the one-person ENG camera crew, for this new camera is an all-in-the-head design — fully integral, with no power cord to a separate battery. Its reduced weight and size enable the camera-person to slip solo in or out of vehicles or through crowds, unhampered as never before. In performance and reliability it is the ENG camera of tomorrow in the authentic lineage of Ikegami cameras of yesterday and today.

Ikegami Electronics (USA) Inc., 37 Brook Ave., Maywood, N.J. 07607, (201) 368-9171; West Coast: 19164 Van Ness Ave., Torrance, Calif. 90501, (213) 328-2814; Southwest: 330 North Belt East, Suite 228, Houston, Texas, 77060, (713) 445-0100.



**Ikegami HL-79A**

Circle (19) on Reply Card

TK-76, the tape machines are Sony BVU-100s, in the process of converting to the lighter weight Sony BVU-50. The editing equipment is Sony BVU-200 with BVU-500 editors.

The station has 13 local minicam ENG units, plus four network minicam ENG units. Included in the local fleet are seven automobiles equipped with portable camera and recorders and six GMC Suburban Vans, capable of recording stories and feeding back live information via microwave. Each unit can transmit on two different frequency bands, 2GHz or 7GHz. This dual band

system is unique to WMAQ-TV in the Chicago area.

The station places very small microwave units in their vans. A Microwave Associate MA 13CP mini-microwave unit, approximately 2"x4"x6" with a range of about one mile is used for intermediate relays to the larger live units, so that when a crew goes into a building to do a story, the mini-microwave placed in a window can transmit to the van on the street. The signal is then retransmitted on the high powered microwave system that delivers it to the receive locations at the Hancock or Sears Tower.

#### Audio/video source identification in ENG/EJ operations

A complex news operation will involve multiple field vans and one or more airborne news sources. Equipment is available now to encode the transmitted signals so that the station can decode, edit and use multiple transmissions for rapid news processing.

Two sources of such equipment are QSI Systems in West Newton, MA, and Comrex in Sudbury, MA. QSI provides coding systems for both audio and video signals while Comrex specializes in audio cueing systems. The QSI complex system generates color bars, source ID, and a voice output to communicate the source ID. In addition, their most sophisticated system takes the ID, encodes it, transmits it with the picture using one line of horizontal video, and then decodes/displays it on the received end. Such a system will provide continuous video source identification before and during live programming from multiple ENG/EFP locations.

The Comrex ENG cue system combines and retransmits program and instructions from the ENG van to field personnel. It accepts two audio inputs (one for program, one for cue) and controls levels so that program is heard continuously, with instructions overriding the program audio when necessary. The system is claimed to provide a maximum range in ENG/EJ studio-to-van and optimum van-to-field communications linkage.

The user list for such source identification equipment reads like the Who's Who of Broadcasters and is growing daily. Look for even more functional and elaborate systems to appear at NAB '80 in Las Vegas.

#### Vans

The WMAQ-TV vans are being built through a collaborative effort between the station and ENG Corporation, Concord, CA. The station opted for a 4-wheel drive vehicle, the GMC Suburban, to ensure mobility, reliability and lightness. Avoiding any chance of electronic power failure, each van is equipped with four separate and independent power systems. They include one alternator, two Dynamote Power Converters driven from the Suburban engine and shore power. The station attributes the success of last May's DC-10 coverage to the fail-safe performance of its well equipped vans. The crew was able to bring the van near the site, extend the telescoping microwave mast, align the antenna and relay live pictures within minutes after the tragedy.

#### Crew mobility

Crew mobility is mandatory in ENG. Small crews cannot be overburdened with heavy equipment to set up and tear down and the transport of camera, tape machine,

lights and microphones. At WMAQ-TV, 2-person crews are regularly assigned for local and network news. They communicate over an intra-communication system composed of three basic radio systems. The 160MHz band is used for dispatching and crew assignment. The 450MHz band is for engineering and the 455MHz band for production. Two subcarriers for IFB are carried on the main WMAQ-TV transmitter aural channel allocated to engineering and production. It enables WMAQ-TV to transmit on the regular, far stronger signal and greatly improve reliability over the traditional 90W mobile transmitter.

WMAQ-TV has installed two Nural Dual Band Superquad Antenna systems on the John Hancock Tower, each permitting simultaneous and independent microwave ENG/EJ operation in both bands. The two receiver sites installed on the east and west pylons atop the towers at Hancock, plus the 2-channel system at Sears Tower give the station the capability for multiple remote pickups from the live units exceeding that of any other television station in the area.

The receiver stations on the Hancock are a redundant system. The two complete systems complement each other and provide 360° coverage with systems that can overlap and act independently.

As technology marches on, WMAQ-TV keeps right in step improving live capability with the latest equipment available. Sophisticated microwave systems, reliable fully equipped vans, improved communications systems and a full time helicopter enable the station to maintain its competitive position in the Chicago marketplace.



ENG vans at WMAQ-TV5 are fully equipped and ready for instant assignment to cover a fast-breaking news story in the Chicago area.





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**Airborne.** KBTV's photographer Jim Berger (left) and reporter Neal Browne cover live any breaking news or major traffic problems. Berger mans an RCA TK-76 camera feeding a Tayburn 2GHz microwave transmitter.

## KBTV-9 Denver: On top of the news

*Since acquiring an ENG 'copter, the KBTV news coverage has definitely been looking up.*

In a growing number of cities across the US, television viewers are getting a bird's-eye view of the news thanks to the most advanced technique in electronic news gathering: a live, camera-equipped helicopter. (The cover this month shows the KBTV-9 craft in service.)

In the year since Denver's ABC-affiliated KBTV put its "Sky 9" helicopter into action, the station's visibility, image, and rating in the community has been substantially enhanced.

KBTV reporter Neal Browne talks to the newsroom via a Motorola MT-500 handie talkie just prior to take off. Helicopter is in the air every day from 5 until 6 PM to cover breaking news occurring while newscast is on the air.



KBTV was one of the early stations to put an eye-in-the-sky as part of its news program on a regular basis. After months of experimenting on how to use it most effectively by monitoring feedback from the public and management, more than 40 hours are now being logged in the air each month. Some shooting is videotaped, but most of the coverage is live-at-five-week-days. KBTV's enthusiastic, aggressive news director, Roger Ogden, uses an experienced helicopter operator to provide both craft and pilot service, and to handle all the details that the TV executives don't have the time or expertise with which to deal.

The telecopter—a Bell Jet Ranger III—is painted with the station's colors and channel number and is ready to go at a moment's notice to a newsbreaking event as well as circle the city each evening during the news to cover live special events or stories that add human interest to the show.

The specially-equipped helicopter is claimed to give the station a significant edge over competitors which sometimes must wait for later broadcasts of the same events. For example, KBTV was able to provide extensive coverage of a tornado that devastated Cheyenne, WY,—a location the other area media couldn't reach fast enough.

Channel 9 has reporter Neal Browne on top of the news week-days. He and a camera operator are harnessed into the helicopter for safety. The helicopter, which

flown without incident for the TV station since the summer of 1978, has an experienced pilot to withstand the pressures of the daily drama of deadlines for videotaped programs and the urgency of live news scenes.

The news team is met each day at Currihan Helistop, which is operated by Rocky Mountain Helicopters (RMH) and conveniently located just minutes from the Channel 9 studio. At takeoff, the pilot extends an omnidirectional antenna which permits transmission to the studio via an autotracking station on Lookout Mountain. Prior to RMH designing and installing the extendable antenna system, a KBTV engineer was required to accompany the news crew to point the transmitter at a ground microwave station for relay to the downtown studio. Now, live broadcasting is possible up to a 100-mile radius.

KBTV boasts one of the most sophisticated electronic news gathering operations in the country and is proud of its up-to-date information at news time. Headquartered in Provo, UT, RMH has more than 75 aircraft in operation worldwide and claims to be among the top five helicopter operators in the US. In Denver, its telecopter has proved safe, economical and has had a definite impact on ENG coverage.

Sky 9. Sky Cam. Live Eye. Whatever they are named, many TV stations claim that helicopters are the best things to happen in ENG for several years. □



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January 1980 *Broadcast Engineering* 29

# THE ENG HELICOPTER: Buy or Lease?

By Howard M. Collett.  
Rocky Mountain Helicopters



## WCCO in Minneapolis Acquires ENG 'Copter

Ron Handberg (right) news director of WCCO-TV 4, Minneapolis, MN, receives a log book to the JetRange-III from Dwayne K. Jose, Bell Helicopter's vice president of commercial marketing, and accepted the station's ENG aircraft at Bell's facility in Ft. Worth, TX.

The CBS affiliate has been flying an "Eye in the Sky" since March, 1979 on a charter basis with Imperial Helicopters at Fleming Field in South St. Paul, MN. "After making a cost analysis and evaluating the aircraft's capabilities in news reporting, we made a decision to invest in a helicopter," said Handberg. "As a result, we purchased a 5-place Bell JetRanger-III helicopter for continued

live coverage and videotape reports of fast breaking news events."

"Our first helicopter," Handberg continued, "employed a *homemade* electronic news gathering system which could transmit live from nearly 35 miles out. Our new aircraft will incorporate the Tayburn microwave equipment that will provide live coverage from as far away as 125 miles from WCCO. One of the key advantages is an auto-tracking antenna that eliminates the need of a hand antenna. It's a fully integrated system, and all airborne electronics are portable."

Bell's JetRanger-III, the latest and most powerful version of this series, cruises at 133 mph and has a range of 346 statute miles.

Helicopters have been used as a news-gathering vehicle for over 20 years, but coupled with new state-of-the-art microwave systems, they have recently come-of-age as an effective ENG tool.

Combined Communications Corporation of Phoenix is a pioneer for ENG helicopters, with six of its seven stations regularly using helicopters. **Sky 4** in Little Rock was launched early in 1977, with **Sky 9** and **Sky 12** in Denver and Phoenix starting up in 1978.

Methods of operation vary significantly from station to station, as may be expected with any innovation. Some stations fly only 10 hours per month, while others are approaching 50 or more. A few have live broadcast capability, although most plan to have this capability.

Most of the stations use their helicopter for more than ENG: servicing transmitter sites (a necessity in high mountainous regions), production of TV commercials, station promotions and traffic reporting. In some cases the traffic reporting is done jointly with a company-owned radio station. Some stations charter their equipment to free-lance filmmakers and municipal governments on an as-needed basis, thus softening the budgetary outflow of dollars.

This report provides information to help management decide on the size of operation needed. Specific details of a helicopter ENG operation would be ironed out during the contract negotiation with a selected company.

### Type of operation

The type of arrangement for helicopter use as specified in the lease agreement, or management's goals and objectives by outright purchase, is most critical to achieving the desired results of a helicopter operation. Because helicopters have high fixed costs and relatively lower variable costs, the more the craft is flown, the less expensive the cost per hour.

A helicopter must fly 600 to 900 hours a year to be profitable to the operator and affordable to the customer. The same holds true in a purchase, where the operator is the customer. Flying less than that amount either increases the hourly price to a point offsetting the advantages over other means of transportation, or decreases annual revenue to the operator, making it impossible to cover fixed costs. For



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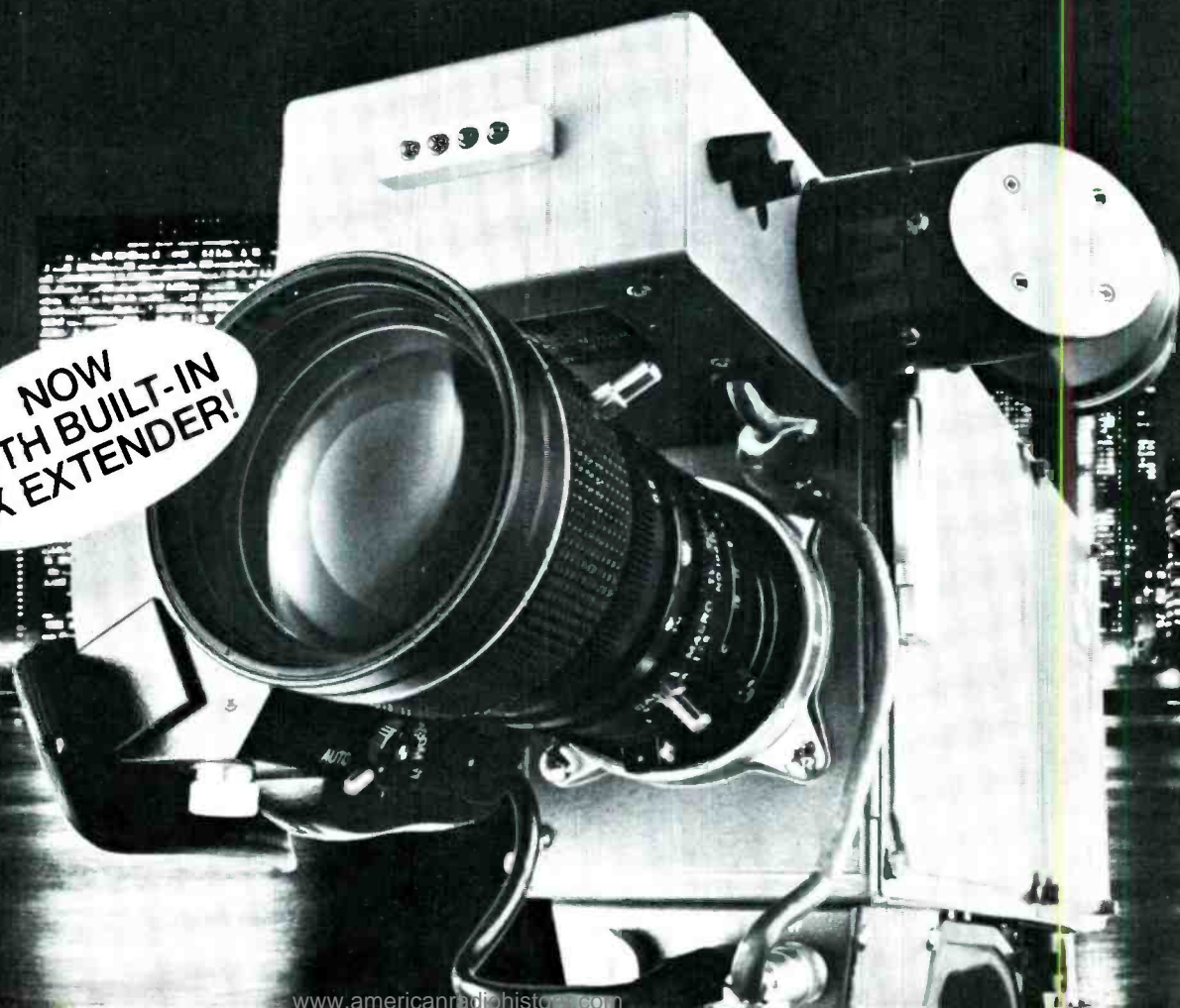
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this reason, non-exclusive use contracts must generate revenue elsewhere to cover costs, and exclusive-use contracts must set a minimum number of hours to be flown each month.

The **On-Call Rental** is a basic hourly rental on a first-come basis,

and is suited to those stations intending to fly only 10-15 hours per month. However, under this plan the helicopter may be unavailable when needed most by the station.

One step up is the **Priority Rental**. The ship may still be chartered to other customers, but is scheduled

for a set time each day for the station, usually the early evening news. While this is probably the most common type of operation, scheduling conflicts can occur when the station wants quick coverage of news in progress and the helicopter is flying another customer the station is usually required to fly a minimum of 20 or more hours each month.

There are four other lease or purchase alternatives that guarantee a station exclusive use of a helicopter.

**Purchasing** a new or used helicopter provides the station a greater flexibility of operation, and in some cases, a tax advantage. But it includes the responsibilities of maintenance management and general administration, all of which must be handled by station personnel inexperienced with the complexities of the helicopter industry and federal regulations. Purchasing also requires a large cash outflow for the down payment, necessitates an ownership commitment of several years, and restricts operations should the helicopter have a major breakdown,

Camera stabilization in helicopter ENG/EFM operations can be achieved with suitable support equipment. Shown here is cameraman Tony Bond (the Zachary Co., Las Vegas, NV) using the celebrated Steadicam system for a field shooting. The Steadicam stabilizer arm is attached to a Fairchild FH100 'copter, but Zachary also uses the Bell Jet Ranger and Hughes 500C crafts. The camera being used is the Cinema Products MNC-71CP described in the camera roundup section of this issue.



#### PARAMETERS FOR HELICOPTER OPERATIONS

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
TYPE OF OPERATION	RESPONSE TIME IN MINUTES	EXCLUSIVE USE OF HELICOPTER	FLIGHT REQUEST PRIORITY	MAINTENANCE UNAVAILABILITY	ADMINISTRATIVE RESPONSIBILITY	MICROWAVE INSTALLATION	PAINTED INSIGNIA	LENGTH OF CONTRACT	TERMINATION OF CONTRACT	DOWN-PAYMENT	COST PER FLIGHT HOUR (1st YEAR)	MINIMUM HOURS PER MONTH USE	TOTAL COST PER MONTH (L x M)
ON-CALL RENTAL	60+	No	No	Long	H	X	No	Day to day	1 day	None	\$300 to \$400	0	--
PRIORITY RENTAL	30 to 60	No	Yes	Norm	H	X or Y	Yes	1-12 mo.	30 days	None	\$275 to \$375	20	\$5,500 to \$7,500
EXCLUSIVE USE LEASE	5 to 30	Yes	--	Short	H	Y or Z	Yes	6-12 mo.	30 days	None	\$250 to \$350	50	\$12,500 to \$17,500
MANUFACTURER LEASE NEW	5 to 30	Yes	--	Long	TV	Y or Z	Yes	2-6 yrs.	\$ Pen-alty	None	\$275* to \$325*	50	\$13,750* to \$16,250*
PURCHASE-USED	5 to 30	Yes	--	Long	TV	Y or Z	Yes	6-7 yrs.	Sell	\$32,000 (20%)	\$275* to \$325*	50	\$13,750* to \$16,250*
PURCHASE-NEW	5 to 30	Yes	--	Long	TV	Y or Z	Yes	6-7 yrs.	Sell	\$52,000 (20%)	\$350* to \$375*	50	\$17,500* to \$18,750*

#### CHART ABBREVIATIONS:

Column F: H = Helicopter Service; TV = Television Station.

Column G: X = Each flight; Y = Prewired plug-in; Z = Permanent installation.

Column L and N: \*Does not include Administrative Responsibility or overhead for helicopter operation items that must be borne by the TV Station.



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**Field cameraman** "A nice compact, lightweight, well-balanced camera. One that delivers clear shots even in near darkness. That's what I need."

**Top management** "Higher productivity, more effective training and selling, better communications... if a video camera can help deliver that, I'm for it."

**Studio camera-man** "We're ready for the high performance of a sophisticated Saticon camera. And I can certainly do without having to have a separate genlock unit."



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Type of operation \_\_\_\_\_

or become economically or functionally obsolete.

**Leasing from the manufacturer** presents management and commitment problems similar to purchasing, with the exception of the down payment.

The **Exclusive Lease** offers a good compromise between a non-exclusive rental and ownership. All management and administrative details are handled by an experienced helicopter operator. This type of lease is generally for a period of 12 months and offers the station the

option of upgrading to another helicopter model. It benefits the station that is uncertain about future helicopter needs by eliminating budget worries that accompany longer-term lease or purchase commitments. In addition, the helicopter is flown and maintained by seasoned professionals.

#### Response time

The time from first notification until the helicopter is airborne depends upon the arrangement the operator has with the station. A

helicopter on an exclusive-use lease, with pilot on standby, can be in the air in five minutes. A station with an on-call rental agreement may find that the needed helicopter is 50 miles away flying other clients.

The on-call rental agreement (for a station-owned helicopter, it's the maintenance arrangement) does not provide top maintenance priority should something go wrong. A lack of priority, and a lack of spare parts found in some smaller operations, could create a lengthy and costly downtime. Customers with exclusive-use contracts receive top priority because they provide more business.

#### Administrative responsibility

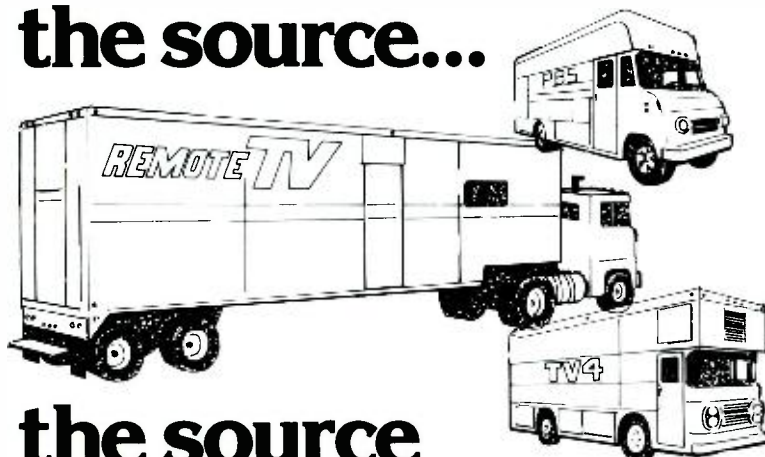
Many helicopter services have found that the ideal number of helicopters to manage falls between eight and 12 and multiples thereof. From an administrative standpoint, it takes little more to manage eight helicopters than it does one or two. For a small operation, this can mean higher administrative costs per factor, an overwhelming factor for a television station that chooses to purchase or to lease from the manufacturer.

Maintenance scheduling, logs and records updating, compliance with manufacturer's directives, pilot training, parts ordering, accounting, insurance negotiation, fuel purchase and allocation, and personnel administration are duties the station must undertake if it decides to do things on its own rather than contract with a dependable helicopter service. A helicopter service can also provide research and development assistance in adapting later-generation ENG technology to the helicopter, modifying configuration to service remote transmitter sites, and other adaptations where experience comes into play.

#### Equipment and installation

Budgetary restraints not only determine the type of helicopter service a station can afford, but also the effectiveness of that craft once it's in the air. Many stations have simply attempted to adapt their "action cam van" equipment to the helicopter. This often produces poor results and can be dangerous because much of the equipment wasn't designed with the helicopter in mind. For a live broadcast, the ship is fully loaded with pilot, cameraman, reporter, technician and several boxes containing cameras, transmitter, tape recorder (backup to going live), antenna and power-pack. The pilot is required to fly the

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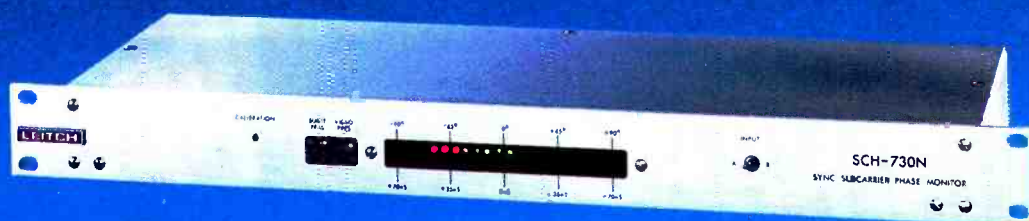
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machine in a direction to get the best photo angle, and at the same time accommodate the technician who is trying to aim his dish antenna at the ground receiver.

A safer method is to record the event first, then transmit to the ground, or drop the tape off on the station roof (it is being done!). But the latest technology provides for an omnidirectional antenna to be mounted on the bottom of the helicopter, eliminating the need for a technician inside. The helicopter is wired to provide power to the

ENG equipment, and the transmitter is permanently mounted inside the baggage compartment. An autotrack repeater, permanently located on a hill or building, eliminates the need for the van.

Expensive? Yes. But considering that the extra hardware replaces at least two technicians and the van, can respond faster, provides greater geographical coverage, and gathers news from an unparalleled viewpoint, it not only results in a cost savings, but also offers the live coverage desired.

### Cost of operation

Down payments are normally not required for a lease, but can amount to 20% or more of the purchase price for a new or used helicopter. The 1979 price for a new Bell 206 B or Hughes 500 is \$230,000. A basic option package—including such necessary items as extended height landing gear, heater, engine particle separator, engine automatic relight, rotor brake, dual shoulder harness, VHF radio, and transponder—makes the total price \$260,000. A 20% down payment would amount to \$52,000.

For a commercial helicopter service, prices will vary with the operator. The small operator often has the lowest price. The midsize operator, while he quotes a higher price, is generally more firmly established in the industry and can provide more experienced pilots and better maintenance support.

Helicopter prices are based on fixed and variable costs. **Fixed** costs remain the same regardless of the number of hours flown, and include hull and liability insurance, administrative and overhead costs, debt service, pilot and mechanic salaries, plus benefits, hangar fees, etc. **Variable** costs accrue only as the helicopter is flown and include running maintenance, parts, reserve for overhaul, fuel and oil. Maintenance costs for helicopters are high. Most of the moving parts (and there are many) are required to be replaced after a certain number of flight hours. A major 1200-hour inspection can approach \$10,000, and a 3000-hour engine overhaul can exceed \$40,000. Hull insurance for a single helicopter can exceed \$40,000. Hull insurance for a single helicopter will run 8½% of replacement cost, or \$22,100 annually.

An unexpected early overhaul can be disastrous to a 1-ship operator, but is averaged out and makes much less of an impact to a larger operator. In some ways, the higher price charged by a larger operator assures that when something goes wrong, the customer is not out of business. The attached chart summarizes the options available to a television station. The chart shows six methods of helicopter operation for television stations, is intended to represent the average market, and makes no attempt to cover every variation. Several exceptions are possible, depending upon the helicopter service used, age and condition of the helicopter, optional equipment, night-flying requirements, geography, altitude, required pilot standby, etc. □

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# ENG/EFP COLOR CAMERA ROUNDUP

By John Williszowski, video editor, and Bill Rhodes, editorial director

The development of lightweight, portable video cameras of high quality and nominal costs has revolutionized electronic news gathering (ENG) and electronic field production (EFP) for broadcasters. As evidence for this, note the marked increase in local, national, and worldwide news coverage plus the improvement in scope and quality of the broadcast messages.

Behind the news scenes there has been a corresponding evolution in the economics of news. One prominent broadcaster (who has insisted on remaining anonymous) reports that just a few years ago only a handful of broadcasters were making money from their news programs. He reports that this situation is now reversed, but still insists on remaining anonymous because advertisers squawk about spiraling costs and broadcaster's profits.

In station tours, from coast to coast, **BE** has noted the accelerated rebuilding of stations to excel in news and local productions. New cameras, lenses and accessories are at the heart of this effort and provide broadcasters with the tools they need for their market.

This roundup article tabulates selected features of ENG/EFP color cameras currently available. However, because manufacturers present their data in many different ways, the data summarized here should be considered as approximate guidelines. While every attempt has been made to present the information in a fair, impartial and consistent manner, **BE**

assumes no responsibility for precision in the specifications nor for price and delivery claimed.

A manufacturer's listing is also provided so that readers may obtain detailed data by use of the reader service card.

**WEIGHT** is given in kilograms. Unless noted, the weights given include all items normally necessary for production. (1 kg = 2.2 lbs.)

**Tube type** is listed as follows:

ACT = Anti-comet Tail Plumbicon  
DGP = Diode Gun Plumbicon  
C = Chainicon  
L = Liddicon  
N = Newvicon  
P = Plumbicon  
S = Saticon  
T = Trinicron  
V = Vidicon

When more than one tube can be used in a specific camera, they are listed in the order recommended in the manufacturer's specifications. No attempt has been made to distinguish between classifications within a particular tube type. Specifications on some of the cameras listed recommend broadcast quality tubes while others recommend industrial tubes. Information concerning the classification of the type of tube recommended should be obtained from the manufacturer.

**Sensitivity** is given in lux, rated at f/4, 60% reflectance except as noted, (One fc  $\approx$  10.8 lux.)

**Signal-to-noise (S/N)** is the ratio of the peak value of the video signal to the value of the noise present, which

is usually measured in decibels (dB). The higher the number, the less noisy the picture.

**Gain boost** is an increase in voltage or power, usually expressed in dBs. Gain boost for an ENG/EFP camera enables the camera to produce a usable picture in lower light levels than is normally possible.

**Resolution** is given as percentage of 100% modulation at 400 TV lines (uncorrected) or in the number of lines discernible using a resolution test wedge located in zone 1. Depth of modulation and resolution are limited, in most cases, only by the pickup tube. Most video amplifiers are capable of a flat response (100% depth of modulation) at upwards of 10MHz, or, if translated into TV lines, could process the signal necessary to produce a resolution of 1000 TV lines. However, since the pickup tube is incapable of such a response, the amplifiers are limited to approximately 8MHz, or 640 TV lines, to improve signal-to-noise.

**Registration** error is listed as the percentage the registration differs from the ideal within zone 1. (Registration error within zones 2 and 3 should be obtained from the manufacturer.)

**Prices** listed are "ball park" figures, do not include the full range of options available, are subject to change without notice, and are given in dollars.

**Delivery** is typically (in weeks) after receipt of order (ARO) and does not account for backlogs at any particular time.

Parameter. Firm & Model number	Weight (kg)	No. of Tubes	Tube Type	Sensitivity (lux)	S/N (dB)	Enhance- ment	Max. Gain Boost	Horizontal Resolution (Center)	Registra- tion Error	Geometric Distortion	List Price (\$)	Delivery ARO (weeks)
<b>Ampex</b>												
BCC-14 (self contained)	7.0	3	2/3" P	2400	50	H,V	12	both 45% depth modulation at 400 TV lines (uncorrected)	0.1%	1.5%	41,270	12
BCC-14 (EFP with remote control)	9.2	3	2/3" P	2400	50	H,V	12	40% depth of modulation at 400 TV lines	0.1%	1.5%	48,150	12
<b>Asaca</b>												
ACC-2000	10 (w/o lens)	3	2/3" P or S	2000 at f/4-5.6	50	H,V	9	40% depth of modulation at 400 TV lines	0.1%	1.5%	29,600 (w/o lens)	5-6



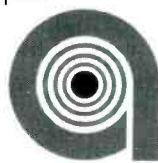
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January 1980 *Broadcast Engineering* 41

Parameter Firm & Model Number	Weight (kg)	No. of Tubes	Tube Type	Sensitivity (lux)	S/N (dB)	Enhance- ment	Max. Gain Boost	Horizontal Resolution (Center)	Registra- tion Error	Geometric Distortion	List Price (\$)	Delivery ARO (weeks)
<b>Bosch Fernseh</b>												
KCA-100	5.5 (w/o lens)	3	2/3" DGP,P	2500	51	H,V	9	500	0.1%	0.5%	42,000	16
<b>Commercial Electronics Inc. (CEI)</b>												
310	3.6	3	2/3"S	2100	52	H,V	12	600	0.1%	1.0%	41,980	4
330	5.85	3	2/3"S or P	2100	52	H,V	12	600	0.1%	1.0%	54,830	4
<b>Cinema Products</b>												
MNC-71CP	8.5 (w/o lens)	3	2/3"P or S	2600	51	H,V	12	>500	0.1%	0.5%	34,500	off shelf
MNC-710CP (teleproduction system)	10.3 (w/o lens)	3	2/3"P or S	2600	51	H,V	12	>500	0.1%	0.5%	47,000	off shelf
<b>GBC</b>												
CTC-7X	7.95	3	2/3"C	2000	50	H	6	500	0.1%	1.5%	26,000	—
CTC-5X	3.5	1	1"V	1000 (at f/1.9)	40	No	No	240	NA	NA	2334	—

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Compare the sensible panel layout of these broadcast mixers to the cluttered array of tiny buttons, midget knobs and closely spaced faders on other mixers costing much more. Ours are easier to operate and understand.

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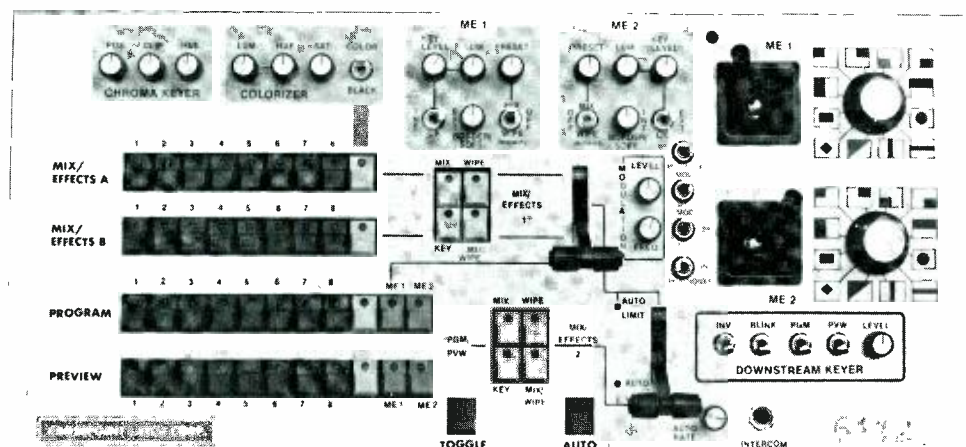
Parameter. Firm & Model Number	Weight (kg)	No. of Tubes	Tube Type	Sensitivity (lux)	S/N (dB)	Enhance- ment	Max. Gain Boost	Horizontal Resolution (Center)	Registra- tion Error	Geometric Distortion	List Price (\$)	Delivery ARO (weeks)
<b>Hitachi</b>												
SK-90	8.5 (w/o lens)	3	2/3"S	2690	>51	H,V	6,12	500	<0.1%	<1.5%	39,675 (w/o lens)	stock
SK-80A	8.5 (w/o lens)	3	2/3"S	2000	50	H,V	6	500	0.1%	1.5%	29,475 (w/o lens)	stock
SK-70	6.7	3	2/3"S	2000	50	H,V	6,12	500	0.05%	1.0%	38,341 (w/o lens)	stock
FP-3060	5	1	1"S	2000	46	No	No	270	NA	NA	9400	—
GP-7	5.2	1	1"V	100 f/2	40	H	No	250	NA	NA	3750	—
SK-96	6.8 (w/o lens or VF)	3	2/3"S	2000	>51	H,V	6,12	500	<0.1%	<1.5%	39,735 (w/o lens)	4
FP-20	5.5 (w/o lens or grip)	3	2/3"S	2500	49	H,V	+ 6	500	0.1%	1%	12,000 (w/o lens)	stock
FP-40	6 (w/o lens or VF)	2	2/3"S	2000	50	H,V	6,12	550	0.2%	1%	23,500 (w/o lens)	stock

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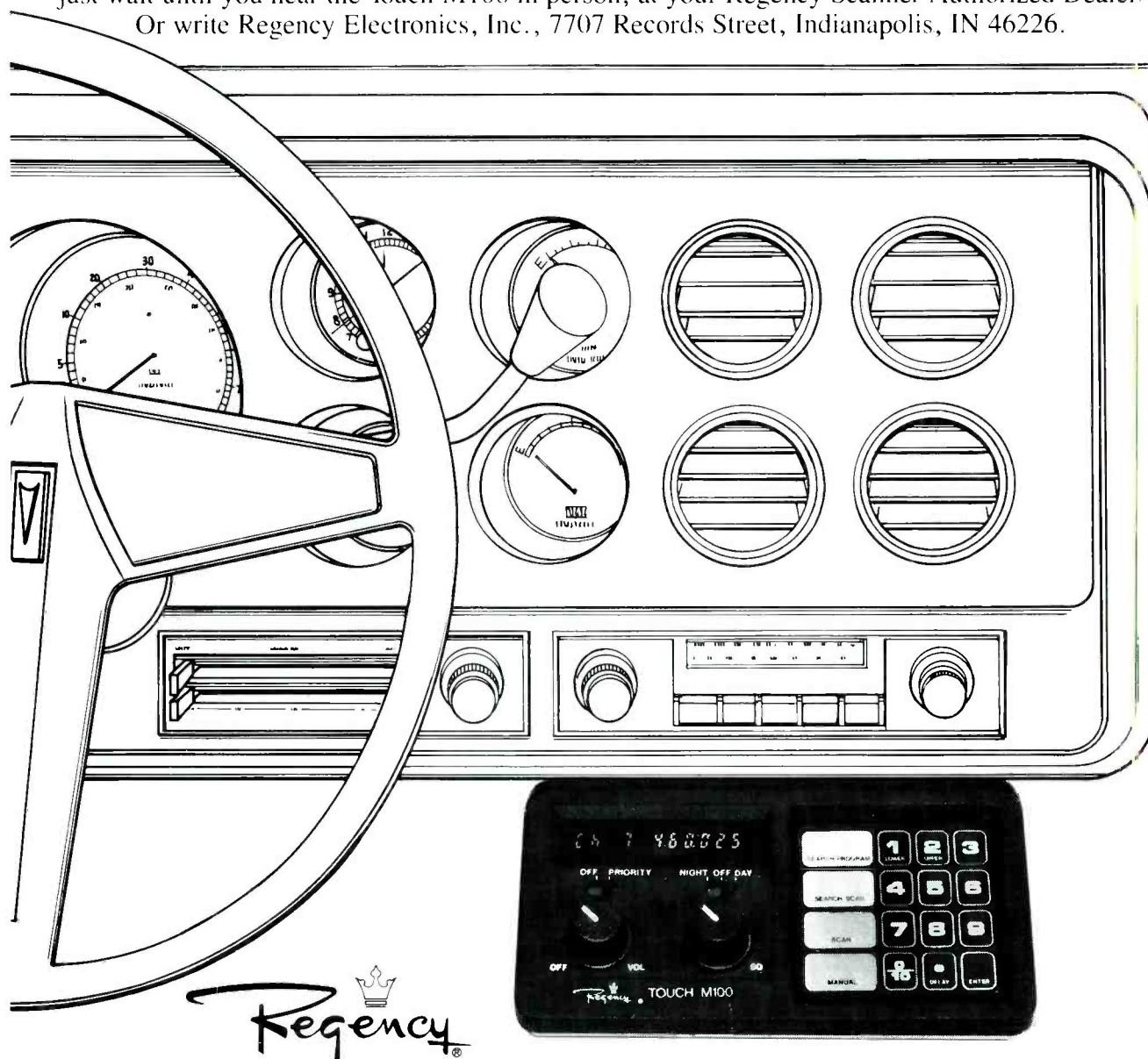
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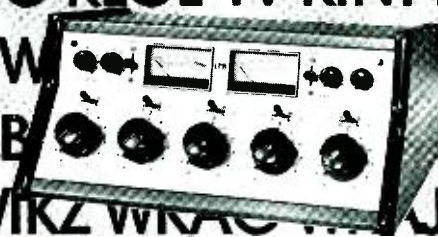
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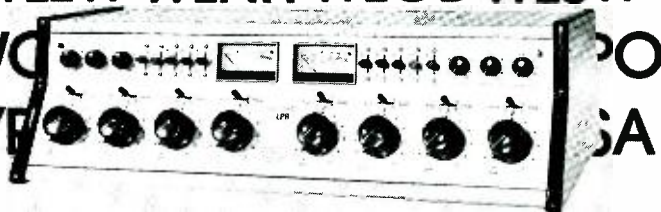
January 1980 **Broadcast Engineering** 45

Parameter. Firm & Model Number	Weight (kg)	No. of Tubes	Tube Type	Sensitivity (lux)	S/N (dB)	Enhance- ment	Max. Gain Boost	Horizontal Resolution (Center)	Registra- tion Error	Geometric Distortion	List Price (\$)	Delivery ARO (weeks)
Ikegami HL-51	13 (w/vf & w/o lens)	3	1"P ACT or DGP	3000	>55	H,V	12	600	0.1%	<1.5%	54,800 (w/o lens & tubes)	—
HL-52	4.45 (w/VF & w/o lens)	3	2/3"P ACT	2200	50	H,V	12	500	0.1%	1.5%	46,000 (w/o lens & tubes)	—
HL-79A	5.1 (w/ VF & w/o lens)	3	2/3"P or S	2000	54	H,V	18	500	0.1%	1.5%	34,110 (w/o lens)	—
ITC-240	5.2 (w/ lens)	3	2/3"S, C,P	4000	48	H,V optional	12	500 with S	0.2%	2.0%	17,790 (w/o lens)	—
HL-53	7 (w/o lens & W/VF)	3	1"P or DGP or PCT	1500	55	H,V	12	600	0.1%	1.5%	60,000 (w/o lens & tubes)	—
HL-78A	6 (w/o lens)	3	2/3" P,S	2000	54	H,V	18	500	0.1	1.5%	22,000 (w/ tubes)	—

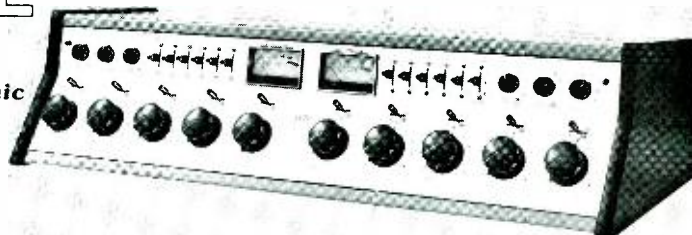
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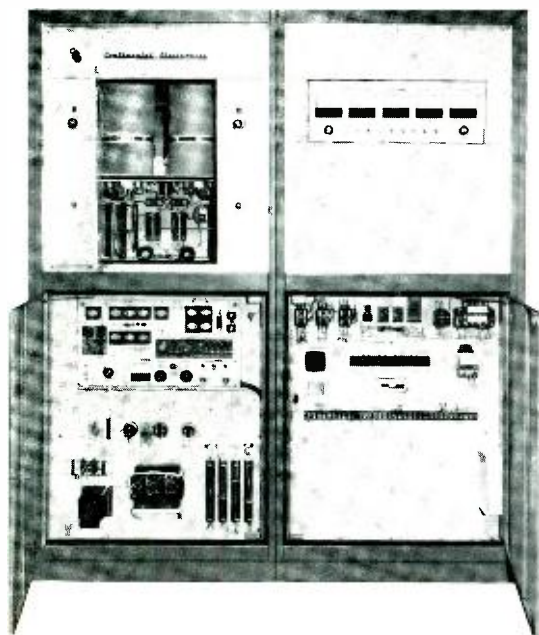
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Parameter Firm & Model Number	Weight (kg)	No. of Tubes	Tube Type	Sensitivity (lux)	S/N (dB)	Enhance- ment	Max. Gain Boost	Horizontal Resolution (Center)	Registra- tion Error	Geometric Distortion	List Price (\$)	Delivery ARO (weeks)
HL-790A (convertible to HL-79A)	17 (w/o lens & w/VF)	3	$\frac{2}{3}$ "P,S	2000	54	H,V	18	500	0.1%	1.5%	50,000 (w/o lens or tubes)	
ITC-350	5.0 (w/o VF or lens)	3	$\frac{2}{3}$ "P,S	—	52	H,V	12	500	0.2%	—	15,000 (w/lens & tubes)	
IVC IVC-7000P	7.7 (w/o CCU)	3	1"P	2000	51	H,V	12	675	0.06%	1.5%	50,250 (w/o lens)	
IVC-7005P	7.7	3	1"DGP	2000	51	H,V	12	675	0.06%	0.5%	55,000 (w/o lens)	8
JVC KY-2000	2	3	$\frac{2}{3}$ "S	2500	52	NA	?	500	0.1%	—	9300	4-6
Link Electronics Type 120	12	3	ACT	160	46.5	V,H	12	40%	0.05%	>1%	—	—
Marconi Mark IX P	7.5	3	1"L	1100	49	H,V	12	650	0.1%	0.25%	67,500 (auto- matic)	8

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Parameter Firm & Model Number	Weight (kg)	No. of Tubes	Tube Type	Sensitivity (lux)	S/N (dB)	Enhance- ment	Max. Gain Boost	Horizontal Resolution (Center)	Registra- tion Error	Geometric Distortion	List Price (\$)	Delivery ARC (weeks)
<b>NEC</b>												
MNC-61A	7.85	3	3/4"P	2600	50	H,V	6	500	0.1%	NA	20,000	off shelf
<b>Panasonic</b>												
AK-750	7.2 (w/o lens w/VF)	3	3/4"P	2152	49	H,V	6	500	0.1%	1.0%	18,550 (w/o lens)	off shelf
AK-920	25	3	1"P	1614	—	H,V	—	500	0.2%	1.0%	20,500	off shelf
WV-3800	4.9	1	1"V	1506	47	H,V	6	260	—	—	3750	off shelf
<b>Philips</b>												
LDK-14	5.9 (w/o lens)	3	3/4"P	2380	50	H,V	12	600	0.1%	1.5%	35,440	8
Video 80-ENG	12	3	3/4"P	2680	50	H,V	12	600	0.15%	1.0%	23,650	4
Video 80-EFP	9.2	3	3/4"P	2680	50	H,V	6	600	0.15%	1.0%	24,500	4
<b>RCA</b>												
TKP-46, System I	9 (w/o CCU)	3	1"P	1250	48	H,V	9	650	0.1%	0.5%	52,600	—
TKP-46, System II	9 (w/o CCU)	3	1"P	1250	48	H,V	9	650	0.1%	0.5%	47,195	—



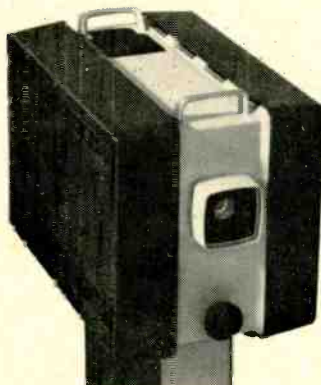
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For data display, such as election returns or stock prices, the projector can display signals from an alphanumeric character generator. Also, use it to preview new programming impressively for sponsors and agencies.



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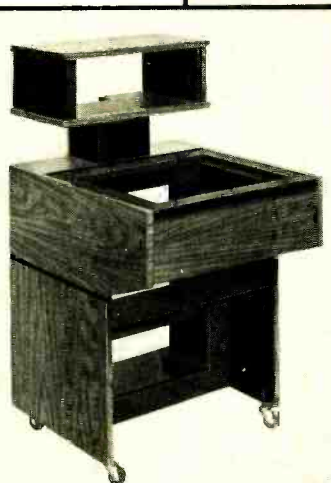
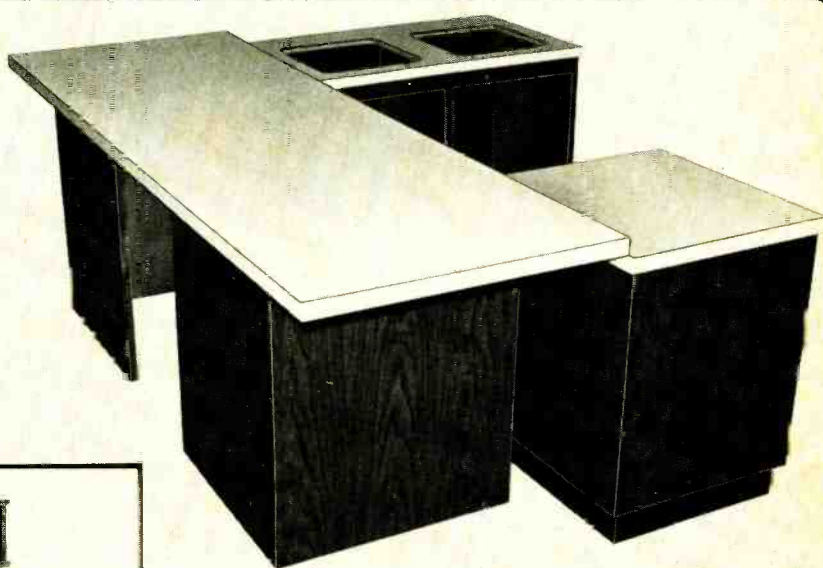
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**GENERAL  ELECTRIC**

*General Electric Professional Large Screen Color TV Projector in rear-projection application at WTMJ-TV, Milwaukee, WI*

Parameter. Firm & Model Number	Weight (kg)	No. of Tubes	Tube Type	Sensitivity (lux)	S/N (dB)	Enhance- ment	Max. Gain Boost	Horizontal Resolution (Center)	Registra- tion Error	Geometric Distortion	List Price (\$)	Delivery ARO (weeks)
TK-760	17	3	2/3"S or P	2500	51	H,V	9	600	0.1%	0.5%	57,250	—
TK-76B	8.1	3	2/3"P or S	2500	51	H,V	9	600	0.1%	2.0%	43,750	—
<b>Sanyo</b>												
VCC-9000	7.6	1	1"V	1280	40	—	—	300	—	—	3040	off shelf
<b>Sharp</b>												
XC-530	4.3 (w/o lens)	3	2/3"S	2500	47	H	6	>420	0.3%	2.0%	10,390	—
XC-500U	4.3 (w/o lens & CCU)	3	2/3"S	2500	47	H	6	>420	0.3%	2.0%	10,000	—
XC-320U	4.5 (w/o lens)	3	2/3"V	2500	46	No	6	>400	0.5%	2.0%	5000	—
XC-300U	4.3 (w/o lens & CCU)	3	2/3"V	2500	46	No	6	>400	0.5%	2.0%	4600	—
<b>Sony</b>												
BVP-300	5.6 (w/o lens)	3	2/3"P	3300	53	H,V	18	500	0.1%	1.5%	43,390 (w/o lens)	—

## NEW BROADCAST STUDIO FURNITURE FROM RUSLANG



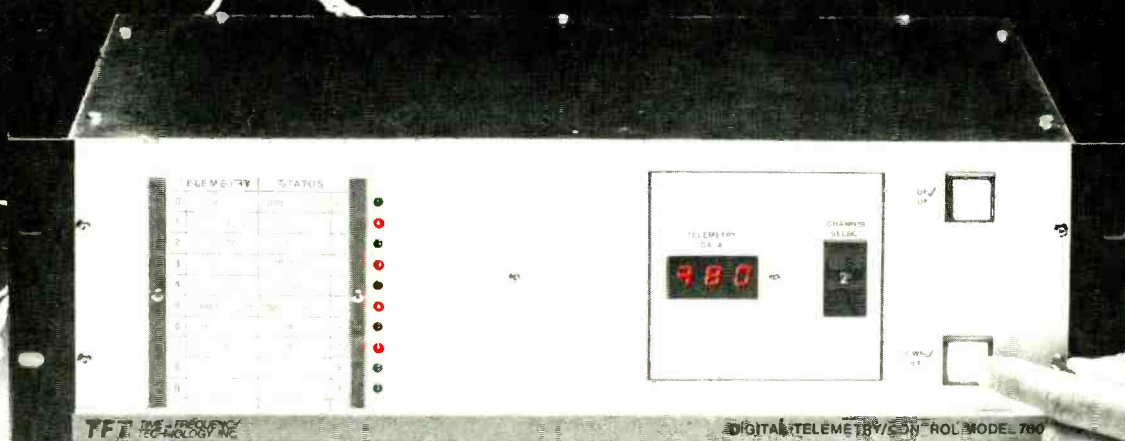
If you're building or remodeling, add the elegant look of expensive furniture for much less than you would expect. We build electronic racks in various heights, consoles for any size tape deck, and control stations that put you on top of things. All are constructed of quality materials, including high pressure laminates, making them sturdy as well as attractive. They are available in either wood grain finish or various solid colors. Send for literature showing dimensions, etc.

**THE RUSLANG CORPORATION**  
247 Ash Street, Bridgeport, CT 06605 Tel: 203 384 1266

Circle (36) on Reply Card



# INSTANTANEOUS Digital Command



## 30 Functions for only \$2195

TFT Model 7601 represents a major breakthrough in remote control systems. Now, you can get 10 channels of digital command functions plus 10 channels of digital telemetry functions for less than \$2200! And it's the same high quality, reliable design that has made TFT equipment a standard in the broadcast industry. Just check this line-up of features:

### DATA SECURITY ASSURED

Full command-code redundancy, *plus* odd/even parity check, makes digital data errors virtually impossible. A TFT proprietary feature. Even lightning induced noise has no effect on integrity of command functions.

### INSTANTANEOUS COMMAND

Less than 0.2 second marks the time for a complete command/execute function with the new TFT high speed data modem.

### ONE MAN CALIBRATION

The front panel of the Model 7601R (Remote Terminal) has a DVM and scaling potentiometers so that just one man, on-site, can perform the FCC required weekly calibration. A studio lock-out switch provides complete operator safety for on-site work.

### CHOICE OF TRANSMISSION METHODS

Model 7601 interconnection can be either telephone lines or radio links which include STL, TLS or SCA.

### MINIMAL SERVICE DOWNTIME

Quick-disconnect rear barrier strips allow fast removal of the 7601 from the rack without disconnecting any of the interface wiring between the remote terminal and the transmitter or alarm sampling points.

### TEN OPTIONAL STATUS CHANNELS

In addition, 10 status indicator functions may be factory or field installed to provide instant status display and alarm.

The Model 7601 is just one of a full line of field-proven, reliable, fail-safe remote control systems offered by TFT. Other remote control systems designed for AM, FM and TV include the Model 7610, a 110-channel digital telemetry/status/control system; the Model 7815, a fully independent 15 to 45 channel DIRECT control/status/alarm system; the Model 7840 data acquisition, automatic logging and alarm system and a complete line of remote control accessories. They're all available from TFT. For all the facts on these and other TFT products call or write:

**TFT** TIME AND FREQUENCY TECHNOLOGY, INC.  
3090 OAKMEAD VILLAGE DR., SANTA CLARA, CA 95051 (408)246-6365 TWX 910-338-0584  
Circle (37) on Reply Card

Parameter. Firm & Model Number	Weight (kg)	No. of Tubes	Tube Type	Sensitivity (lux)	S/N (dB)	Enhance- ment	Max. Gain Boost	Horizontal Resolution (Center)	Registra- tion Error	Geometric Distortion	List Price (\$)	Delivery ARO (weeks)
BVP-100	4.7 (w/o lens or back- pack)	3	% "P	4000	50	H,V	6	500	0.1 %	1.5 %	28,000	
BVP-200	5.6 (w/o lens)	2	1 2/3 "S 1.1 "T	4000	50	H,V	9	500	NA	NA	18,200	
DXC-1610	4.9 (w/o lens)	1	1 "T	NA	45	H	6	300	NA	NA	4150	
DXC-1640	4.5	—	2/3 "T	—	45	H,V	—	300	—	—	—	—
<b>Thomson-CSF</b>												
Microcam MC-601	5.6	3	2/3 "P or S	2000	53	H,V	18	500	0.01 %	1.5 %	37,000 w/tubes	4
MC-602	3.63	3	2/3 "P	2000	53	H,V	12	25-30% depth of modula- tion at 300 TV lines	0.05 %	1.0 %	32,000 w/tubes	4
<b>Toshiba</b>												
PK-39	10.5	3	2/3 "L or DGP	2000	51	H,V	?	500	0.1 %	1.5 %	33,950 (w/o lens & tubes	—

# FACT!

*Nobody Can Match The  
Spotmaster® 3000 Series*



The Spotmaster 3000 is the only cartridge tape machine series on the market with **all** of these performance proven features:

Nortronics' Duracore® heads; auto/manual fast forward option; low-voltage current regulated solenoid; independent azimuth adjustment; solid-state switching logic; headphone jack for maintenance; and wide record input range. Models available for 1/2 and 3/4 rack widths.

For complete information on the Spotmaster 3000 series, call or write your local Spotmaster distributor, or contact:



a FILMWAY company

**BROADCAST ELECTRONICS INC.**

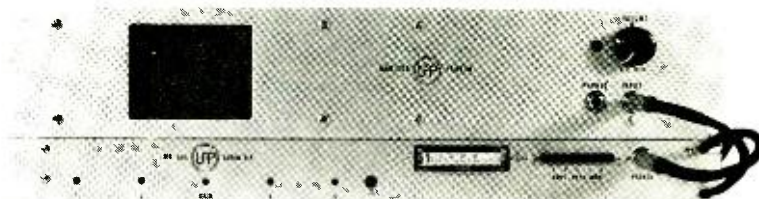
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QUINCY, IL 62301 • PHONE: (217) 224-9600

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52 *Broadcast Engineering* January 1980

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3 clean audio watts from a -20dbm line • only 2 rack-units (3.5") height • transformer input • headphone disconnects • speaker • input front & rear • smooth response.



AM3 shown patched to monitor the outputs of the incredible **MR5x5** audio D.A. offering 5 5-output transformer-coupled line amplifiers (5x5) in but 1 rack-unit space.

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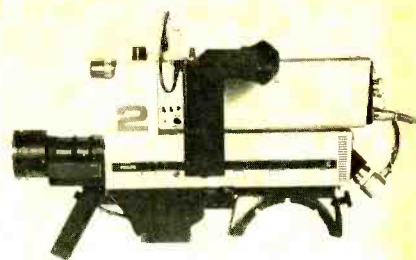




Hitachi SK-96



JVC KY-2000



Philips Video 80

## ENG/EFP Camera Source Data

For information on ENG/EFP color cameras, contact the manufacturers listed in the **BE** annual Buyer's Guide (September issue) or use the reader service card and the appropriate number below.

Ampex (150)

Asaca (151)

Bosch Fernseh (152)

Cinema Products\*

Commercial Electronics (CEI) (153)

GBC (154)

Hitachi (155)

Ikegami (156)

Int'l. Video (IVC) (157)

Link (158)

Marconi (159)

Panasonic (160)

Philips (161)

RCA (162)

Sanyo (163)

Sharp (164)

Sony (165)

Thomson-CSF (166)

Toshiba (167)

US JVC (168)

\*Written requests only: Cinema Products,  
2037 Granville Ave., Los Angeles, CA 90025.

# 3D SERIES



### Proven.

Over 5,000 ITC 3D's in use—15,000 decks—Stereo and Mono.

### Economical.

Three premium line reproducers cost little more than two SP Series single decks.

### Compact.

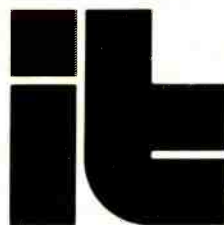
Three deck convenience in the space of two SP single decks.

### Recorder.

Add a WRA Recording Amplifier and the bottom deck becomes a Master Recorder/Reproducer.

## Broadcasters' No. 1 Choice

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# business news

## PK-39 camera deliveries

Deliveries on Toshiba's ENG/EFP portable color television cameras have begun. The unit is being used as a 1-piece completely self-contained camera and a 2-piece handheld camera with separate control unit in both broadcast and teleproduction applications. The unit can also be used in the studio with an

optional 5-inch viewfinder. It uses 3/4-inch lead oxide tubes and is also available with diode gun tubes, providing increased resolution.

## Lease signed

Abraham I. Dranetz, chairman of the board and president of Dranetz Engineering Laboratories, announced the signing of a lease for a new 60,000 square foot production and office facility in Edison, NJ. The new building will triple the amount of space currently occupied by the company in two separate locations. The facility is located on New Durham Road at the intersection of New Brooklyn Road. Dranetz manu-

factures precision electronic instrumentation equipment for electric power companies, computer service organizations and manufacturers of communications equipment.

## Convergence expands facility

Convergence has expanded into new quarters. A long-term lease has been negotiated for an additional 15,000 square feet of office and research space. The facility is to become the Convergence Corporation Technology Center, which will house design engineering, software development, manufacturing engineering, field engineering and an expanded research and development department. Administration and marketing also will occupy office space in the new building which is located at 1641 McGaw in Irvine, CA.

## Ampex camera group moves

The camera products group of Ampex' audio/video systems division will consolidate its operations in a 103,000 square foot facility in the Valco Industrial Park, Cupertino, CA. Ampex has signed a 10-year lease for the facility, which will consolidate the camera group's product management and engineering departments, formerly located at corporate headquarters in Redwood City, and manufacturing, formerly in Sunnyvale.

## Lowel to light Olympics

Lowel-Light has been selected by the Lake Placid Olympic Organizing Committee to light the press and interview areas of the XIII Olympic Winter Games. The six sites, strategically located near all the major event venues, will be available to the world press in attendance for on-the-spot interviews with athletes.

## Ampex official supplier of magnetic tape

Ampex announced it has been selected as the official supplier of audio and video recording tape to the 1980 Winter Olympics at Lake Placid, NY. Magnetic tape products to be supplied include quadruplex and helical videotape, VHS and Beta-format videocassettes and audiocassettes.

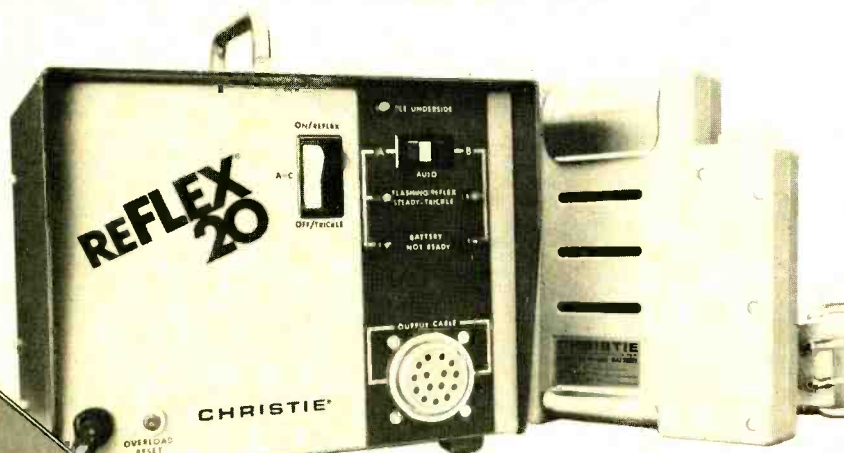
Broadcast media teams must be ready at a moment's notice. With Christie's integrated system; the REFLEX® 20 Charger and sempiternal ni-cad battery packs, there is virtually no wait. Recharge? The fastest in the industry. 12 to 20 minutes and you're completely charged.

Because of the revolutionary "burping" system the batteries remain cool, their cycle life is extended up to 10 times that of conventional ni-cads and 50 times that of other rechargeable batteries.

The Christie System... reliable, effective and 90-97% efficient.



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## SALES/CONTRACTS

### Industrial Sciences

Industrial Sciences has completed a research and development contract for the Public Broadcasting Service. This contract included development of the broadcast closed



captioning system developed by PBS.

### Harris

The broadcast products division of Harris is providing an MW-50A, 50kW PDM transmitter and a 4-tower antenna phasor to WAAY radio in Huntsville, AL.

Fiji Broadcasting Commission has placed a \$250,000 order for broadcast equipment with the broadcast products division of Harris. The order included Harris' FM-1K, 1kW FM transmitter and two BC-20H, 20kW medium wave transmitters.

### Audiotronics

Audiotronics video display division announced a major award from RCA-Lancaster, PA. The agreement calls for the purchase of over two million dollars worth of private-label monochrome video monitors during the 1980 calendar year.

### Sony

Sony Broadcast, a division of Sony Video Products, has announced the sale of more than \$1.1 million in broadcast video production and editing equipment to three television stations owned and operated by Combined Communications, Phoenix, AZ. The combined orders include 11 BVH-1100 1-inch Type C studio VTRs, two BVH-500 portable 1-inch Type C VTRs, five BVP-300 ENG color video cameras, 10 BVT-2000 TBCs, seven BVG-1000 time code generator/readers and 17 BVU-200A broadcast 3/4-inch editing videocassette recorders, plus other peripheral editing and production equipment.

### Marconi

Marconi has won an order to equip 25 IBA stations throughout the United Kingdom when the Independent Broadcasting Authority launches the fourth television channel in 1982 with the transmitters required for the new channel.

A recent order for three Mk IX television cameras by the Mexican Commission for the Promotion of Academic Activities has raised the number of this latest family of cameras from the Marconi stable to 101 equipments sold so far.

## FINANCIAL

### Orrox

Orrox reported record results for the third quarter and nine month periods ended September 30, 1979. Net earnings for the three month period ended September 30, rose

244% to \$583,711 or 34 cents per share from \$169,800 or 9 cents per share for the same quarter last year. Revenues increased 80% to \$2,813,543 compared to \$1,559,310. For the nine months, net earnings reached \$1,447,856 or 84 cents per share against \$340,833 or 17 cents per share. Revenues were \$7,279,731 compared to \$4,336,784 for the nine month period in 1978.

### Cox

Cox Broadcasting reported higher revenues and earnings for both the third quarter and nine months ended September 30. Net income for the three month period was \$10,421,000 equal to \$1.55 per

share, compared with \$8,701,000 or \$1.30 per share the same quarter a year ago, a 20% increase.

### Chyron

Chyron reported that sales for the first quarter of the current fiscal year were at a record level. Sales for the quarter ended September 30, 1979 doubled to \$1,509,163 from \$758,312 last year and net income advanced to \$156,660 from \$59,909 earned from operations in the corresponding quarter of 1978.

### Radio Broadcasting

Radio Broadcasting has purchased two NEC 30kW transmitters for their pay TV station, Channel 57.

## Cut Time... Code while you tape

Now you can cut a substantial part of your post production time by coding while videotaping.

The new Telcom T-7000 TIME CODE GENERATOR/READER weighs only 10 ounces, yet offers full-scale capability — right in the palm of your hand.

The internal Ni-Cad battery packs up to 8 hours of energy. The convenient book size carrying case stores another 18 to 30 hours of reserve power for long, unexpected ENG assignments.

Check these features:

- Direct keyboard entry of time and user bits
- Standard 600 ohm +11 dBm output
- Jam-sync (with optional built-in reader)
- Colour framing
- Handles drop-frame, 25 and 30 frames per second as well as remote start/stop capability
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Innovators in Time Code technology.

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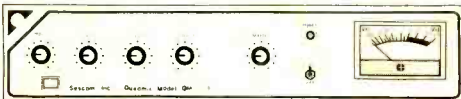
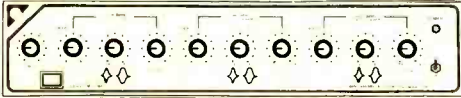
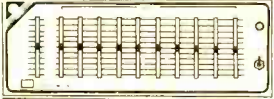

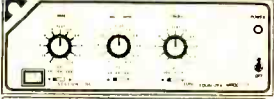





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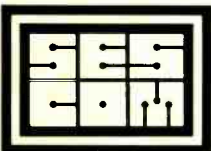
## SESCOM INTRODUCES IT'S NEW PRODUCTS

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PM - 1 \$140.00		3 BAND PARAMETRIC EQUALIZER
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AC - 1 \$125.00		ADJUSTABLE ACTIVE CROSS OVER
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SH - 1 \$125.00		STEREO HEADPHONE AMPLIFIER
ACTIVE AUDIO DA 4 CHANNEL		ADA - 1 \$125.00
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TWX (910) 397-6996

## meetings, events & seminars

**Traveling course**—A 5-day course called *Modern Methods of Digital Signal Processing* is being taken to several major cities during 1980. Contact Integrated Computer Systems, 3304 Pico Blvd., Dept. BE, P.O. Box 5339, Santa Monica, CA 90405.

**February 25-28**—65th Technical Meeting and Exhibits, London: will be held at the London Hilton Hotel and the Park Lane Hotel. For information contact Laurie Fincham, KEF Electronics Limited, Tovil, Maidstone, Kent ME15 6QP, United Kingdom, telephone Maidstone (0622) 672261.

**March 24-25**—Video Disc and Videogram 80 will bring together video experts from North America, Europe and Japan. For further information, contact Nord Media Ltd., Dept. BE, 37 New Bond Street, London, W1Y 9HB, telephone 01-629-9381.

**March 26-28**—The first International Conference and Exhibition on Viewdata, Teletext and TV based information systems is to be held at the Wembley Conference Center in London, England. For more information contact Technology Marketing Analysis Corporation, 680 Beach Street, Suite 428, Dept. BE, San Francisco, CA, telephone (800) 227-3477.

**April 13-16, 1980**—Las Vegas will be the site of the 1980 convention of the National Association of Broadcasters. For additional information contact NAB, Dept. BE, 1771 N St., NW, Washington, DC 20036.

**May 6-9**—66th Technical Meeting and Exhibits, Los Angeles will take place at the Los Angeles Hilton. For more information contact Carolyn Davis, Synergetic Audio Concepts, P.O. Box 427 Tustin, CA, 92680, telephone (714) 838-2288.

**June 17-19, 1980**—EuroComm 80 will take place at the Bella Center, Copenhagen. The event is for those who develop, produce or use highly advanced communications equipment for public and commercial purposes. In connection with EuroComm 80, a conference *Comprint International 80* will be held from June 16-18 at the Bella Center. For further information, contact Bella Center A/S, Center Blvd., DK-2300 Copenhagen S. Denmark, phone (01)51 88 11.

**July 25-27**—World Friendship through Amateur Radio is the theme of the national American Radio Relay League Convention to be held in Seattle, WA. Information may be obtained by writing the 1980 ARRL National Convention Committee, Dept. BE, P.O. Box 68534, Seattle, WA 98168.

**September 20-23**—The International Broadcasting Convention 1980, has made its call for papers. For details contact the Institution of Electrical Engineers, Dept. BE, Savoy Place, London WC2R OBL, United Kingdom.

Circle (44) on Reply Card



## State broadcasting organizations and other associations

(continued from page 16)

### ASSOCIATION FOR BROADCAST ENGINEERING STANDARDS, INC.

1730 M STREET, NORTHWEST  
SUITE 705  
WASHINGTON, D.C. 20036

Wallace E. Johnson, formerly chief of the Broadcast Bureau of the FCC has become executive director of ABES. ABES is a trade association of AM and FM stations concerned principally with aural broadcast allocations and technical standards.

### The Canadian Association of Broadcasters

The Canadian Association of Broadcasters has sent its priority list on policy to the federal govern-

ment and included in it a task force on communications and broadcasting.

The CAB's views on priorities, preceding the opening of Parliament and the Throne Speech, went to Communications Minister David Macdonald in a letter signed by the association president, Ernest Steel.

The association made the following points:

With the onset of new broadcast signals delivered by satellite—American or Canadian—there should be new Canadian content rules, says the CAB. Pay TV also should live by certain Canadian rules and it is the broadcasters who should program the system of pay-per-channel or pay-per-program.

The rate structure for the carriage of broadcast signals by Canadian satellite also must be reduced and the private broadcasting

sector should be represented on the Telesat board.

Social goals set by the government should be centered on the secretary of state, not the communications department where technical matters belong.

### Society of Motion Picture & Television Engineers

The theme of SMPTE's 14th Annual Television Conference is "The Digital Decade." The conference is set for the Sheraton-Centre Hotel in Toronto, February 1-2.

The 2-day conference will focus on four major areas, one for each half-day session. On Friday morning, the subject will be *The All-Digital TV Plant*. On Friday afternoon, the session will cover *Digital Signal Processing*. The Saturday morning session will be on *Digital Transmission and Testing* and the Saturday afternoon session will discuss *Digital Video Recording*.

The conference will be highlighted by an equipment exhibit that will feature equipment relevant to the program subjects. Information about the SMPTE Television Conference is available from SMPTE, 862 Scarsdale Ave., Dept. BE, Scarsdale, NY 10583. □

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The new Magnetic Tape Reproduce Calibrator (Flux Loop Test System) accurately establishes and isolates the magnetic characteristics of the reproduce head. It allows one to use a Reproduce Alignment Tape to isolate and establish losses produced by gap characteristics and spacing effects. Gap losses and reproduce equalization are tabulated in the recently introduced Standard Tape Manual.

In addition to the new Reproduce Calibrator and the Standard Tape Manual, STL offers the most complete selection of magnetic test tapes available - Frequency Alignment - Pink Noise - Sweep - Speed & Flutter. All are available in reel-to-reel, cassette and cartridge.

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15-input, 4-bus  
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"It's a wonderful sense of security for a director to have access to the people he works with."

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Are you entirely satisfied with your ENG communications?

We've just finished talking with every Comrex Cue System user and, after talking with them, what we can't understand is why every station who does ENG, EFP, sports, or live studio programming hasn't at least considered our Cue System.

The Comrex Cue System is an RF system that goes in a van, helicopter, press box, studio control room, etc., and sends both program and instructions to small, rugged, pocket receivers.

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## people in the news

.....

### Manufacturers/Distributors

**John W. Wellend** has joined System Concepts as marketing services manager. Prior to joining the company, Wellend was with Convergence.

Angenieux has announced the appointment of **Ken Rice** for Western TV sales. He will be responsible for the sale of zoom optics for broadcast, portable and ENG/EFP color cameras.

IGM division of NTI, has announced the appointment of **Darrell Wichers** as sales manager of the firm. Prior to his appointment, he was a house salesman and in the customer service department.

**Tom Mouhelis** has been appointed Midwest regional manager for the professional/industrial products group of Maxell.

**Rick Plushner** has been appointed Western district manager of Sony Industries' digital audio division. Prior to joining Sony, Plushner was president of Audio Design, Miami, FL, where he designed and supervised the sales and installation of professional sound systems.

Eastman Kodak has announced the appointment of **Otis E. Finley** as regional sales manager, Pacific Northern region, in the motion picture and audio/visual markets division.

**Vince Caravello** has been promoted to transmitter supervisor for KSDK television in St. Louis.

US JVC announced the appointment of **N. Sakoda** to the position of director and president. Sakoda succeeds **S. Hori**, who will be assuming new responsibilities at Victor world headquarters in Tokyo.

**Tom Jones**, sales manager, Multronics, has been named vice president, sales and marketing for D-B Electronics.

Data Communications has announced three promotions within its broadcast division. **Bill Boyce** was named general manager, sales and service. **Dewey Hemphill** will replace Boyce as sales manager. **Dorothy Simon** has been advanced to regional manager of the division's central region.

**Hugh P. Wilcox** has been named engineering manager of Cetec Broadcast Group. Wilcox has responsibility for product design and development and for technical support of marketing.

**Wilfred L. Larson**, chairman, and **Fred O. Dumke**, secretary-treasurer, two of the co-founders of Switchcraft, have announced plans to retire from the company effective December 31. Both will continue indefinitely as consultants.

**Bruce Scrogin** has been promoted to vice president for international sales at James B. Lansing Sound. His



prior experience includes seven years in the advertising division of Sunkist Growers.

Coastcom has announced the appointment of **James H. Fisher, Jr.** as Southwest regional manager, in charge of sales.

**Don Massa** has been appointed product manager of Ampex Switcher Operations in the video systems group of Ampex' audio/video systems division. He was previously with RCA.

**Edwin W. Engberg** has been appointed product manager of the audio products group in Ampex' audio/video systems division.

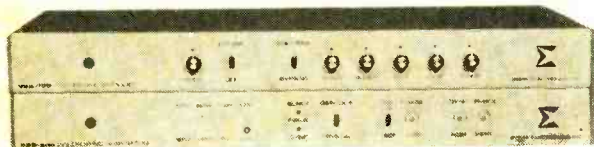
## Radio/Television

**Jack Verner** has been named chief engineer of WTBS, Atlanta.

**Gino Ricciardelli**, chief engineer of WICZ-TV 40, has been named director of engineering for Stainless Broadcasting Company, North Wales, PA.

**William J. Hart** has been promoted to vice president and general manager of WILX-TV in Lansing, MI. WILX-TV is an NBC affiliate acquired by A-T-O Communications in 1978.

**Jim McFarland** has been named chief engineer for Life Anew Ministries. Previously McFarland was an engineer for WMTV in Madison, WI.



### STOP MAKING DIRTY PICTURES

Sigma Video Processing Amplifier (VPA 100) strips the dirty sync pulses and fuzzy color bursts from helical VTRs or whatever source, and reinserts clean pulses and color bursts freshly generated from a genlocking sync generator such as Sigma CSG 300 or one of your own.

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The Wilkinson Electronics FM-250SS all solid state FM broadcast transmitter is housed in a steel cabinet finished in a hard durable enamel finish. Only four square feet of floor space required and it is light enough for table mounting. All operating controls are on the front panel and access to the interior of the Power Amplifier is through the PA cubicle. A sliding drawer directly beneath the PA houses the power supplies and control adder circuits. Overload indicators as well as overload reset controls are on the front panel of this slide-out drawer. All components of these circuits are completely accessible when the drawer is opened.

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# THE SIGHTS

## Chroma Insert Keyer, Model 7010.

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It is the ENG production tool for adjusting color variations after encoding, and enables a broadcaster to balance varying color values from a variety of program sources. Program materials from cameras, tapes, films or network feeds can be color-balanced to each other after tape playback or microwave receiver during live coverage. Available with an optional automatic sensor for telecine use.



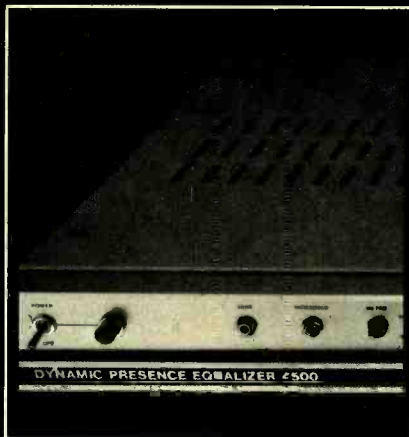
## Dynamic Presence Equalizer, Model 4500.

Enhances broadcast signal presence automatically. Gives program material more punch and improves sound quality. Compensates for lack of presence caused by poor microphone placement, incorrect equalization, misaligned tape heads and unequalized telephone circuits.

## FM VOLUMAX®

### Automatic Peak Controller.

Designed especially for the FM broadcaster. Allows maximum signal strength and prevents overmodulation caused by pre-emphasized signals. Full brilliance and dynamic range are maintained without distortion through multi-band processing. Available in monaural or stereo.



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Designed for either stereo or monaural use, this model contains two distribution amplifiers, each with eight balanced outputs from one input, strappable to a 1 x 16 unit. Ideal for distributing program and monitor circuits to studios and control rooms. Features differential, balanced inputs, 40 dB gain and high output isolation.

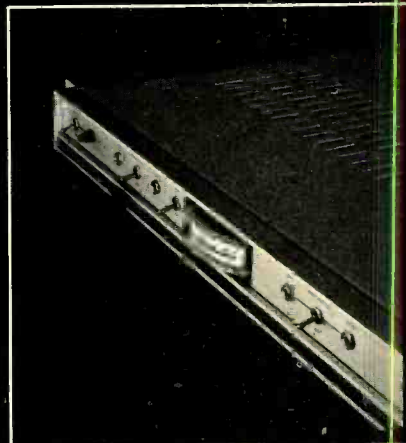
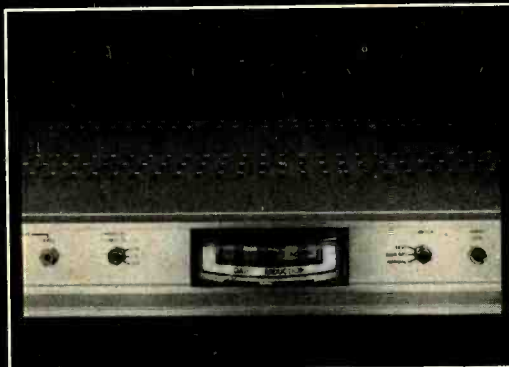
#### VOLUMAX® Automatic Peak Controller, Model 4330.

With patented control action, this AM limiter assures maximum utilization of each watt of carrier power without overmodulating the transmitter, and with minimal signal distortion. Automatic peak phasing insures negative asymmetry and is silently inverted for positive modulation to the maximum allowable limit of 125%.

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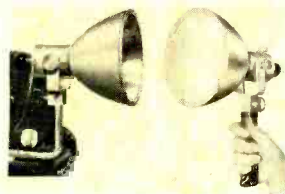


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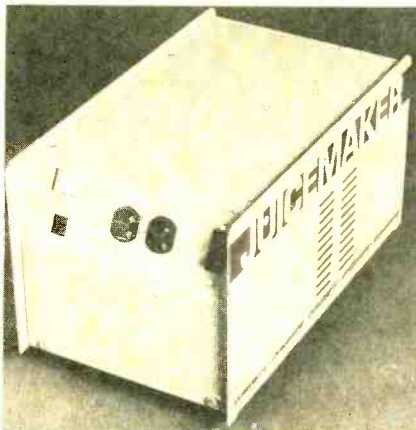
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## new products

### Dynamote

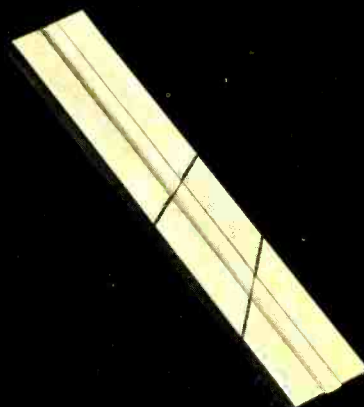
Dynamote has introduced the B18-12 to its line of 120Vac power inverters. The B18-12 provides up to 1800W for operating floodlights, as



well as ENG equipment. The unit is available in models providing 60Hz, or 59.94Hz  $\pm .01\%$  to synchronize with standard video vertical deflection.

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### IFB system

Comrex has introduced a 1W IFB system that combines and retransmits program and instructions from ENG van to field personnel. The Model CTA cue transmitter takes up 1 3/4-inch in a standard 19-inch rack and accepts two audio inputs and controls levels so that program is heard continuously and instructions override the program audio as they occur.

Circle (176) on Reply Card



### Table-top console

Ruslang has developed a universal table-top transport console, the RL 300. It is designed to fit the new RL 350 rack base and will accept any 19-inch by 15 3/4-inch tape transport.

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Circle (54) on Reply Card



#### Camera pickup tubes

**Amperex** has announced a line of low capacitance diode gun Plumbicon television camera tubes for use in professional studio, ENG and EFP cameras. The diode gun construction in this series of tubes provides for high resolution, low lag and beam reserve for highlight handling, according to the manufacturer.

Circle (178) on Reply Card

#### Modulation controller

**Sta-Max**, from **Automated Broadcast Controls** is a wideband modulation controller that produces maximum loudness for FM stereo signals



with complete elimination of overshoot or distortion. It is compatible with any stereo generator/exciter combination, signal enhancement device or format.

Circle (179) on Reply Card

#### Voltage controlled amplifier

A low distortion, low noise, high bandwidth voltage controlled amplifier has been introduced by the professional product division of **dbx**. The model 2001 VCA approaches such low levels of inter-modulation and total harmonic distortion independent of gain, input or output levels, that they almost cannot be measured, according to the manufacturer.

Circle (180) on Reply Card

#### Matching transformers

**Beyer** has designed a line of matching transformers that permits professionals to quickly interconnect equipment having a variety of



impedances and connector types. Beyer matching transformers are available wired into cables or in compact plug-in form, with Cannon, phone, DIN and phone connectors.

Circle (181) on Reply Card

# 690PLL: Clean, clear FM sound.

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Fred Sears BSEE, Cetec RF design engineer.

# Cetec Broadcast Group

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January 1980 **Broadcast Engineering** 63

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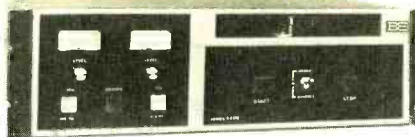
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Circle (56) on Reply Card

## Cart machine

The model 3400 rack mount for A, B and C sized carts has been added to the **Broadcast Electronics** line of cartridge tape machines. The unit is



designed into a rack mount assembly with no shelf or filler panels necessary. It can also be used for desktop operation when equipped with an optional cover.

Circle (182) on Reply Card

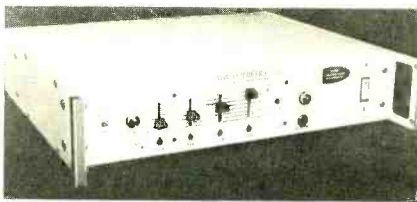
## Time compression system

A time compression system designed to increase or decrease the speed of recorded voice and music without the loss of definition or bandwidth has been introduced by **Integrated Sound Systems**. The process enables a 30-second commercial to be reprocessed to 20 seconds without producing the high-pitched effect which normally occurs when a recording is played faster.

Circle (183) on Reply Card

## Enhancement system

**Kahn Communications** has designed the Non-Symmetra-Mod enhancement system, a concept in AM broadcasting that provides 125% positive modulation, free of typical



clipping type distortion. The technique allows the AM broadcaster to custom enhance his signal to increase coverage, according to the manufacturer.

Circle (184) on Reply Card

## Digital products

A 16-track digital mastering recorder, two preview units, an electronic digital editing system and a 16-track update kit for later expanding a 16-track recorder to 32 tracks, have been added to **3M's** digital mastering series.

Circle (185) on Reply Card

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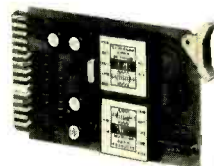
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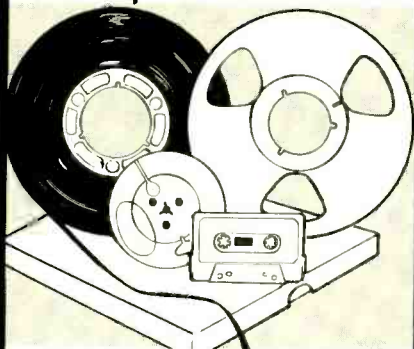
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## feedback

Letters from readers, technical & miscellaneous notes, station & plant visits

### Orban address processing

Regarding Dennis Martin's letter (BE, October 1979, p. 10) discussing the Elcom "limiter," which is in fact a composite (or baseband) **clipper**, I would like to make several observations:

(1.) If Martin feels that he and his associates have discovered the problem of overshooting lowpass filters in stereo generators, then he is at least four years too late. The first reference known to me in the literature on this problem is the paper I wrote on "Combining High Signal Quality with High Modulation Levels in FM" published in 1975. The paper describes our Optimod-FM system which uses nonlinear lowpass filters that combine less than 0.5dB overshoot with maintenance of the integrity of the baseband spectrum. Since the introduction of the highly successful Optimod-FM, at least three other manufacturers have introduced systems with designs to control overshoot without compromising the baseband spectrum.

(2.) Contrary to Martin's assertions, there are several FM limiting systems in commercial production which employ fast attack time limiters rather than clipping to control peak modulation.

(3.) Martin implies that the 53 kHz filter in a switching-type stereo generator will overshoot and ring. If the audio applied to the stereo generator is properly lowpass-filtered such that the baseband spectrum is controlled, then a properly-designed 53 kHz composite lowpass filter will look like a delay line at all baseband frequencies (it must be phase-linear to avoid compromising the stereo separation), and absolutely no further ringing will be produced. While such filters are not **perfect** delay lines, the ringing introduced is quite negligible. (Of course, if the 19 kHz filters are eliminated, then the 53 kHz filter can ring and aliasing distortion will also be introduced.)

(4.) An ordinary swept-front-end spectrum analyzer is not suitable for evaluating the short-term spectrum of transient phenomenon such as filter overshoot because of the transient response characteristics of the spectrum analyzer's own filters. If the transient can be captured digitally, then a fast fourier transform can be computed to find the actual spectrum.

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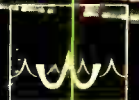
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(5.) Baseband clipping (as performed by the Elcom device) happens to be a very cheap way to make the modulation monitor look impressive. However, unlike the nonlinear filter approaches which keep the main channel separated from the stereo subchannel and which protect the stereo pilot from contamination, the baseband clipping approach creates both harmonic and intermodulation distortion **in the baseband**. On a transient basis, the main channel, the stereo subchannel, and the pilot can all intermodulate with each other. Sidebands will be created around the pilot. In addition, harmonics of the baseband (which can extend to  $n \times 53$  kHz, where  $n$  is the harmonic number) will be created on a transient basis. While their energy may be small, they can, on a transient basis, exceed FCC occupied bandwidth requirements. Whether they actually do so cannot be evaluated accurately with a conventional analog spectrum analyzer because of the filter transient-response and averaging properties alluded to above, but they can be computed digitally.

I would, therefore, pose the following questions to Martin:

(a) Have you done a rigorous analysis of your station's occupied bandwidth? What about adjacent-channel interference in secondary coverage areas?

(b) Have you evaluated the dynamic separation (i.e. with left-only modulation; is the right-channel

crosstalk perfectly clean-sounding; or is it interrupted by clicks, pops, and other non-linear crosstalk)?

(c) Have you determined the sensitivity of many different stereo decoder designs to modulation of the pilot? In particular, have you checked the VCO control voltage in typical PLL stereo decoder ICs to make sure that pilot sidebands are not causing glitches in this voltage which can introduce instantaneous frequency modulation of the recovered audio?

(d) Have you determined the effect of this technique on crosstalk into SCAS?

(e) Even if none of the above considerations are practical problems when the system is correctly set up (a postulate whose accuracy remains to be determined), what is the sensitivity of the system to tiny drifts in gain between the composite clipper threshold and stereo generator output level? What happens when the clipper is overdriven 0.5dB? 1.0dB?

(f) Given that the system is part of the transmitter (as it is located after the stereo generator), have you verified that the system meets all requirements of part 73.322 of the FCC Rules? Or has the manufacturer filed data with the Commission and received a letter stating that the device may be freely installed in a transmission system as is currently the case with stereo generators with known performance parameters?

(g) Is baseband clipping, in fact, legal under current FCC Rules as a

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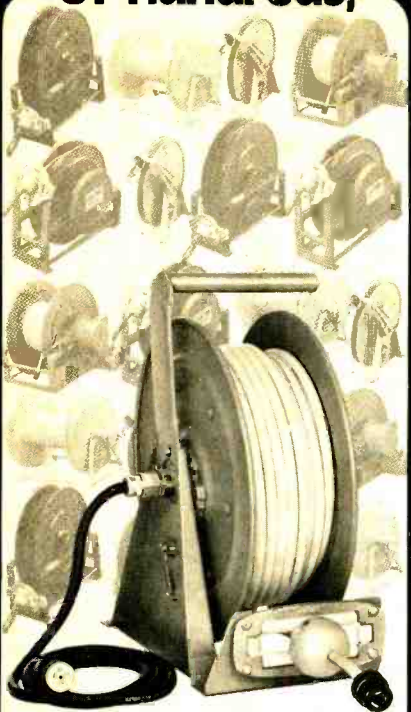
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means of signal processing? Does the fact that the instantaneous pilot injection falls well under 8% during transient clipping violate the FCC requirements regarding pilot injection? What about transient occupied bandwidth? What about clipping-induced second harmonic distortion of the pilot's exceeding the -40dB 38kHz suppression requirement?

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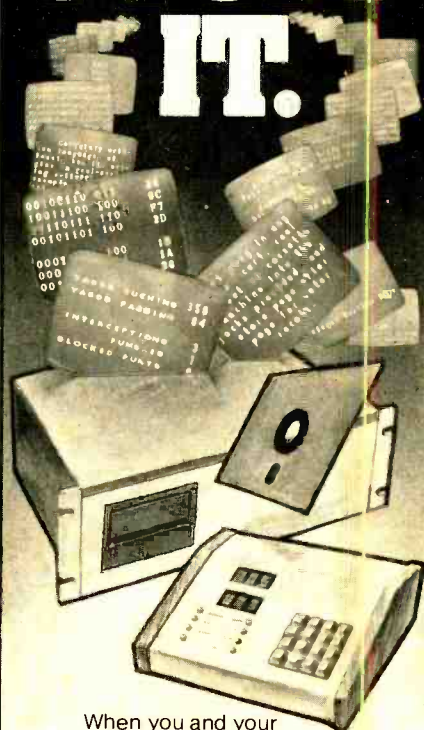
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## Satellite communications products catalog

Scientific Atlanta—The 150-page 1980 catalog of satellite communications products describes the company's full line of earth stations and communications products for transmitting and receiving signals via satellite.

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## Standard update

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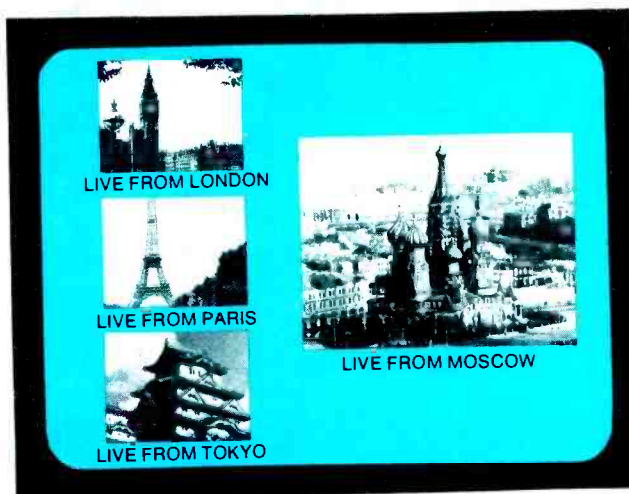
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