

MAY 1976

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REPORT INSIDE.



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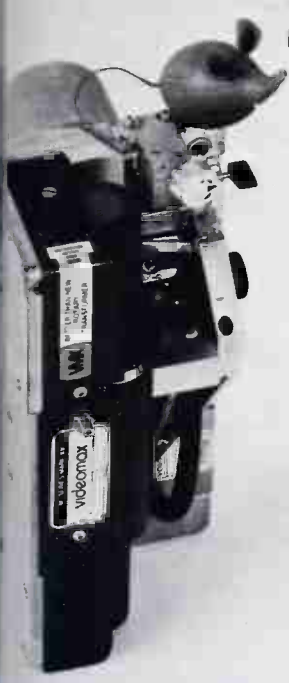
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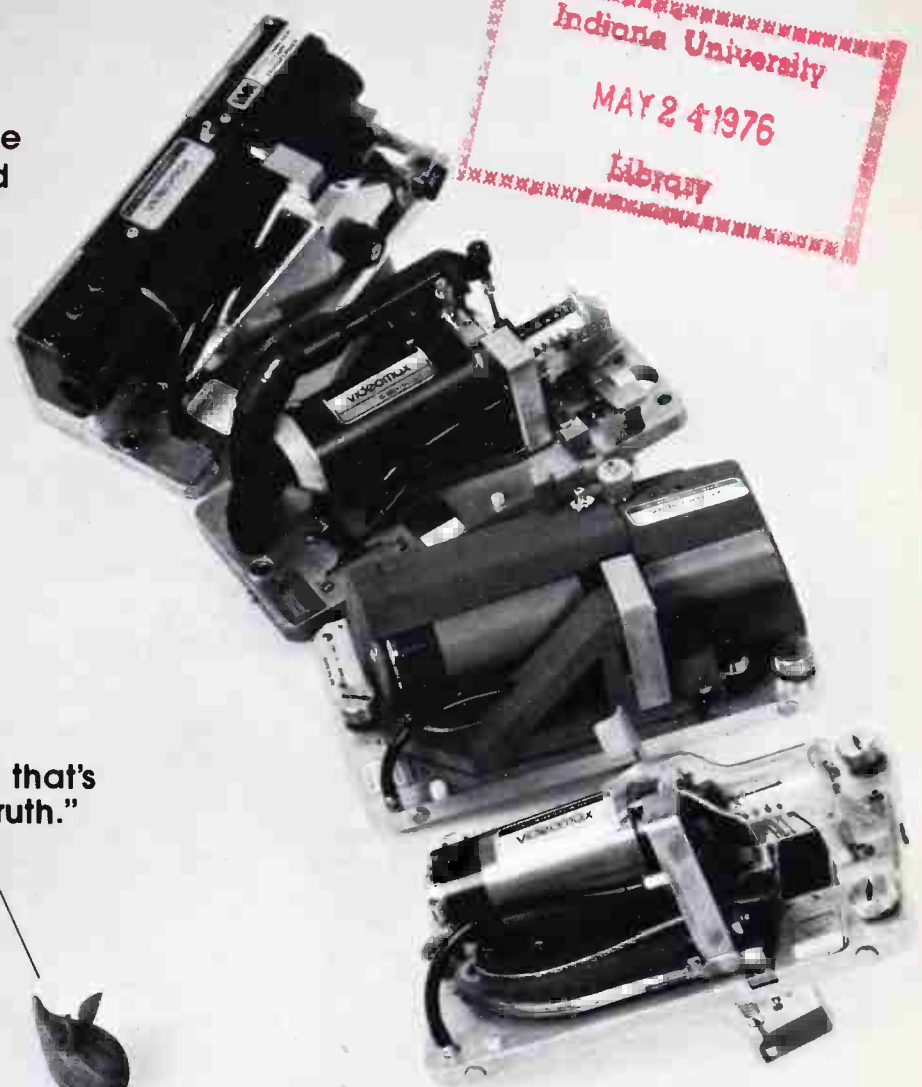
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# BM/E

BROADCAST MANAGEMENT/ENGINEERING



"Fantastic" is the word used by visitors to describe the new equipment on display at NAB '76. "Fantastic" is the word used by exhibitors to describe both traffic and interest in new equipment—in both Radio and TV. Read about what was on display beginning on page 33.

**BROADBAND  
INFORMATION SERVICES, INC.**  
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*Timing errors that occur between sync pulses in a video signal have been largely ignored, both in measurement and in correction. With a reliable, inexpensive measurement technique apparently worked out, we can't avoid the second problem: How are we going to correct the error?*

### 108 Great Idea Contest

*Here's the second installment of BM/E's all new 1976 contest. Read the entries, vote on the Reader Service Card and send in your Ideas!*

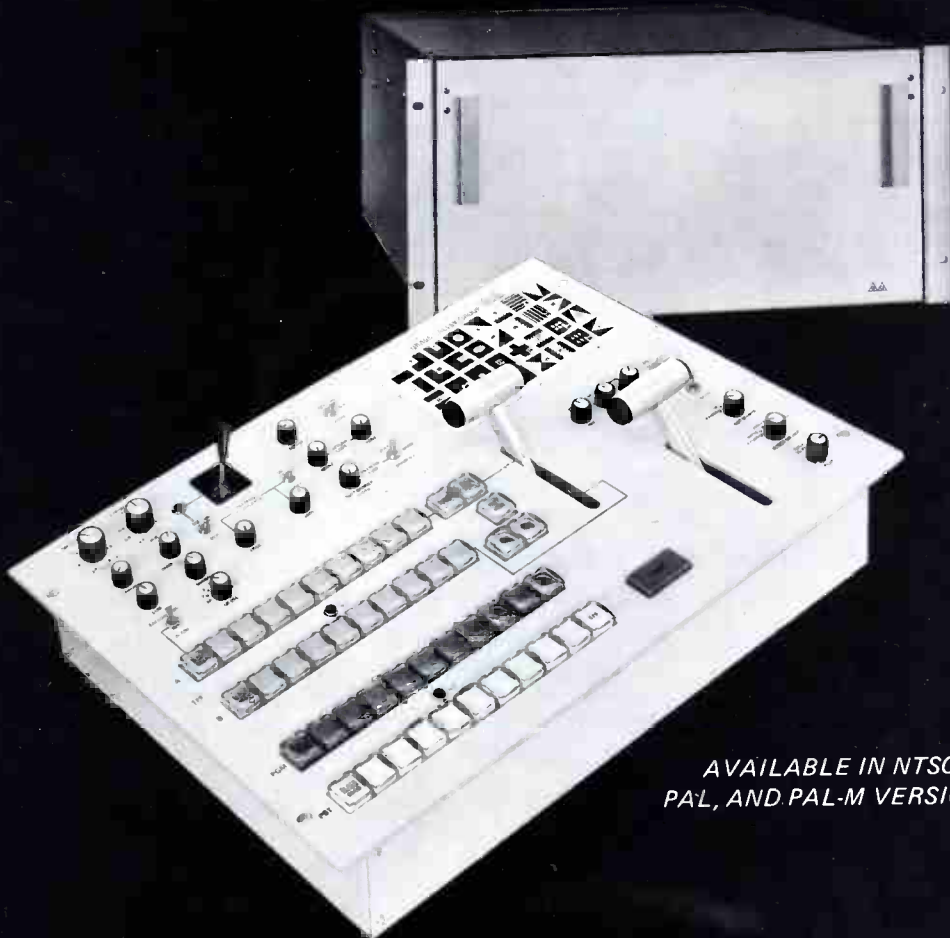
### 112 Broadcast Equipment

*New and significant products.*

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BROADCAST INDUSTRY

# NEWS

## A Door To The Future: Auto Transmitter Rules Proposed

In an action that could change the face of broadcasting over the next few years from what it has meant to engineering personnel for decades, the FCC issued on April 8th the proposed rules opening the way to use of automatic transmitters. From the timing of the comments requested (on or before June 12th) and the Commission's current spirit of do-it-now, evident in many recent actions (see next items), it seems likely that the auto transmitter rules will become official well before the end of the present year.

The FCC sees automatic transmission systems (ATS) as a *third option* for broadcasters, after direct and remote control; moreover, the proposal is for permission to use automation in any *parts* of the operation the broadcaster chooses; he can be partially automatic, partially "manual". Prior authority for ATS would not be required, except that AM stations with directional antennas would have to submit certain advanced showings. Others simply notify the FCC that they will do it.

The FCC proposes that stations adopting ATS for all specified functions will *not* be required to have a first-class radio-telephone operator in full time employment. Such an operator must be available for inspections, measurements and adjustments made at specified intervals, for all on-air adjustments, and for check-out at the end of maintenance work. However, since the law now specifically requires it (amendment is anticipated), the ATS station must have a continuous-duty operator with at least a restricted operator permit.

The FCC proposes that ATS can be adopted by adding a "black box" to an existing transmitter—completely new transmitters are not required, although eventually there will certainly be transmitters with the automation built in.

As to the black box itself, it is clear that recent developments in micro-processor control systems have showed the way toward extremely compact, inexpensive and reliable quasi-computer systems that would have more than

enough memory for all the functions of a transmitter needing monitoring and automatic control. The FCC lists functions that would be controlled, a very comprehensive list starting with output modulation, loss of signal, etc., and specific conditions calling for automatic shut-off, with others merely activating an alarm.

Every broadcast station manager and engineer must study the ATS proposal; if copies are not on hand at station, the FCC should be asked for them. Certainly no drastic events will take place the day the rules are adopted, but over several years a major evolution in broadcast engineering practice seems certain.

## FCC Realigns '77 Rebuild Cable Channel And Access Rules

An important realignment of the cable channel capacity rules, under discussion for several years, was another item in the current big-decision splurge at the FCC. It makes a substantial attempt to meet the industry's criticisms of the earlier rules as impractical, economically. The old rules included: a requirement for 20-channels in "new" systems (starting after March 31, 1972); in major markets, one non-broadcast channel for every broadcast channel; facility for non-voice two-way service; four dedicated channels, one each for public, educational, local government and leased access; complete program facilities for local access. Systems in operation before March 31, 1972, were to be given until March 31, 1977 to come up to these standards.

The new rules, effective May 1st, 1976, eliminate channel capacity and access rules for systems with fewer than 3500 subscribers; delete entirely the one-nonbroadcast-for-one-broadcast rule, provide that for larger systems, the rules apply on a head-end, rather than a community basis.

Further, the new rules delete the requirement that older systems reconstruct to provide four dedicated channels or that new ones install them before commencing; require that systems provide the four channels only if they have the activated capacity (but systems with more than 3500 subscribers must accommodate access ser-

VICES, even if it involves use of a broadcast channel during duplicated network time).

But a system must expand access channels up to the limit of active channel capacity based on demonstrated use, in no case to require the use of converter. Two-way capacity must be installed in all systems with 3500 more subscribers, but no system is required to reconstruct solely for that purpose. Finally, the "large" systems must reconstruct to comply with 20-channel and two-way requirements in not more than ten years.

## New Alloy Extends Life Of Magnetic Heads

The development of a new wear-resistant alloy by the Nortronics Co. now makes it possible to significantly extend the life of magnetic heads. After two years of extensive testing by Nortronics of the alloy developed by Carpenter Technology of Reading Pa., long-wear properties of the high permeability type magnetic alloy named Wear-Resistant Hy Mu 800 were confirmed. Nortronics will be the first magnetic head manufacturer to offer the new alloy in its products.

## "Fairness" Reaffirmed: No Change Will Be Made

In another of the "big" decisions pouring out of the FCC in March and April, the Commission gave a flat "no" number of requests for elimination or changes in, the Fairness Doctrine under attack by a covey of critics. FCC restated the basic two-part "Fairness" duty of licensees as: devoting a reasonable proportion of air time to public issues; making the coverage in the sense that there is opportunity for contrasting viewpoints to be heard. FCC rejected the proposal that "Fairness" be evaluated only at renewal time, saying that this could allow a broadcaster to get way "off base" by jeopardizing renewal, and could let the issues get "stale". Also rejected was bringing commercials under the rule ("... they do not inform the public on any side of an issue of public importance," nor would opposing commercials provide any substantial

continued on page



Full Facility Broadcast Console.

All the advancements in audio and video were shown at the NAB Show. Very likely your video equipment has been modernized, but can you say the same about your audio equipment? Does some of it go back almost to the days of black and white TV? Our highest quality audio equipment gives life to your sound, as color does to video. We offer performance specifications unsurpassed by any equipment anywhere in the world.

We gained our reputation where audio is everything. Automated Processes is the leading U.S. manufacturer of audio consoles for recording studios worldwide. Our console designers have long personal operating and engineering experience in studios like yours... we understand your problems. For example, the console set-up controls can be conveniently located underneath the hinged bolster. During equipment set-up, controls are preset, secured under the bolster out of the way of production personnel. Preset-Air-Cancel pushbuttons on-air selector, controls console assignment to transmitter.

Standard Features Available:

- Model 440 Fader, (illuminated scale).
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Our modular construction permits customized consoles at off-the-shelf prices. We can assemble consoles and facilities to meet your exact requirements. A letter or telephone call to us will put you in touch with experts who can offer the best equipment to meet your needs.

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Fifteen telemetry and thirty command functions are provided by the TRC-15A. The **Model TRC-15AR**, when used in conjunction with a Moseley STL, or other radio link, will provide total wireless operation. The **Model TRC-15AW** is for use on leased telephone, or other wired circuits.

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Fully digital remote control of a remotely located transmitter point is provided by the **DCS-2 Digital Control System**. Multiple transmitter site operation—a standard option. **Command, telemetry, and status** provided in groups of thirty channels. **Automatic parameter logging** available. Computer-assisted operation of the DCS-2 is another standard option, and can provide **totally automated plant operation**. The **Model DRS-1 Digital Remote System** provides many of the features of the basic DCS-2 at an affordable price. Up to 30 telemetry functions and 24 status channels to a single transmitter site.

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**Models RPL-3 and RPL-4 Remote Pickup Links** provide unsurpassed audio performance for remote broadcasts. Two full-time microphone and high-level line audio inputs are standard. The RPL-3 and RPL-4 Transmitters are only 4 inches high and weigh a mere 16 pounds—complete with audio mixing and AC/DC power supplies.



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## NEWS

balance). A third proposal rejected the taking of fairness action only evidence that a station management deliberately ordered a slanting of news. The FCC said that the press system strives for a "delicate balance among the interests of all concerned is "outlined with specific procedural requirements and with substantial guidelines upon which viewer and censee may rely. The Commission tailored its actions so as not to become in effect, the broadcast journalist programmer."

## FCC Briefs

The proceeding looking toward regulation of "hypoing" (Doc 20501) has been dropped by the FCC because of difficulties in defining "right" and "wrong" actions, possible unfairness in the application, First Amendment problems from judging programs on content... **Not certified equipment** can now be shown at Trade Shows, says the FCC, it carries clear notice that it is not for sale until certified... The FCC announced formation of a **Consumer Assistance Office**, at headquarters, 1915 M St., NW, Washington, where members of the public, citizen groups and licensees will get information and assistance.

The FCC proposes to add to "equity" a requirement that a station give time to a candidate within 48 hours prior to an election day, immediately notify opposing candidates (comments by May 17)... **Request for VHF and FM translator power 10 watts** in areas east of the Mississippi (now restricted to 1 watt) were turned down by the FCC as not warranted by the facts; it promised to consider such requests on a case-by-case basis.

## Cox Pres., Researchers See Continued Upswing Broadcasting & Economy

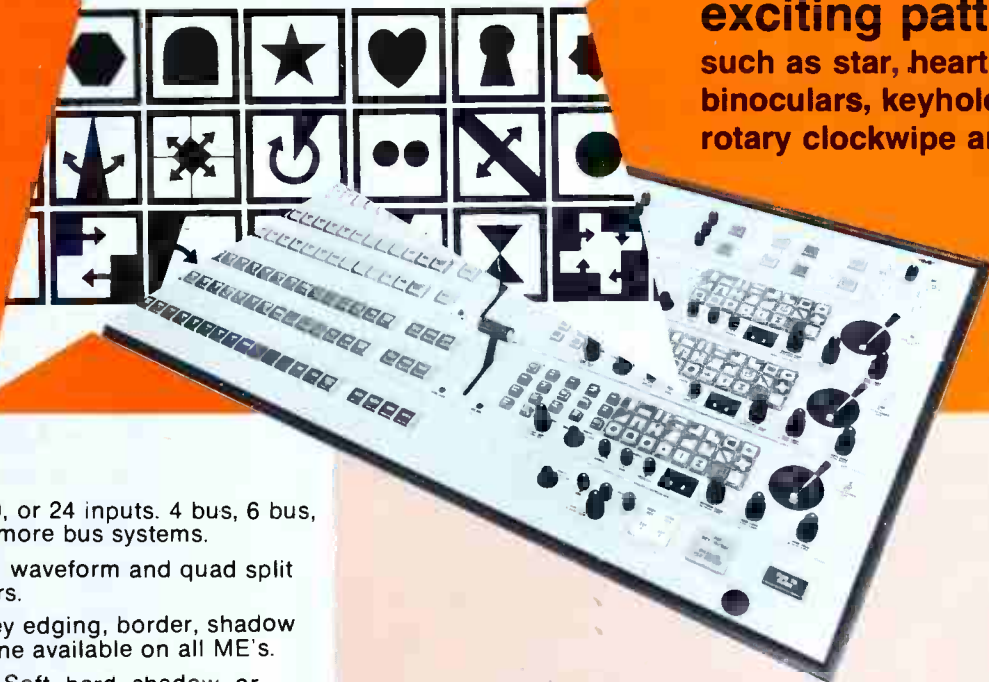
The rebound in radio and TV advertising sales indicates the nation is gradually coming out of the recession in a very healthy way, Clifford M. Kirtland, Jr., President of Cox Broadcasting Corp., commented at the company's annual Shareholders Meeting. "We frequently state that broadcasting reflects the national economy," he said. "The solid momentum which broadcasting finished 1975 continues to be. We see a lesser impact of inflationary pressures and a pickup in consumer confidence."

Kirtland remarked on broadcasting... continued on page



# VIX-114 production switcher with STAR studded features

Choice of over 80  
exciting patterns  
such as star, heart,  
binoculars, keyhole,  
rotary clockwise and more



12, 16, 20, or 24 inputs. 4 bus, 6 bus,  
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Ready to interface for computer  
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The VIX-114 series video switching systems are conceived and designed by the largest specialized independent video switching company in the USA. Vital Industries, Inc. is holder of US patents on digital effects and analog rotary effects. Vital VIX-114 series switchers open new vistas in production of television commercials and programs to yield maximum pleasant visual impact.

Do not fear to discover a superior product in the VIX-114 series switchers. Ask to see the demo tape for a sample of what we can do for users of switching equipment.



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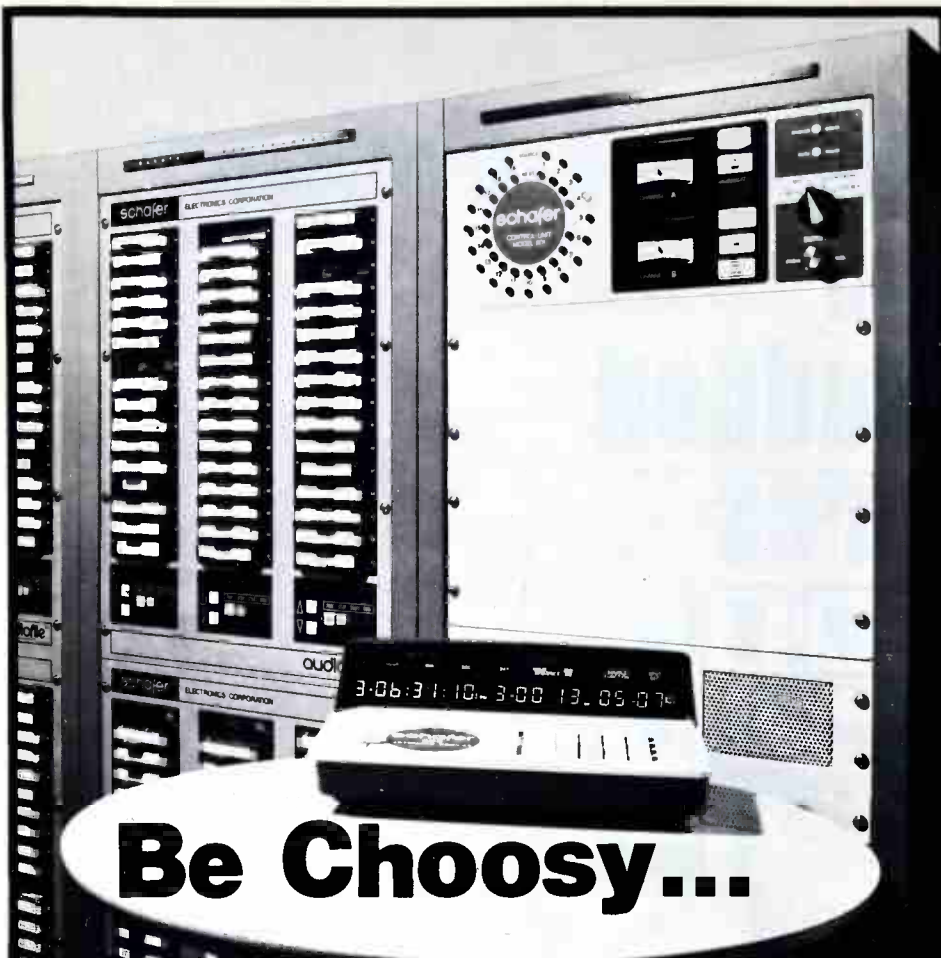
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That's why Schafer has specialists in automation . . . all with radio backgrounds . . . to work with you in making the right decision for your station and format.

That's also why we offer professional programming assistance, and have written a booklet called, "The Financial Advantages of Schafer Automation," which outlines tax and operating savings that you should know about.

There are a lot of good reasons to be choosy when you're making an important investment in your radio station. That's why the people at Schafer do much more than just make the best automation. Find out for yourself. Our automation specialists are as close as your telephone. We can make the right decision a lot easier for you.

YES! I want to be choosy . . . show me your '76 lineup.

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TITLE \_\_\_\_\_

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**Schafer Electronics Corporation**  
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## NEWS

which accounts for the largest centage of Cox's revenues and earnings, "With more Bicentennial programs, the summer Olympics and accelerating political campaign be us, indications are that broadcast advertising time will be in demand throughout the year."

In agreement with Kirtland is B Eastman Dillon & Co., the New York City investment researchers. In recent industry service report Broadcasting-Television Entertainment (Volume 1, No. 2), they sees continued strength in broadcast billings that started in the latter part of 1975 and predicts that 1976 first quarter industry revenues will increase between 10% and 14% for all television categories—network, national spot and local. Looking at the total picture for 1976, the company says that due to tight supply of available broadcast time and increased demand, including many companies new to the medium, the rise in industry revenues should be about 11½% with the gain at the local level somewhat higher than network and national spot. In addition, advertising rates will increase due to the accelerating demand of political advertisers.

### Taylor Buys Atlanta Common Carrier Company

Edward L. Taylor recently announced the acquisition of 100% of the assets of Southern Satellite Systems I (S.S.S.) a common carrier company formerly owned by Turner Communications Corp. of Atlanta, Ga. Taylor, President of S.S.S., was formerly President of Marketing for Western Satellite Systems of Western Union.

Taylor also announced an agreement in principle with R.C.A. Global Communications Inc. for lease of one hour transponder on the R.C.A. Satcom Domestic Satellite for the distribution of the signal of WTCG Channel 17, Atlanta, to CATV stations.

### TPT Manhattan Plans Election Year Programs

Teleprompter Manhattan Cable TV announced plans for a series of political programs which they plan to produce for this election year. The company feels that since much national attention will be given to New York City next year due to the upcoming Democratic National Convention, the company should give its viewers the most complete coverage possible. The first program in the series was on April 6 and was devoted exclusively to the

continued on page

When the FCC approves  
 a 750kW power level  
 for 12 clear channel AM stations  
 to better serve the people  
 of the United States,  
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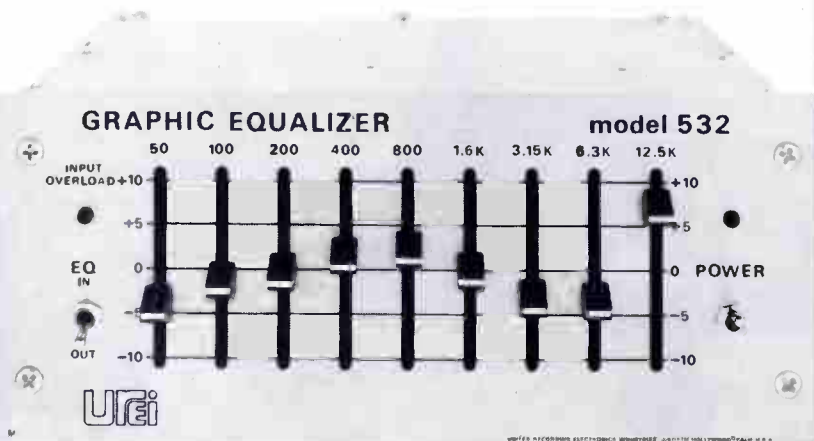
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# Our New Math:

$$\frac{530}{2} = 532$$

The new Model 532 is a single channel version of UREI's popular 530 Dual Graphic Equalizer, offering real economy for recording, sound reinforcement, radio and TV, and monaural music systems. The nine equalizers are centered at each octave from 50 Hz to 12.5 kHz. The 532's input may be operated balanced or unbalanced and the transformer-coupled output amplifier is capable of delivering +20 dBm into a 600 ohm load. Signal-to-noise ratio at maximum output is 110 dB, distortion is below 0.5%. Half rack size, uncompromising performance. Available from your UREI dealer.

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QUALITY  
OF COURSE



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## NEWS

York City results of the statewide Presidential primary.

### CATVers Urged To Improve Campaign Communication

The President of the NCTA has urged the nation's CATV operators to join together in an industry-wide public service effort to help improve communications during the 1976 election year. In a special letter to the NCTA membership, President Robert Schmidt called upon the CATV industry to undertake a national demonstration of CATV's capability to assist in facilitating the flow of information about vital national and local issues to the public.

Schmidt urged CATV operators wherever possible to provide free low-cost cable time to bona fide candidates for public office, and to encourage use of CATV channels for public discussion of campaign issues by candidates.

### NRBA Board Actions

The National Radio Broadcasters Association made several important decisions at its meeting last March 22 in Chicago. The Board voted to oppose reducing the channel spacing of the FM broadcast band from 200 KHz to 150 KHz or 100 KHz as had been proposed in a recent report by the Chief Engineer of the FCC and a fact-finding committee was designated to further study that proposal. The special problems faced by daytime radio broadcasters were discussed and NRBA General Counsel Tom Schattner was instructed by the Board to deliver comments to the Commission supporting pre-sunrise authorities for all daytime broadcasters who do not have them.

The Board also planned a series of regional sales seminars during the months of May and June. Radio broadcasters from across the country will be invited to attend one-day workshops in such cities as Chicago, New Orleans, New York and Seattle. The seminars will follow NRBA's traditional panel discussion format. For further information call the NRBA at 212-869-8873.

### TV's Worldwide Popularity Rivals Telephone & Cars

It took only 30 years for TV to rival both the telephone and the motor vehicle in worldwide popularity, according to RCA. Based on latest statistics available, it is estimated that there are 364 million TV sets in the world compared with 360 million telepho-

100 million automobiles and The U.S. leads internationally categories, with approximately billion TV sets, 144 million tele- and 130 million motor ve- size of the worldwide TV t is impressive since the indus- commercial growth began only in The telephone is 100 years old ear and the motor vehicle close to ars old.

### Wants More Channels TV Remote Pickups

AB has asked the FCC to allocate additional channels to provide more frequencies for remote TV pickups. requested that the 6425-6525 band be shared by TV broad- on a co-equal basis with the on carriers. This band is cur- allocated to the common carriers the specific purpose of providing pickup service for TV broadcast ve.

### Introduces New Automation Equipment Line

(Broadcast Industry Automation m), a division of Data Communi- is Corp., has unveiled its new S 202 Terminal System," which t become standard equipment for the II system, the latest automation s n introduced for station oper- Developed to provide a wide of efficient information access, ew station equipment includes a Data General mini-computer, 2 CRT's (Cathode Ray Tubes) and tronics Printer.

### pt Makers, Programmers Many Video Cassettes

ars of TV programs and com- als are making heavier and er use of video cassettes, accord- MPCS Video Industries, in New b, which has large studio facilities cassette recording. Most of the larg- d agencies, says MPCS, have nd to videocassettes for talent tests, s commercials and TV "pilot" pro- as.

In addition, the advent of the time corrector has allowed a number of program producers to do the whole on cassettes, with stations going on er directly from cassette recording. test commercials, for example, h pass the audience trials, often go rtly to broadcast without further nsive processing.

### LOAD/COMM '76 Be Held

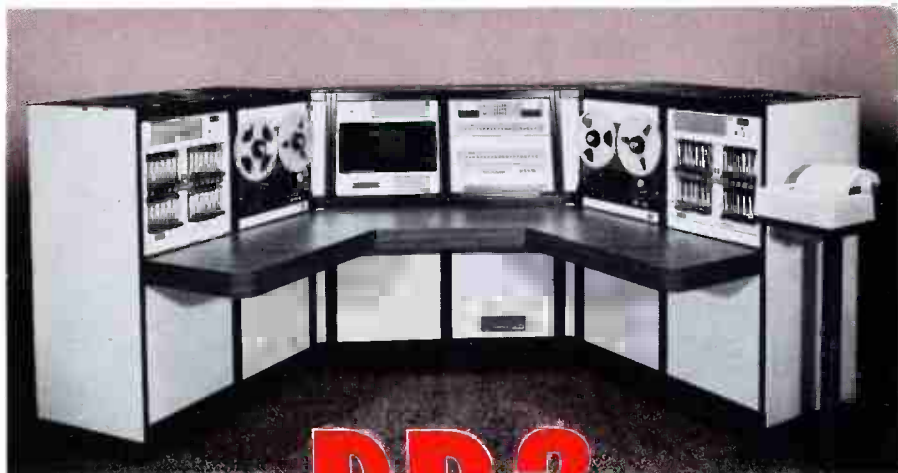
U.S. Dept. of Commerce has an- nounced that "BROAD/COMM '76,"

an Exhibition of Professional Broad- casting and Communications Equip- ment, will be held at the U.S. Trade Center, Mexico City, from June 14-18, 1976. This exhibition, which honors the U.S. Bicentennial, marks the second exhibition of this successful theme at the Mexico City Trade Center. The first telecommunications ex- hibition in June 1974 closed with pro- jected sales of almost \$20 million. Part- icipation in this exhibition is limited to U.S. manufacturers of communi- cations and broadcast equipment. For further information contact Mary R.

Wiening, DIBA/OIM, Room 4031, U.S. Dept. of Commerce, Wash- ington, D.C. 20230; 202-967-4463.

### Newsradio Technician Named "Black Achiever"

Carole Browne, the first woman to be hired as a radio technician at WEEL Newsradio, Boston, has been named a "Black Achiever" by the Greater Boston Young Men's Christian As- sociation. The first annual Black Achiever Awards were presented last continued on page 17



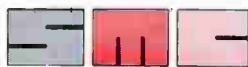
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The DP-2 is available in low-boy console with desk as shown or in standard racks. It's versatile and inexpensive... and it's from the people who invented computer assisted broadcasting - SMC. It's loaded with features that will "hype" your station's air sound and profits.

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For the person who can't stand still to make a video tape! Auto-Trac™ eliminates picture distortions caused by inertial errors when portable VTR's are moved about. Inertial errors are caused by the gyroscopic effect of rotating video heads. When such inertial errors are extreme and are processed through the 2020, only a gentle vertical movement is evident on playback video. Auto-Trac is a must for News Gathering (ENG) applications.

## Extra Large Memory

Access VIRS or VITS through a signal corrector, the line instantaneous input window of the 2020 is. With this wider window, editing and tape lockup tolerances will not cause shifts in timing of test signals. The extra wide window helps absorb inertial errors from portable VTR's.

## Image Ex™



Better than image enhancement! Eliminates the soft transitions and blurriness that are characteristic of low cost helical formats. Front panel control of image crispness. No additional delay through the system! No "enhancement" of noise as with conventional, delay-line image enhancers.

## Video Noise Reduction™

Reduces visual noise distortion by 3 dB. Essential when dubbing or editing requires playback second, third or fourth generation tapes. No special recording or playback procedures are required. Tape from any source can be processed with

## Chroma-Luminance Delay Compensation

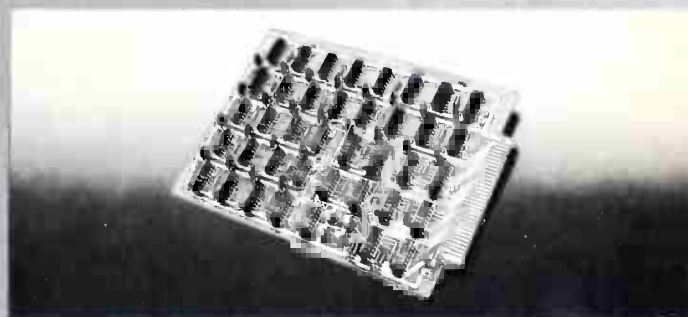
Put the color where it belongs. A card edge control allows positioning of chroma information where it should be relative to luminance information. Up to 400 nanoseconds of correction range ( $\pm 200$  nsec) is available to compensate for changing delay caused by headwear.

## Hetrocolor™

An exclusive Microtime feature which provides excellent, stable color playback from heterodyne VTR's with or without 3.58 feedback. This means cost savings and greater flexibility in emergency situations. Luminance to chrominance cross talk in the input video signal is also reduced.

## Reliability by Design

Every integrated circuit in the 2020 undergoes accelerated aging at 125°C for 96 hours and 100% tested before assembly into circuit cards. The P.C. cards are then tested and built into units to be temperature and power cycled for 96 hours. Finally, the completed 2020's are vibration stressed for one hour at varying frequencies. The result—the most stringent reliability standards in the industry and the most reliable system of its kind! Microtime—the reliable one.



## Modular Construction

All circuits on plug-in P.C. cards. Plug-in options include:

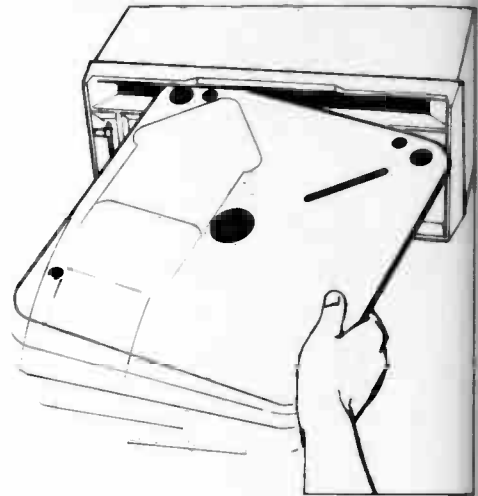
- DOC** A digital design which replaces missing horizontal line picture information with the correct information from previous color lines.
- Velcor** A digital velocity correction design which corrects line to line color distortions caused by velocity errors in higher writing speed formats.

Here's a broadcast color Frame-Stor™ that electronically stores 400 slides---200 on-line--- at a total cost of \$13,250. Need 3200 slides? Just add 7 DISCASSETTE™ records for \$525. Total system cost: \$13,775.

---talk about your dollars and sense! Fact is, if you don't need 3200 color slides (and how many broadcasters do) buy only what you need and can afford and add capacity later. Each flexible DISCASSETTE™ Record electronically stores 400 frames. Their cost? \$75, less than 20¢ a slide.

What makes all this possible is the new ARVIN/ECHO EFS-1 DISCASSETTE™ Frame-Stor.™ The basic unit sells for \$13,250. We also offer external DOC for \$2,500.

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ary to black people in the Boston Massachusetts area who have eved degrees of success in busi- education and social services.

### Service Expected To Curb Film Pirating

Electronic coding system to combat illegal duplication or "pirating" of films from videotape has been developed under a joint engineering venture by Byron Motion Pictures, Tele- vics International and Goldmark Communications Corp. Each organiza- tion provides major program transfer services from tape and film to magnetic videotape for TV viewing.

Although the system has undergone extensive laboratory testing, further development is needed to make the "Sp-Copy" system compatible with all types of videocassette players used in the home. An early design version for most VCRs and video recorders will be made available for a licensing fee to be determined on a case-by-case basis for prospective licensees for immediate implementation against film pirating.

### TV Film Distribution Company Formed

New film distribution company called Karol Media has been formed by Fontana and Kincheloe, formerly of Modern Picture Services. The company will distribute sponsored films for corporations, associations and governmental agencies, as well as selected educational films on a rental basis. Additionally, the company will provide specialized consulting and marketing services for sponsors, producers and distributors. For more information contact Karol Media, P.O. Box 2000, S. Hackensack, N.J. 07606; (201) 261-5522-7779.

### Wometco To Join Pay TV, Cable, Movie Operations

The fine display of "if you can't lick them, join 'em," Wometco Enterprises has announced it would buy the Blonder Tongue pay-TV operation in Newark, N.J., including station WBTB-TV, and Wometco Vision, the pay-TV systems developer. The move has special interest because of Wometco's earlier strong opposition against pay-TV and cable, as a former owner of movie theaters.

Louis Wolfson II, senior vice president in charge of broadcasting and cable TV, said that Wometco is confident the station could become profitable with a mix of specialty programming and pay-TV. In addition, he said, there would be strong cooperation with cable systems, and also with movie studios. continued on page 18

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The first 3 1/2-digit DVM with true RMS, circuit-breaker current overload protection plus these other outstanding features:

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- Large 0.4-inch 7-segment LED display
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## NEWS

theatres, along lines which he declined to elaborate.

### Quinlan Says Six Hours May Be TV Watch Limit

Commenting on the fact that television watching per family dropped from hours 14 minutes a day in 1974 to hours seven minutes a day in 1975, Sterling ("Red") Quinlan, TV veteran and author of several books, says in his new book that "... there is a limit on how much television Americans can watch. Six hours a day may be the limit, Quinlan goes on: "We believe people should, and must, find time for other pursuits. ... we do not want to be accused of stifling the ability of youngsters to (read and) write. ... We will only work harder to make our programs as much as they presently can. The new book, titled "TV Turn of The Viewers Revolt," is scheduled for publication this month.

### Westar Service Expands

Western Union recently announced that, with the concurrence of the FCC, the Westar domestic communication satellite system is now offering a new broadcasting channels on 19 routes between seven Satellite Access Cities. The first customer for the new Westar service is Robert Wold Co. of Los Angeles, a leading packager of broadcast arrangements for sports events. Wold Co. has reserved a number of Type II audio channels (50-7,500 Hz) for high-quality AM broadcast baseball games. Type I audio channels are provided in the 300-3,600 Hz range, and will be used primarily for inserts of news events "actualities." The new Westar service is offered to broadcasters in the cities of New York, Los Angeles, Chicago, Washington, San Francisco, Dallas and Atlanta.

### New Supply "Hotline"

Comprehensive Service Corp. recently announced that the firm has installed a nationwide toll-free "hotline" to commercial film and video locating supplies and sundries. The company says that by dialing 223-5460 from anywhere in the country (except within New York State, where the number is 212-586-6161), professionals can find over 2,000 frequently—and not-so-frequently—needed items, most of which can be shipped immediately from either their East or West-Coast warehouses. In the event that Comprehensive doesn't carry a particular item, they will refer the customer to another source.

## TV System Simulcasts In FM

San Jose, Calif. CATV system incorporated its pay-TV service with a simulcast of "The Towering Inferno" using the TV broadcast technique of simulcasting the TV station sound simulcasting to the FM station sound simulcasting to the viewer. By carrying a portion of the program simultaneously on the pay-TV channel, and an unused channel in the cable FM system, the cable subscriber had the option of using his FM receiver/decoder system to create a "home theater" environment.

## Alaska Radio Station Northernmost In U.S.

Northernmost radio station in the U.S., KBRW-AM, Point Barrow, Alaska, began broadcasting shortly after the last Christmas with a Harris Model 1, 1 kW solid state AM transmitter. The transmitter was purchased from the Alaska Educational Broadcasting Commission and was installed during the day's time in minus 50° tempera-

## Wold Company Major User of Mestar Satellite

Wold Company arranged the first live transmission of a TV program transmitted via satellite between two points within the continental U.S. (a baseball telecast on August 9, 1975) the Robert Wold Company has become the largest single user of scheduled TV transmission on Western Union's Mestar satellite. Wold Company also places more terrestrial orders for radio and TV transmission from AT&T Long Lines than any other individual company.

## Los Angeles Developing CATV Master Plan

The University of Southern California researcher is working with Los Angeles officials and community representatives to develop a comprehensive plan for urban communication in Los Angeles. Herbert Dordick, associate director of the Center of Communications Policy Research in USC's Anderson School of Communications, is finalizing the development of a master plan for CATV communication in Los Angeles for the Dept. of Public Utilities and Transportation.

Dordick said that because the current franchises for CATV in Los Angeles are due to expire at the end of 1976, the city has taken this opportunity to examine a wide range of cable communication issues, including policy for the award of franchises, franchise districts, questions of ownership. Citizen

continued on page 20

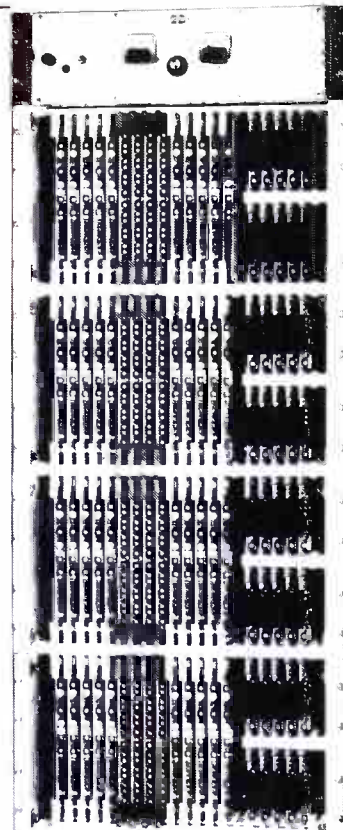
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# Harris' superb new TC-80 features full automatics, and add-on Triax.

The deluxe TC-80 live color camera redefines "top-of-the-line", with unmatched picture quality, real operating convenience, super-stable mechanics, easiest setup . . . and add-on Triax.

This is the first American-built camera with add-on Triax . . . buy now, or simply add it later in the field! No camera modifications required.

A full complement of auto-optics is standard in the TC-80,

including white balance, black balance, centering, and a unique automatic iris. Fewer operator adjustments for better picture quality.

All setup and operating controls are away from the camera head, and are brought up on the CCU front panels with knobs. No screwdrivers are needed.

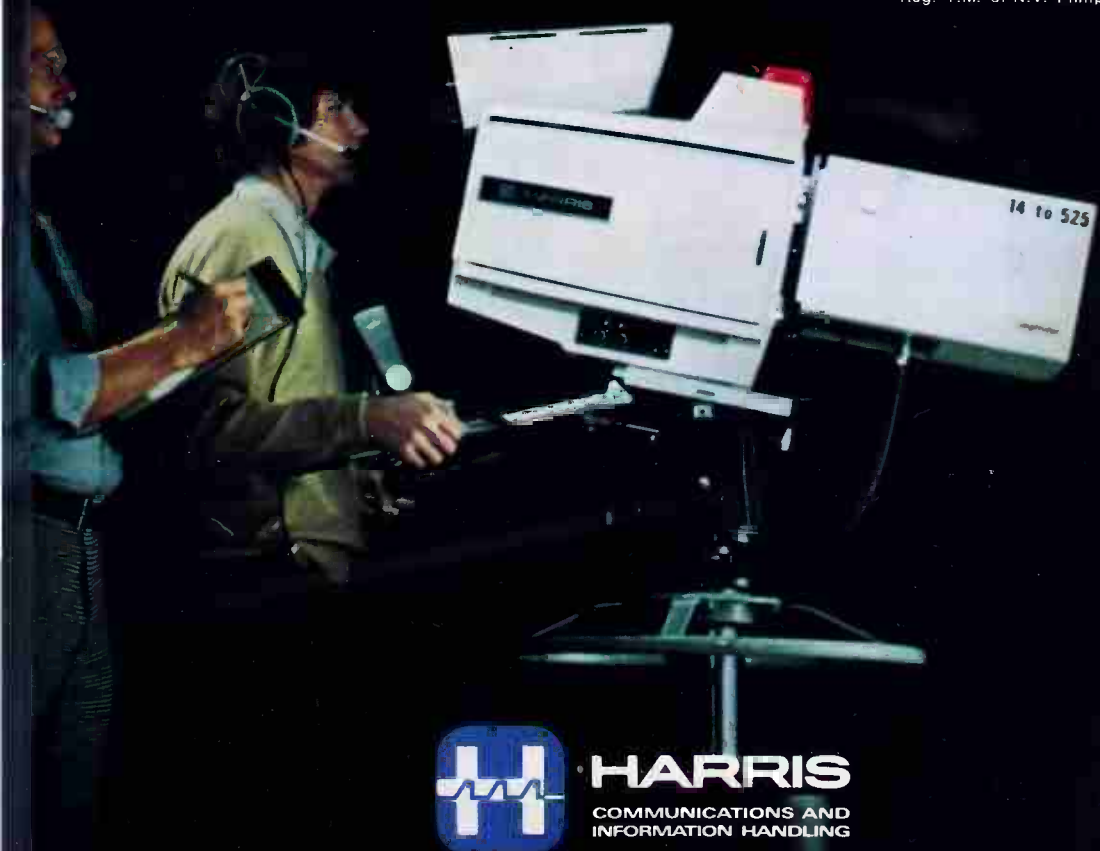
Use either standard or anti-comet tail Plumbicon\* camera tubes . . . without modifications. And a wide variety of lenses may

be employed, from the largest 34-to-1 to 10-to-1, or even smaller.

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\*Reg. T.M. of N.V. Philips of the Netherlands



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# Distortion Of Audience Ratings

By Frederick W. Ford and Lee G. Lovett of Pittman, Lovett, Ford and Hennessey, Washington, D.C.

For a number of years, the Commission has maintained a basic policy against distortion of audience ratings of broadcast stations by misuse of audience survey results. Such distortions are termed "hyposing." Several Public Notices concerning "hyposing" were issued in the early 1960's. Following a Federal Trade Commission determination that "hyposing" activities constituted "unfair methods" of competition, or unfair or deceptive acts or practices in violation of . . . the Federal Trade Commission Act," the FCC adopted its 1963 Public Notice. The Commission stated therein that it intended to refer "hyposing" complaints to the Federal Trade Commission for action. However, the Commission declared that it would take into account any FTC findings regarding "hyposing" when determining if a broadcast licensee is operating in the public interest (either at license renewal time or during the license period.)

The FCC issued another Public Notice in 1965 in response to a series of "guidelines" issued by the FTC concerning deceptive use of audience survey results. The FCC stated that it would consider a broadcaster's compliance with the 1965 FTC Statement guidelines when determining whether the licensee is operating in the public interest. The FTC's 1965 guidelines were, in abstract, as follows:<sup>1</sup>

1. A person (or firm) making a claim concerning the size, composition or other important characteristics of a listening or viewing audience is responsible for seeing to it that the claim is truthful and not deceptive. If he bases his claims on the results of an audience survey, he assumes responsibility for interpreting the data accurately. Thus, he should not engage in activities calculated to distort or inflate such data—for example, by conducting a special contest, or otherwise varying his usual programming, or instituting unusual advertising or other promotional efforts, designed to increase audiences only during the survey period. Such variation from normal practice is known as "hyposing."

It is also improper to cite or quote from the survey report or survey data in such a way as to create a misleading impression of the results of the survey, as by unfairly basing audience claims on results achieved only during certain periods of the broadcast day or on a survey of only a segment of the total potential audience.

2. Audience data are based on sample surveys not derived from complete measurements of the audiences. As such, they are statistical estimates, and, at best, are of only limited reliability due to errors and distortions inherent in the statistical methods yielding such data. Claims as to audience coverage based on audience surveys, should therefore be qualified in recognition of the fact that survey data are inherently imperfect. Any such claim should be accompanied by a disclosure that any figures cited or quoted are estimates only or are based upon estimates, and are not accurate to any precise mathematical degree unless based upon a true probability sample. Audience surveys are not in practice based upon true probability samples.

3. Such claims should not be based upon data obtained in a survey that the person (or firm) making the claim knows or has reason to know was not designed, conducted, and analyzed in accordance with statistical principles and procedures, reasonably free from avoidable bias or based upon a properly selected sample of adequate size. Such claims should not be based upon survey reports or data that do not reliably reflect current audience coverage, either because the passage of time has made the data outdated, or because a later survey report encompassing essentially the same area has been published, or because of the entry or departure of a competitor or for any other reason.

Since 1965, the FCC has enforced the above-cited FTC guidelines on a case-by-case basis. The FCC had three basic methods of enforcement. First, it issued letters of admonition to broadcast stations gaging in distortion or misuse of audience ratings. Second, the FCC has designated license renewal hearings issues of ratings distortion in some cases. Third, the FCC has granted short-term renewals to those stations guilty of more serious audience ratings distortions. The FCC enforcement of the FTC guidelines, in conjunction with the FTC's own investigation of broadcast licensees gaged in distortion practices, became a "double reined" deterrent to audience ratings distortions.

## FCC's Proposed Rulemaking

In spite of the efforts of the FCC and the FTC, misgaging and distortion of audience ratings continue. In response, the FCC recently initiated a rulemaking proceeding

. . . to define distortion and misuse of ratings, prohibit such practices, and enable (the FCC) to apply the additional sanction of monetary forfeiture.

The proposed rule would prohibit the broadcast licensee from doing any of the following:

- (1) Undertaking, within four weeks before or during rating period unusual advertising, contest or promotional activities which are not conducted regularly throughout the year by the licensee.
- (2) Undertaking, within three months of a rating period any advertising, contest or promotional activity which rewards people for stating that they listen to the licensee's station.
- (3) Quoting from audience surveys in a misleading way, either by misrepresenting survey results or quoting accurately the results of an improper conducted survey.
- (4) Quoting survey results which are not the most recent available for the market.

The Commission received numerous comments, nearly all of which opposed the proposed rule. Many of the comments raised questions concerning the constitutionality of such a rule which would dictate programming content (e.g., some programs used to distort ratings would be permitted (a station's "best" program while other programs used for the same purpose would be prohibited (high-value prize contests). Commenting parties asserted that the proposed rule would violate the First Amendment freedom of speech guarantee of the Communications Act.<sup>3</sup>

Formulation of a concrete rule permitting some programming and prohibiting other programming to  
continued on page

<sup>1</sup>As enumerated in *Report and Order in Docket NO. 20501*, FCC 76-226, at para. 3; adopted: March 10, 1976; released: March 17, 1976.

<sup>2</sup>*Notice of Proposed Rulemaking in Docket No. 20501*, FCC-643; adopted May 29, 1975.

<sup>3</sup>Section 326.

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## FCC RULES & REGS

nate distortion of audience ratings would too closely tangle the Commission in the determination of program content. The Commission would effectively become an arbiter of the value of different types of promotional programming activity.

### Rulemaking Denied

Although the Commission admitted that First Amendment and programming discretion considerations entered into consideration of the proposed rulemaking, it shied away from basing its decision to adopt or reject a new rule upon those issues. Instead, the Commission said:

... it appears that there does not exist immediate and impending dangers to the public interest that clearly outweigh possible First Amendment, Section 326 and [other] problems . . . that are inherent in any proposed Rule which would discriminate between forms of entertainment programming on the basis of program content.

The Commission concluded that in light of the abovementioned "balancing" test, that the audience rating distortion rule should not be enacted. The Commission based its decision, in part, upon the Supreme Court statement that "Calculated risks of abuse are taken in order to preserve higher values."<sup>4</sup> Clearly, said the Commission, the value that might accrue from intrusion by the FCC into the sensitive area of programming creation would be outweighed by damage to the national policy of a free, uncensored complement of competitive broadcast media programming. The Commission went on to say that the problems inherent in the distortion of audience ratings simply do not lend themselves to administrative or mechanistic regulation.

Further, the Commission noted that the proposed rule assumes that *all* variations in promotional patterns are motivated *solely* by an intent to distort audience ratings. This, in fact, is not true. The Commission went on to cite a number of situations in which *independent business considerations*, and not an intent to distort audience ratings, underlie initiation and continuation of promotional activities by broadcast licensees. Put another way, the existence of certain outside competitive factors simply negates a broadcaster's *intent* to distort audience ratings. The Commission's examples of those situations which would not constitute true distortion of audience ratings follow:

- (1) Television stations normally increase advertising and promotional activity at the onset of (a) the new fall programming season (when new series are introduced) and (b) the second programming season (mid-winter).
- (2) Contest, promotional and advertising activity often increases when "special event" programs (e.g., the Super Bowl, the Olympics) occur; such special events are obviously not scheduled to coincide with audience survey activity.
- (3) A licensee whose station increases power quite naturally desires to heavily promote the station to new potential listeners.
- (4) A station that changes its program format has a legitimate interest in promoting the date that the change will occur in order to attract the largest possible audience.
- (5) A radio station has a legitimate interest in increasing its advertising, promotional and content.

<sup>4</sup>Columbia Broadcasting Company v. Democratic National Committee, U.S. 94, 125 (1973).





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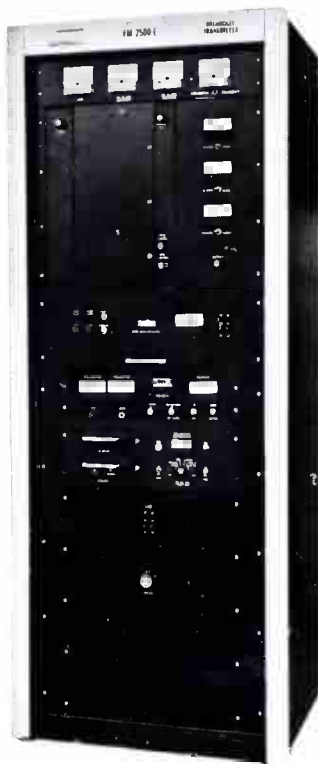
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## FCC RULES & REGS

activity when another radio market competitor changes to the station's programming format.

- (6) A broadcast licensee has a legitimate interest promoting (a) its station anniversary, (b) the addition of an air personality to the announcing station and (c) the sudden availability of a long-sought advertising opportunity (e.g., a uniquely attractive advertising position within a newspaper's television program listings).
- (7) A broadcaster has a legitimate interest in initiating a concentrated advertising campaign to promote a particular aspect of its own coverage (e.g., a particular sport) to counteract an intensive advertising campaign by another media source such as a newspaper.
- (8) An independent TV station (especially a UHF) has an interest in maintaining concentrated advertising and promotion activities to counteract the strong new program offerings of the networks during the Fall season, the mid-winter second season and the summer re-run season. Especially in the third case UHF's have a special opportunity to increase their ratings, which they would not normally have during the initial run of network shows.

### Commission Policy

Having declined to adopt the proposed Rule, the Commission concluded that the practice of intensifying promotional advertising, or contest activity "at times at which scheduling or program modifications are made" does not constitute an unfair method of competition as defined by the FTC. The FCC views the goal of such activities merely "to persuade viewers to sample a station's program schedule." The FCC also concluded that such activities "reflect a healthy competition among licensees that is both economically important and in the public interest."

The Commission distilled from the Comments file its response to the proposed rulemaking that "the goal of seasonal promotion is not to exert short-term, temporary influence on any particular rating survey." Rather, the promotional activities are aimed at the justifiable and perfectly legitimate goal of attracting new viewers to a particular licensee's program fair.

### Conclusion

The Commission declined to adopt a rule relating to the distortion of audience ratings because such a rule would be too mechanistic and pose extremely complex enforcement problems. The Commission will continue to enforce the FTC's 1965 Statement guidelines (as presented above) to detect and eliminate unfair trade practices by broadcasters who misuse survey results.

Further, the Commission explicitly stated that licensees will henceforth be required to exercise "reasonable diligence" to determine what surveys are being made in their markets. The Commission will hereafter forward copies of complaints relating to distortions or misuse of audience ratings to the FTC for possible action. The Commission will continue to consider findings (or cease and desist orders) regarding distortions of audience ratings in determining whether a licensee has discharged its public interest obligations.

Finally, the Commission issued a stern warning to the failure of the rating industry, itself, to take "effective measures" against ratings distortions might cause the Commission to recommend Congressional legislation on the subject in the future.

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# Ampex AVR-3. The

Two decades ago, Ampex introduced the first videotape recorder, and now Ampex opens a new generation of VTR capability with the all-new AVR-3, the machine that thinks for itself.

You'll want an AVR-3 for a couple of basic reasons: for the "intelligent" way it does an outstanding job for you, and for the superb pictures it makes. In any broadcast band it delivers superior picture quality. With Super High Band Pilot you have the most foolproof record/playback technology available.

"Intelligent." What does it mean? It's a lot of things, such as automatic sensing and switching of speeds and bands. It's an all-new optional Edit Controller for teleproduction capabilities that once seemed impossible. It's fast, efficient, gentle tape handling. And much more.

There isn't anything in the world like an AVR-3. It produces unequalled pictures; it protects you against errors in playback settings; it provides the easiest and best editing you've ever known; it's going to give you longer service life than any other VTR you've ever owned. AVR-3 is the best recording investment on the market.

## Super high band pilot The Mouthful That Becomes An Eyeful.

How does a VTR compensate for signal irregularities introduced during the recording phase? In the past, those corrections were made on the basis of "average" information. In the

new AVR-3, with Super High Band Pilot, signal correction is triggered on a continuous basis. Color velocity errors and equalization variables are "seen" and corrected before they can be displayed. The result? Perfect pictures. You can see the difference.



# First "Intelligent" VTR



With Super High Band you'll get a picture at  $7\frac{1}{2}$  lines per second that's virtually as good as you've learned to expect from 15 ips High Band. The tape speed means half as much tape. It's a money saver.

## Recording options

When you order your AVR-3, you'll be able to choose from the following pairs of recording bands: Super High Band/Pilot/High Band; High Band/High Band Color; Low Band/High Band Color; Low Band/Low Band Mono. And no matter which pair of bands you specify, you'll get both 15 ips and  $7\frac{1}{2}$  ips recording capability.

## "Intelligent"

Putting the Brain to Work. The first thing you'll notice about your new AVR-3 is that it "knows" how a given tape was recorded. It'll automatically sense the recording speed and the band you used, and will switch to the right playback configuration. Intermixing tapes won't be a problem, because the AVR-3 always knows how to sort them out.

The second feature you'll notice is the way your AVR-3 handles tape. Punch up a fast take, and AVR-3 programs the deceleration from a gradual stop to speeds up to a flying 375 ips. Then, as the tape approaches the end-of-reel (or a cue point), the

program takes over again, producing a smooth deceleration curve to a precise, dead stop. You'll never damage a tape as you run it back and forth, time after time, on an AVR-3.

## Editing

**If You Can Imagine It, You Can Accomplish It.**

The standard AVR-3 editor permits manual insert and assemble edits. If your needs are simple, you can stop right here.

The optional Edit Controller takes you the rest of the way. Using either time code or tape timer information, it includes search capability. This feature gives you separate video and audio edit points, and the keyboard control allows you to move or enter edit points at will.

There's more. An optional color framer eliminates *all* color ambiguities between edited segments. A time code generator and reader and a character generator are other handy options.

## Housekeeping and computer control

What else does the AVR-3 do to make your life easier? Once the video and audio edit points are keyed in, Edit Controller takes over the housekeeping. It automatically computes and controls pre-roll addresses, acceleration/deceleration profiles, synchronizing information, and all switching

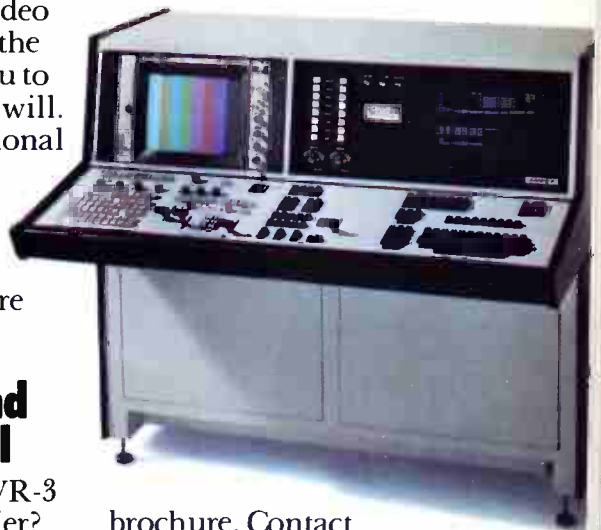
necessary for precise edits. An optional computer interface lets you work with any external editing system, such as the fully computerized Ampex EDM-1.

## Economics

**Good at First, Better Every Year.**

Even the basic AVR-3 model will outperform most previous top-of-the-line VTRs. And no matter how you equip your AVR-3, it'll cost less than you'd expect and then pay for itself with many years of reliable, professional service.

Complete technical data and performance specifications are now available in our AVR-3



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...and the company whose innovations over the past 10 years revolutionized color television cameras in the U.S. and throughout the world, now puts its 3-Plumbicon picture and a beam-splitter prism into the most exciting new lightweight camera value on the market.

## **The PHILIPS LDK-11. Full broadcast quality for both ENG and commercial production!**

With the LDK-11 no longer must broadcasters or production companies sacrifice picture quality or operational features for portability. Broadcasters started using the LDK-11 in January, 1976 and the reactions have been outstanding. A typical report from one of the first stations to get delivery... "the field pictures look as if they were shot in our studio!"

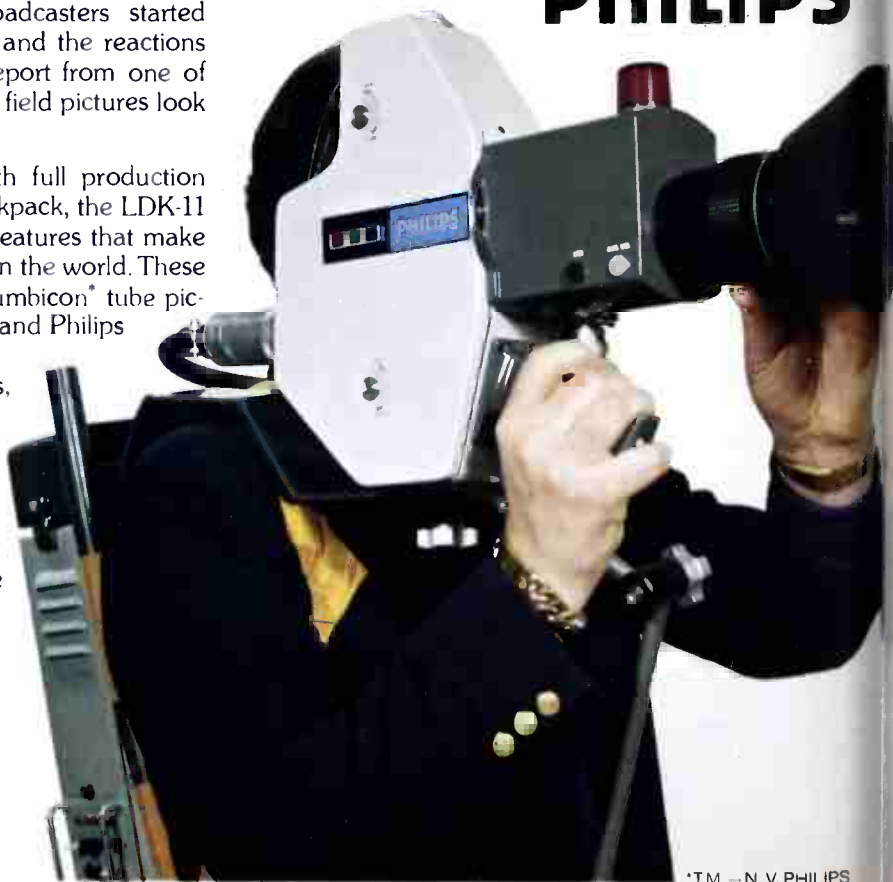
Battery or AC powered and with full production control either remotely or at the backpack, the LDK-11 has all the key Philips engineering features that make it like no other comparable camera in the world. These features include Philips famed 3-Plumbicon<sup>®</sup> tube picture, beam-split prism with bias light and Philips linear matrix for superb colorimetry. Also included are H & V contours, auto iris, auto white balance, gen-lock sync generator, switchable gain and gamma, built-in color bars, remote VTR and zoom controls, and two audio channels.

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utmost flexibility and economy for ENG, local remote and studio production...without compromise. And the LDK-11 is available now!

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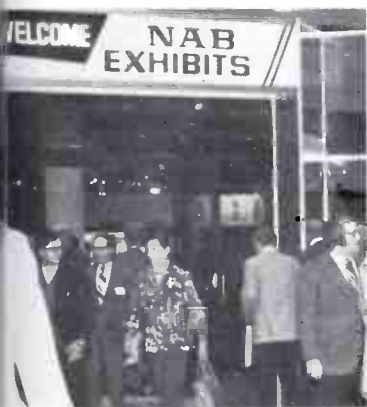
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**SHOW-IN-PRINT—A Fantastic Affair, More Exhibits  
Eager Buyers Than Ever Before.**

## **Radio It Was Go From The Start—See Page 78.**

## **TV It Was a Three Ring Event With Major Attractions.**

In the center ring, it was helical VTRs; in the flanking rings it was ENG in one and digital processing in the other. There were dozens of shows, some of them major attractions.



Early signs pointed to the 1976 Convention as an ENG show—operating Thomson-CSF Microcam going to be unveiled representing breakthrough in size and weight (11.22 watts); NEC said it was bringing the MNC-61, also low in weight and power drain by virtue of micro-intensity. And Hitachi, Ikegami and others also promised new, compact camera designs. Sony, for months, talked about unveiling an entirely new line of broadcast equipment, but items in the ENG class. *All of these events did happen but NAB 1976 was not an ENG show!* To the surprise of most, it was a VTR show—more precisely a helical VTR show. Three major developments made it so:

• A big push by Bosch-Fernseh to establish its BCN line, introduced last year at Montreux, as the non-quad standard both internationally and in the U.S. In the days immediately preceding the convention, Bosch-Fernseh worked out agreements with IVC, Philips and Ampex whereby these three giants would produce and sell the BCN segmented-tape system. (At the convention both Bosch and Philips announced they were joining up to produce the BCN line.) In the unveiling by Sony of an entirely new but compact, full-broadcast quality one-inch helical VTR, the M-1000. This unit was capable of

still-frame and slow motion and displayed no tracking problems. A "one and a half" head design—one video head scanning a full field followed by a second head to pick up vertical interval pulses between fields—was a unique design feature.

- The springing of another coup by Ampex—and one bigger than the announcement of the AVR-2 two years ago—this time in the helical area. Ampex took the wraps off of a totally new unit, the VPR-1, which like the Sony unit provides still-frame and slow motion. The VPR-1 incorporates an automatic scan tracking (AST) system to completely eliminate tracking and interchange problems. AST was so effective there was absolutely no noise bar crossing the monitor during slow motion or frame stepping.

While the main focus as far as helical VTRs were concerned was on one-inch formats that could compete with quad for on-the-air broadcasts and teleproduction jobs, there was an important side show running and that was on improving the signal quality of U-matic cassette devices. The stars here were not the VTR manufacturers (indeed, Sony's new ENG recorder/player models did not change as far as video specs were concerned) but the time base corrector people and others.

- In the video enhancement area there

were new standalone devices from Corning, TRI, and Yves Faroudja, Inc., all designed to sharpen the picture coming from cassette players. The Crisp-matic by Faroudja, not only did not hurt the S/N ratio it improved it.

- In the broader signal processing area, the standout product was the new Microtime 2020 Signal Processor. This unit was considerably more than a TBC; it also increased resolution, reduced visual noise, and improved color quality. (In getting it all together, Microtime adopted the crispener circuitry developed by Faroudja.)

All of these items will be discussed in more detail later, after we establish the point that the NAB television show was more than ENG and more than a helical VTR show. Continuing advancements in such areas as digital processing and disc recording added the third main ring to the show. The star performers had slightly different acts, but it all added up to new approaches to graphics production and new special effects:

- One group of performers were the character generator people. Leading in their ability to create new dynamic effects were Chyron, 3M and TeleMation. These companies showed assorted shapes and forms digitally and then set them in motion (performing in



*Highlight of convention was celebrating video tapes 20th birthday. Ampex pioneers feted (l. to r.) Chas. Ginsberg, Alex Maxey, Ray Dolby, Chuck Anderson.*

## NAB SHOW-IN-PRINT

a variety of colors).

• Another entourage was from the floppy disc sector but those who were storing analog signals. Arvin Systems and Eigen starred here—partly as a new means of adding animation, or as an inexpensive method of storing still slides.

• Getting into this act from yet another technology were the primarily time base corrector people. Video Systems Labs showed a few effects called 3-D—you could see an entire picture rotate about an axis parallel with the screen. Central Dynamics said they would be adding this feature to switchers. The power of the computer in creating effects operating in several planes was shown by Computer Image.

There were many other new developments and new products either discussed in technical sessions or shown in the TV arena—new cameras, a new super intelligent quad recorder, electronic still store, new editors, new switchers, new accessories of many sorts. We'll start with the category of ENG cameras.

### Those ENG cameras were remarkable

Most camera manufacturers had their cameras trained on attractive la femme models. Thomson-CSF was different: it had female models handling the camera! We're referring, of course, to the new bantam weight Microgram. And handle it they did! A favorite maneuver was to swing it high over one's head to demonstrate without a doubt the camera's light weight. At 8-lbs., the Microcam with lens and viewfinder is the lowest weight ENG camera around. The electronic hip pack adds another 3-lbs., but the total is still only 11-lbs.

Thomson-CSF made a strong point out of the fact that the Microcam is more flexible than most and that one can therefore increase the number of camera angles in getting an interesting story in sports or the upcoming political conventions. CBS Network reports that it will take most of the first 50 cameras (priced at \$30,000) that Thomson-CSF can turn out (for use at the political conventions) and that thereafter it has an option to purchase every other camera produced.

One of the important features of the Microcam is image enhancing. Specially-designed horizontal and vertical comb filter image enhancing techniques are built into the camera to monitor the color segments of the television picture as it is transmitted to



The bantam weight Thomson-CSF Microcam.



The RCA TK-76 on convention floor.

sharpen the image and provide the viewer with crisper pictures on the television set.

Other features are stability over a wide temperature range ( $-20^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ ) and a sensitivity of 5 ft. candles at f1.4. Camera has a number of built-in auto circuits.

While the Thomson-CSF Microcam is somewhat in a league by itself by virtue of its small sized head and separate hip pack (and extra connectors as critics point out), it was only one of six of the latest generation of full broadcast backpackless cameras. The complete line up at NAB included the RCA TK-76 weighing 19-lbs., the NEC MNC-61 weighing 13.5-lbs. *with lens*, the Ikegami HL 77 weighing 13.2-lbs., the Hitachi SK-80 weighing 16.7-lbs., and the Asaca 2000 weighing 14 $\frac{3}{4}$ -lbs. (These aforementioned weights includes the viewfinder but not a lens except the NEC unit.)

The TK-76 was the first camera of this latest generation to be announced (last year) and it certainly was in most prominent display at NAB since RCA had a roving ENG crew around McCormick Place. The camera helped enhance the RCA exhibit area by bringing in live fresh flower scenes every day—from the gigantic flower show going on simultaneously with NAB, one flight up at McCormick Place. Engineers were heard to comment, "Fi-



The compact NEC MNC-61 ENG camera.



The backless Ikegami HL77.

nally an American ENG camera that the Japanese will have to respect."

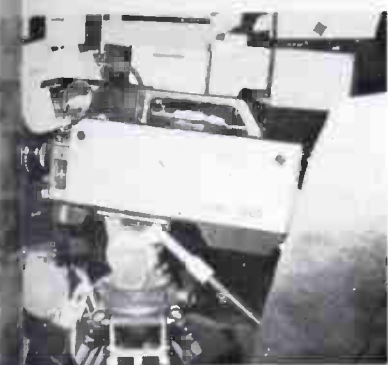
The NEC camera got a little doubt exposure by virtue of being adopted by Ampex as its own portable ENG system. At the Ampex exhibit the camera was called the BCC-4. The unit incorporates microcircuits and is the lightest, lowest power drain unit of all the new entries save for the Microcam. A 5 $\frac{1}{2}$ -lb. battery belt provides 1.5 hours of operation since the consumption is only 25 watts. The unit features auto white balance, bias light flare compensation, aperture correction, etc. The unit uses a standard C-mount lens.

Not a great deal of information was available on the new Ikegami HL77, but it appears to be fully competitive with all of the other new models. It was affectionately dubbed the "Ike". The head weighs only 13.2-lbs. without lens and it uses three  $\frac{2}{3}$ -in. Plus biconics along with prism optics. It has the same performance, stability, colorimetry, and sensitivity of the HL-35. It has both a +6 dB and a +12 dB gain switch which means minimum scene illumination could be as low as 6 ft. candles at f1.4.

The Hitachi camera display was impressive in that it included cameras suitable for ENG. In the same category there were three—with the new SK-80 topped



## SHOW-IN-PRINT



Akai's new SK-80 and other cameras.



Asaca ENG 2000 camera.

Least expensive was the FP 1600. In between was the FP 1600. Most of the latter are one-tube cameras with the FP 1600 having a little edge in portability. (The fourth ENG camera is the SK-70—introduced last year— which has a backpack but unusual in that it adapts readily to studio use.) The SK-80 is a full feature camera including I and Q encoder, image enhancement (both H and V), bias light, color bars, auto white balance, auto 6 dB gain switch, indicators in the viewfinder. Standard lens is a Fujinon 10:1 zoom but the unit also takes mount lenses. The SK-80 sells for less than \$20,000 and is ready for shipment in June. The FP 3030 is in the below \$5000 category.

The Asaca 2000 was shown as a prototype and it too had a great many features of studio cameras: S/N better than -50 dB, over 550 lines of resolution, a sensitivity of f 2.8 at 2000 lux (186 ft. candles), enhancement, back registration, etc. The camera is priced at \$22,000.

BM/E did not inspect the interior of the cameras. From reports from broadcasters some looked as if they might be hard to maintain because of their small size. On this score the slightly larger RCA unit was judged as very good in design.

The self-contained units did appear to take the play away from those relying on backpacks. Producers of the latter were quick, however, to justify the addition of a backpack as a means of coming up with higher capabilities. This may or may not be true. Certainly one-inch Plumbicon units should

be capable of doing a better job. There were fewer new cameras in the backpack category. The familiar ones—all introduced earlier—were the Fernseh KCN, the IVC 7000P, the Philips LDK-11 and the Ampex BCC-2. The brand new units were the HL 37 from Ikegami and the Sony BVP-100. The latter included all of the usual goodies typical of its class. Additional features were a -9 dB high-light-level/low-noise-level switch, test scan points for easy set up. VTR video switchable to the viewfinder for playback monitoring, prism optical system, negative green for ease of registration, etc.

Several innovations have been added to earlier cameras. Bosch Fernseh's KCN can now be connected to the processor of the automatic color camera, KCK, via an interface backpack, thus making it a portable studio camera with automatic line up and operational controls.

The IVC 7000 P portable camera is now available in a studio version. A special mounting configuration includes a seven-inch viewfinder.

Incidentally, there were several other exhibitors showing ENG cameras. Harris showed what it called the TC-3 portable live color camera. It is actually the Asaca ACC-3000 unit carrying the Harris name plated. Akai was present and featured the VTS-150 system. JVC exhibited the 4800 and Panasonic the WV-2000 feather weight. In the Philips booth was the Magnavox handheld. Camera Mart, a distributor, offered a number of brands either for sale or lease.

In the ENG accessory category were various braces, stands, etc. (Camera Mart) and hot items at Cine 60's booth were power belts and power paks. (See also Camera Accessories.)

### ENG recorders still only Sony and JVC?

There was plenty of big news in video tape recorders as a result of the new one-inch helical formats offered which we will cover in detail in a moment. But as far as ENG recorders were concerned, the show was almost anti-climatic.

The only cassette sources remain as they were before—Sony and lately JVC. JVC has been promoting the CR-4400 U portable and CR-8300 U studio unit heavily since January (see BM/E Feb. and March). The CR 4400 is remarkable because of its low power drain. It was busy at NAB and got a boost in promotion since Ampex adopted JVC units as part of its ENG system.

Sony, as everyone knows, has been advising the industry publicly since January (and privately before that) to

wait for NAB for its ENG announcement. What it unveiled was, of course, its successor to the 2850/3800 models. The new units are designated the BVU-100 (studio) and the BVU-200 (portable).

The units boast new features but prices went up to \$9000 and \$4500 respectively. Among the new features were the ability to record and playback SMPTE code on an auxiliary track, a framing servo, video agc reference to sync amplitude, new audio level control, chroma level control, new video outputs, new connectors. No spec sheets were available at the show but we understand video performance is rated the same as was the VO 2850.

It is not entirely correct to imply that Sony and JVC are the only source of ENG recorders. It is true as far as U-matics are concerned. The Bosch-F Fernseh BCN at 44-lbs. can be used as a ENG unit. The Asaca AVS-3200 is another alternative. The latter is in use in Japan for news gathering. It's a very



Sony's BVU-200, right.



Asaca's 1-in. quad portable VTR.

high performance system using four heads in a transverse scanning mode. It's not standard quad, however, (tape is one-inch) and stations may be reluctant to try this recorder without having compatible playback units available (such as the Asaca AVS-3300 high-band VTR). Although the 3200 is a portable unit it does have master erase, fast forward, rewind and converter

continued on page 36

## NAB SHOW-IN-PRINT

playback controls. The APA 300 playback unit supplies color and provides time base correction for on-the-air broadcasting.

Although we have talked about the ENG recorder as a separate device, we should point out that many exhibitors stressed ENG systems by which they meant a camera/recorder combo and perhaps also a TBC and editor. Asaca, for example, linked its ACC 2000 portable camera together with the AV5-3200 VTR and APA playback unit and called it a 9000 system.

Sony, by virtue of now making its own TBC and editor, could boast of producing most components in an ENG system, but by not having a top grade backpackless camera of its own (its BVP-100 is a private label entry) it didn't quite have it all together.

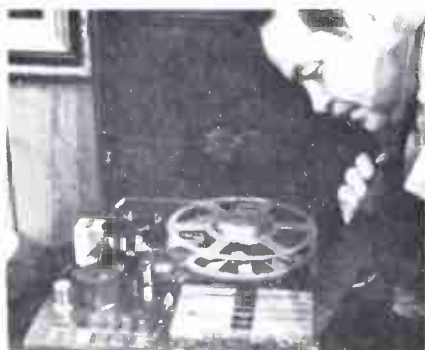
Ampex referred to its BCC-4 as a system. It coupled the JVC 4400 portable cassette unit and the JVC studio unit with the 8300 along with Ampex's TBC-800 and the NEC hand held camera to make a system. JVC and Akai, of course, linked closely their own cameras with their own recorders to make systems.

**To help you get information on NAB products,** reader service numbers are given for selected products in the various categories. Circle the appropriate number.

**For more ENG equipment information,** Thomson-CSF 340; NEC MNC-61 (Ampex BCC-4) 341; Hitachi SK-80 342; Asaca 2000 343; Ikegami HL-77 339; Sony camera 344; Sony BVR-100/200 345; JVC recorders 346.



Bosch-Fernseh BCN studio version.



Bosch-Fernseh BCN 20 portable.

## On Licensing, Renewal, Etc.

Let me assure you today that reeregulation will continue to be our number one priority in the year ahead . . . We have made considerable progress along the path I laid out two years ago . . . One very large task ahead . . . is . . . the development of a rational, coherent and pragmatic licensing and renewal policy. . . . I support the enactment by Congress of a five year license for both radio and television stations . . . this action is right, it is in the public interest and it is long overdue. The problem which remains, however, is the comparative case—either among a group of qualified applicants for a "new" facility or between a challenger and an incumbent licensee . . . How do you compare an apple with an orange? You can't. Congress should meet the issue straight on and abolish the comparative process involving an incumbent licensee . . . The FCC, on its own motion and with the aid of citizen input, carefully scrutinizes licensee performance at renewal time and does not hesitate to take strong remedial action against the deficient performer. We would continue to undertake such oversight even in the absence of the comparative renewal process. Re new applications . . . we can only speculate concerning which applicant, among a group of qualified newcomers, is likely to provide the "best" broadcast service. The selection process might be better based on some kind of an objective, non-discriminatory method of selection: for example, a lottery.

—Richard E. Wiley, Chairman, FCC.

## A new game in VTRs: pick another standard

Twenty years after it all began (1976 is the 20th anniversary of videotape recording), players of the videotape Monopoly game are back to "Go." The game is still remarkably fluid and exciting inasmuch as one block of property on the board had never been developed and others are being abandoned and therefore available for renewal. How the board looked before NAB 1976, is shown in the chart below.

Before 1976, the situation could be fairly easily appraised. Ampex and RCA shared the quad side of the board from Kentucky through Marvin Gardens; both had developed these properties quite fully up to the hotel level in most cases. As 1975 drew to a close, Ampex was raking in the most. It wasn't always so—RCA got some hotels first with the TCR-100. But Ampex recovered by fielding the AVR-2 ahead of the TR-600.

IVC was sitting on Park Place and Boardwalk with the ultimate machine, its segmented helical IVC 9000 but customers were, except for a few teleproduction houses, slipping by it.

Up until the present, Ampex was the embarrassing position of having the least valuable helical properties: Mediterranean and Baltic. IVC was in a good position in the helical world by holding St. Charles Place, al—a more desirable address than Oriental, etc. held by assorted Japanese manufacturers. But IVC lately, was being passed up by customers who favored the U-matic cassette. Sony was sitting pretty on St. James, Tennessee, and New York Ave.

After NAB, 1976, the game looked like it was about to change. Up for grabs was that whole block of property between quad land (Go To Jail—[Not Pass Go] and Park Place. Bosch Fernseh staked out a claim in Pennsylvania with its segmented-sc system using the Echo Science transport. It looked like it might be able to sweep up North Carolina and Pacific since it had commitments from IVC, RCA and Philips to develop this property by cross licensing sales and manufacturing agreements. But at the show Sony was laying claim to Pacific Avenue with its BVH-1000 unit already sold to CBS (Hollywood) and Ampex carried along with the VPR-1. The VPR

continued on page

Monopoly name (pre NAB '76)	Format	Player/owner
Mediterranean, Baltic	helical	Ampex
Oriental, Vermont, Connecticut	EIAJ, etc.	Various Japanese manufacturers
Charles Place, State, Virginia	helical	IVC
St. James, Tennessee, New York Ave.	U-matic	Sony
Kentucky, Indiana, Illinois	quad	RCA
Atlanta, Ventnor, Marvin Gardens	quad	Ampex
Pacific, North Carolina, Pennsylvania	?	none
Park Place, Boardwalk	segmented helical	IVC

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No other direct color high-band recorder surpasses the picture quality and production capabilities of Sony's BVH-1000.

## 2. BVT-1000 Digital Time Base Corrector

Sony has combined a wide window of  $\pm 2H$  with a unique moving window concept. This means your picture can hold its lock, even though you may have wide error excursions. The BVT-1000 assures you transparent picture quality. It also comes with full NTSC advanced sync, built-in processor and velocity compensation.

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**Circle 130 on Reader Service Card for a demonstration**

## NAB SHOW-IN-PRINT

could vie for the whole tract of Pacific through Pennsylvania and it meant renewal of Mediterranean and Baltic. If IVC didn't do something else, Ampex might win the whole market for American helicals. Between Electric Company and Free Parking sat Sony, but JVC was threatening to cut in.

Could broadcasters avoid landing on less than all four of these properties—helical, U-matic, quad and segmented helical? They might be forced to use at least three. Quad land was getting too rich. The BCN format, the Sony one-inch and the rejuvenated Ampex with AST, not to overlook the IVC 9000 at half speed, were all real alternatives offering accommodations at low daily (operating) rates. Whether any one of these new contenders could manipulate a monopoly was hard to figure. Dazzled by it all at NAB, broadcasters were reluctant to predict what *they* thought might happen.

Lest this allegory be misinterpreted, let's describe what's happening another way. NAB '76 demonstrated quad no longer need be the only video tape standard. You can do things with other formats sometimes better, sometimes cheaper and sometimes both benefits accrue. True, we said this in 1973 when the IVC 9000 was announced and the world has not changed all that much since. The IVC has proven valuable to teleproduction houses as a mastering machine but it couldn't totally compete in broadcasting—largely because the AVR-2 and the TR 600 gave quad a new lease on life.

However, since 1973, one new tape standard has definitely evolved and it has led broadcasters to realize quad is not sacred. We're referring, of course, to the Sony U-matic cassette format. The U-matic is no threat as a quad replacement but it did open eyes to the



The Sony BVH-1000 1-in. system.



The Ampex VPR-1.

fact that you can get a stable picture cheaply thanks to TBCs. Further, broadcasters have begun to realize that the helical format with its still frame and jogging capability simplifies production.

All of the three new formats offered for customer consideration at the NAB convention, the Bosch Fernseh BCN system, the Sony BVH-1000, and the Ampex VPR-1, offer some things quad cannot without compromising picture quality in any way. Bosch appears in a strong position with RCA, IVC and Philips behind it, and it has been in production for a year making it a here and now system. But there is no compelling reason to believe it can beat out the other systems—not yet. In terms of the most "elegant" design, the VPR-1 with its automatic scan tracking system would have to take the honors. It features guaranteed interchangeability, still frame, slow motion, a second head for monitoring, and fast forward and reverse.

Whether the Ampex AST scheme is easier or harder to make and maintain than the Sony approach of precision guides and sensitive servos, only time will tell. At the show the VPR-1 worked faultlessly, and AST eliminated noise bars on slow motion. Sony couldn't make that latter claim but, of course, slow motion isn't a normal mode for most programming.

A most telling Ampex point was its guarantee that an AST-equipped VPR-1 could play any Ampex helical format tape. This means one could use Video Memory's VM1000—with the VPR-1. But interchange (between Sony machines) is absolutely no problem for the BVH-1000 either according to Sony spokesmen and so the two may be at a standoff on this score. (At NAB Sony played sixth generation dubs intermixed with the master and you'd be hard pressed to know where the switches were made.)

**New Competition for 35mm film.** The big feature of both the Ampex and Sony units is that they offer a production alternative to 35mm film in producing TV shows. Already, videotape is proving popular for sitcoms. These



Details of VPR-1 AST system.

new recorders make it even easier put together TV shows. Because their low initial cost, low operating expense, and small size and ease of operation, users can simply assign VTR to each camera and record everything. This means one would not have to lose the ideal camera shot because of a mistake or error on the production board. You've captured everything on tape and you simply put together the final show the way you would edit on film because both the VPR-1 and the BVH-1000 have Moviola like capability—fast forward, fast reverse, still frame.

**Similarities and differences between Sony and Ampex.** Both the VPR-1 and the BVH-1000 offer good tracking, still frame, slow motion and frame-by-frame editing. The Sony achieves good tracking by virtue of four servo systems—a drum servo, dual capstan servo system and two take-up servos. The dual capstan feature meters tape onto and off the drum with even tension. So that the servo never lose control, a second synchronous pulse head picks up where the video head leaves off. This is a unique feature of the Sony design.

The VPR-1's automatic scan tracking system employs a special head system that moves in two planes. This technique allows the head to be electronically deflected over the actual video path during playback to automatically follow any deviation from the "ideal" path.

The sensitive AST system instantly adjusts to a tracking error or interchange problem during playback without causing any picture disturbance. The customary guard band "no bar" which shows up as the head shifts to a new track when the tape is slow down are entirely eliminated on the Ampex unit. It is quite remarkable to see a perfect picture maintained on the VPR-1 even during slow speed still-framing. (This feature means the Ampex can also play back many tapes which may have been improperly recorded and would be otherwise unrecoverable because of severe tracking errors.)

continued on page 40

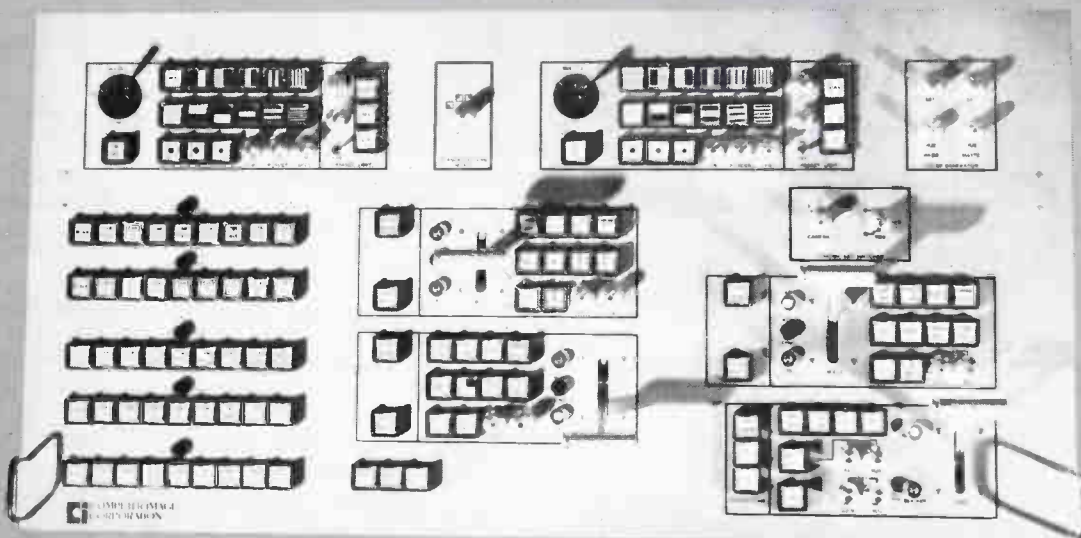
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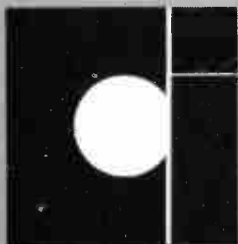
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## NAB SHOW-IN-PRINT

The AST system includes a video head for conformity proof. This feature allows the user to see a simultaneous reproduction of a recording as it is being made.

To handle the special demands imposed by the slow motion and still-frame capability of the AST system, a special digital time base corrector accessory is offered. The TBC includes a dropout compensator which replaces missing video information with material from the previously corrected phased line, and a velocity compensator, which insures high quality multiple-generation dubs. A burst-lock color recovery system is also available.

Both Sony and Ampex offer two full bandwidth audio tracks plus a cue channel. Both have built-in SMPTE time code generators and readers for easy editing. The Sony has the ability to always edit on the beginning of a frame (the edit always dumps at the end of an even field and begins on an odd field).

Sony's price is \$32,000 without the TBC, approximately \$45,000 with. A completely equipped VPR-1 is in the same order of magnitude although a unit without the AST feature starts at \$20,000.

Sony is beginning to make some deliveries now. The first three go to CBS, Hollywood. Other customers are WXLTV-TV, Sarasota, Fla., the Kentucky ETV network, the Video Group, Omaha, and the Transcendental Meditation Group (which recently bought 10 IVC 9000s). The Ampex VPR-1 becomes available late this summer. The first customer is Sask-Media, Regina, Saskatchewan.

**The BCN design is fundamentally different.** To circumvent the tracking problems heretofore encountered in helical machines, the BCN system uses two heads and a segmented scan approach. The length of any field is

## Calls For Broadcaster Militancy

The time has come for broadcasters to become militant and match the influence of others in our society . . . . The day is over when a strong sales force, good engineering and imaginative programming is enough . . . . Government has become another department at stations and broadcasters must spend more time and money to become effective in combating its inroads . . . . Cable and pay cable are two massive reefs upon which our free television system may become shipwrecked. Broadcasters are no longer constrained by the 1971 consensus agreement with cable.

—Vincent T. Wasilewski, president, NAB.

thus half that of one head machines—in the BCN it is only 80mm. The field is divided into a number of segments. Each segment consists of a package of 52 lines (the precise number of segments per field depends on whether the system is PAL or NTSC). The BCN system boasts absolutely no interchangeability problems. Two heads means there is the possibility of banding occurring but this is automatically adjusted for the BCN. In terms of comparison with early quad machines, the system occupies about one third the space and consumes one third of the power. Tape consumption is one third.

Three units are available that are designed to meet all applications. The BCN-20 portable battery powered unit (44 lbs) offers one hour of recording time and features an assembly edit capability. The BCN 40 is designed for use in OB vans. The BCN 50 is a full studio machine including processing, time base correction, a monitor, oscilloscope and vectorscope.

Two rotating erase heads on the headwheel permit electronic editing with single-frame accuracy. There is a fast forward and reverse mode (30 X) to find edit points quickly.

The same standard scanner is employed in all three system versions. Its weight is one-third that of conventional quadruplex machines. The scanner (a self-contained, independent unit which also incorporates the driving motor) can be replaced easily.

Automatic "air lubrication" between headwheel and tape is a special

feature of the headwheel. A better than 300 hour life of the video heads (made of hot-pressed ferrite), is expected.

The BCN format has four additional tracks: two broadcast studio audio tracks suitable for stereo recording with the Dolby "A" noise reduction system, another for cue recording (e.g., time code, etc.), as well as control track for the servo system.

Bosch Fernseh demonstrated excellent pictures at NAB (including demonstration of eleventh generation dubs). Very effective brochures were distributed, B 010, general, and 010-T, technical.

In the way of a comparison, all the new one-inch systems offer low initial costs, lower tape costs and quality equal or better than that offered by quad. All three machines made a big point of low head maintenance costs. The average for quad is about 300 hours at which time one spends \$9 for refurbishing. Bosch guarantees 300 hours on headwheels which it says can be replaced in minutes (the scanner comes out in seconds). Sony says it guarantees 500 hours from its headwheel and that a replacement of its single crystal ferrite head is only \$30. Changing a head is a 20 minute job. We don't have a figure from Ampex. The Ampex does have a second video head. Presumably this adds to cost and to tape wear since there are two heads riding the tape. Operating and replacement costs of heads bound to be a factor which broadcasters will look at closely.

## Ampex offers super high band pilot; other alternatives, including disc

While we've devoted a lot of space to the new one-inch machines, all is not quiet on other fronts. RCA demonstrated that the TR 600 could produce good pictures at half speed and an IVC engineer gave a paper discussing good results from an IVC half track recorder. The big news in quad was Ampex's introduction of the AVR-3, which is called the world's first intelligent VTR. Obviously Ampex sees a future market for both helical and quad.

continued on page

## CATV—To Deregulate Or Not?

People used to worry that radio would be doomed by television. That has proved untrue . . . and so will commercial television's fears about growth of cable systems . . . but more needs to be done in the areas of signal carriage, syndication exclusivity rights and certification requirement. Cable television has in many cases increased revenues for local broadcasters by increasing the range of advertising markets.

—Jay Wagner, North Central Television, Sandusky, Ohio.

I can name at least 14 stations harmed financially by cable competition. Cable systems do not abide by regulations that now exist . . . . Cable TV could destroy the small broadcaster . . . we need a slowdown on deregulation until cable has tried operating for a while under existing rules. If 30 commercial stations go bankrupt, it will then be too late for rule changes.

—Bill Bengston, KOAM-TV, Pittsburg, Kansas.



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	<b>PV18x12B2</b> (for 1 1/4"/25mm Plumbicon*)	<b>P18x16B2</b> (for 1 1/4"/30mm Plumbicon)
Focal length	12-216mm	16-288mm
with 1.5x range extender	18-324mm	24-432mm
with 2x range extender	24-432mm	32-576mm
Maximum relative aperture	1:1.6 (f=12-172mm) 1:2.0 (f=216mm)	1:2.1 (f=16-230mm) 1:2.7 (f=288mm)
Zoom ratio	18x	18x
Image format covered	12.8 x 9.6mm, 16.0mm dia	17.1 x 12.8mm, 21.4mm dia
Minimum object distance from front vertex	0.7m (27.6")	0.7m (27.6")
Object dimension at minimum object distance	Wide	Tele
	103.2 x 77.4cm; 129.0cm diameter	5.3 x 4.0cm; 6.7cm diameter
Back focal distance	62.65mm (in air)	78.08mm (in air)
Glass compensation	69.2mm (BK 7)	70.2mm (BK 7)
Wavelength range for color correction	400-700nm	400-700nm
Weight	23kg (approx. 50lbs.)	23kg (approx. 50lbs.)
Dimensions	466.5mm length x 284mm width x 260.5mm height	
Focus and Zoom control	Manual, with plug-in interchangeable servos	
Range extender control	Plug-in servo/manual	

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## NAB SHOW-IN-PRINT

The AVR-3 is a dualband VTR and is compatible with existing broadcast equipment. It features a new development called Super High Band Pilot (SHBP) which enables the AVR-3 to provide incomparable picture quality. SHBP virtually eliminates "banding" due to velocity and internal errors.

Equipped with an optional Edit Controller, the AVR-3 can be programmed to handle a wide range of editing functions currently possible only with computer-editing systems.

The AVR-3 also offers automatic switching between bands and tape speeds. It can be configured with one of several pairs of bands for NTSC, PAL and SECAM: SHBP/High Band; High Band/Low Band color; or Low Band color/Low Band monochrome and for 15 ips and 7.5 ips operation.

Standard on the AVR-3 are a digital time base corrector, editor, a new digital autotracking system, fully servoed reels, constant-tension tape servo, video head optimizer and vacuum capstan. Prices for the AVR-3 range from \$105,000 to \$137,000.

Since super high band and pilot has been a subject of some controversy in the past between RCA and Ampex, Ampex issued a position paper on the subject setting forth its strong views on the matter.

The half speed IVC machine is called the 9000-4. At 4 ips, a single reel runs four hours. S/N ratio is 47 dB (as good as most quads). Prime application is archival storage for savings in tape. A standard 9000 can be converted to play at 4 ips in about 15 minutes.

Other alternatives were offered at NAB. Recortec talked about R Mod and Merlin Engineering showed how it upgrades torque motors and converts existing machines to high band work, etc. Merlin also showed how to test VTRs with its sweep generator.

Speaking of alternatives, two independent head refurbishers were on hand—Videomax and Computer Magnetics. Videomax stressed that it could refurbish any Ampex or RCA head.

There were fresh developments in disc recorders at NAB—at two ends of the price spectrum. At the lower end, using flexible discs, were Arvin Systems and Eigen Video. Arvin Systems unit was intended primarily for still storage and is described later

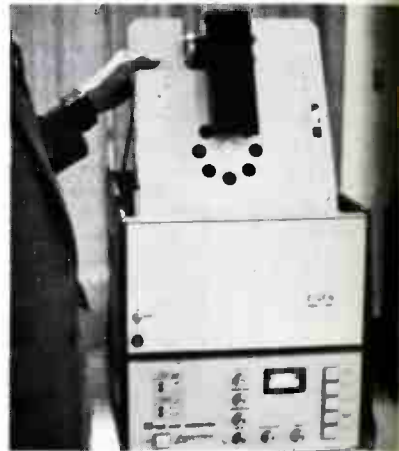
**For more information on VTRs,** Bosch Fernseh BCN 347; Sony BVH-1000 348; Ampex VPR-1 349; Ampex AVR-3 350; IVC90004 351; Ampex HS 100C 352; Data Disc 353; Eigen 354.



Ampex intelligent quad, the AVR-3.



Data Disc compact disc recorder.



Eigen Video flexible disc.

on. Eigen's units are intended for slow-motion (sports, editing, freeze frame, animation). Three units were offered. New were the 20-second unit (priced at \$27,500) and a 30-second unit (priced at \$40,000). Eigen also showed a 10-second unit announced last fall (\$12,500).

These units record consecutive fields as alternate tracks in each direction to achieve continuous "loop" operation, vital to sports slow-motion work. Each track is erased before re-recording by dual-gap magnetic heads. A signal-to-noise performance of 46-50 dB is achieved. The flexible disc eliminates catastrophic head crashes.

Ampex updated the HS-100 by introducing a new model, the HS-100C. The new unit includes a built-in TBC, an integral clean air system, and automatic circuitry. To avoid damage to the disc or heads, automatic head lifters lift heads free of the disc until rotation stops. To avoid damage during freeze frame, a flashing light alerts operator when it's time to move the head to the next location. Prices start at \$95,540.

Last year Data Disc created a stir by showing a unit smaller in size than the HS 100, and lower in price. Data Disc claimed unusual reliability since it has had experience designing such units for NASA. No push was made to promote this product to broadcasters last year but the company was back at

NAB again, this time saying it's ready to go. The unit features continuous variable slow motion, both forward and reverse.

### New patterns, graphics and effects done digitally—as well as better alpha-numeric

It was clear at NAB that new production tools, operating in the digital mode, were coming to the fore. One type is the graphics generator—instead of storing alphanumeric data as is done in character generators, you store graphics, patterns and the like and then set them in motion. Chyron prefers to call its unit of this sort the Dynar Montage Unit. You could animate graphics on the DMU without having to follow a computer program. Electronic memory captures the position of a large number of patterns making up the "frame" of each event. Any of the patterns so captured can be positioned anywhere on the screen, repeated, and assigned value of hue, duration and intensity. They can be made to flash or fade. Each pattern individually identified in memory can be called out when desired.

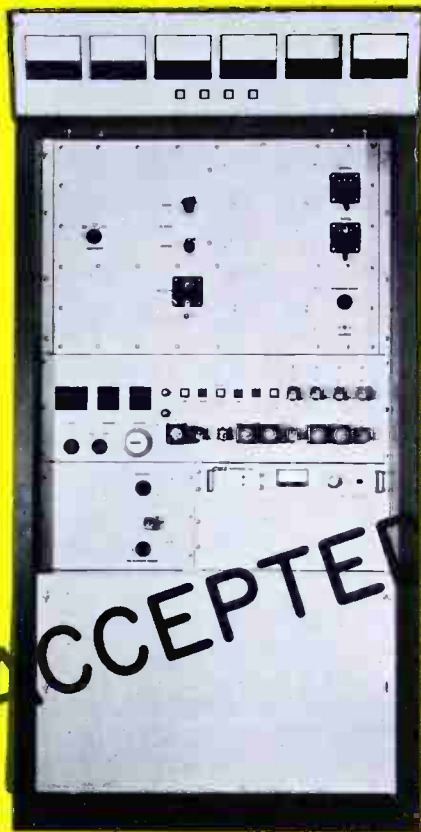
The designer can work with a light pen, a cursor control for ruling and scanning, and a composing easel camera (with zoom lens) to enter ex-

continued on page 44



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## NAB SHOW-IN-PRINT

ing patterns into the memory.

The DMU uses a hierarchy of memories:

- a. Working Memory—a semiconductor memory capable of storing (in dot pattern) every element of a full television frame.
- b. Mosaic Memory—a semiconductor memory for storing the pattern outline and locations (together with their identification data) of up to 64 groups of areas identified by pattern number.
- c. Characteristic Memory—a semiconductor memory storing the digital control information with which to make the various patterns and to display them under different hues, saturation, intensity, flashing priority, etc.
- d. Mosaic Store—a hard disc capable of storing approximately 40 mosaics with access to a new mosaic requiring less than one second.
- e. Event Control Store—flexible disc capable of storing all of the events and mosaic control information required for an entire program.
- f. Mosaic Library—magnetic tape cartridges each one capable of storing approximately 20 mosaics.

A program is created by selecting patterns and then picking a series of events to control the display and characteristics of the patterns.

3M was also showing a system (D-8000) that was capable of introducing patterns and certain preset effects and events (3M used such words as colorization, synthesis, movement, reposition, rotation) such as hue, saturation, etc.

Both Chyron and 3M said they were now ready to implement these concepts into specific hardware options that could be purchased.

It's difficult to distinguish clearly between titling generators and graphics generators and, indeed, TeleMation unveiled Compositor I which it called a Titling/Graphics System. Graphics in this unit refers to graphic quality characters and the introduction of other graphics. The Compositor I showed unusual smoothness in its characters by using character elements smaller than the limiting resolution and provides horizontal elements of 29 nsec width as contrasted with the 45 and 50 nsec typical of many units.

**For more information on Pattern Generators and Character Generators, Chyron 355; 3-M 356; TeleMation 357; Thomson-CSF 358; RCA 359; Systems Concepts 360; Knox 361; Video Data 362.**



Vidifont Mark IV can use light pen to "edit" artwork.



TeleMation's Compositor 1 intrigued visitors.

The Compositor I uses a full mini-computer which offers numerous features and future program expansion. A RAM active font memory (32K x 12 bits) has capacity for from one to three 92-character working fonts. These can be mixed with others added by the keyboard or mixed with those stored on a disk (256K).

Among the features of the new unit are variable horizontal character width spacing, and inter-character spacing (0 to 31 spacing elements) permitting the letter 'A' to be closely spaced to 'V', etc. Vertical inter-row spacing can be made proportional to the character height which can be one of 8 sizes. An optional colorizer permits characters, rows, or pages to be colorized from a selection of 28 basic colors—consisting of seven hues, each available at four luminance levels. Selectable bordering and shadowing is possible, making it possible to create logos from the keyboard.

Single-button random access page sequencing is another feature. The disk memory is of the hard disk type. Custom graphics and logotype generation is expected as a future option. The input technique will use an X-Y grid system as opposed to a TV camera and an A/D converter.

Thomson-CSF introduced the Vidifont Mark IV at the show. It too was called an electronic-character-graphic display system. Although it did not go as far as Chyron and 3M in pattern generation capability, it did allow for fonts and limited graphics to be generated from artwork (or electronically synthesized) and recorded on flexible disks.



Panasonic's digital controller.



System Concepts Q-IV showed power microcomputer.

Among the features: two 92 character fonts, 18 to 128 scan lines height, loadable into font memory three or more different font styles and sizes mixed on the same display roll; automatic character spacing allowing for overlapping characters such as AW; adjustable inter-row spacing on an individual basis, preview display (option) permitting simultaneous presentation of two different messages; edge position controls; eight speeds roll and crawl (plus pause and move).

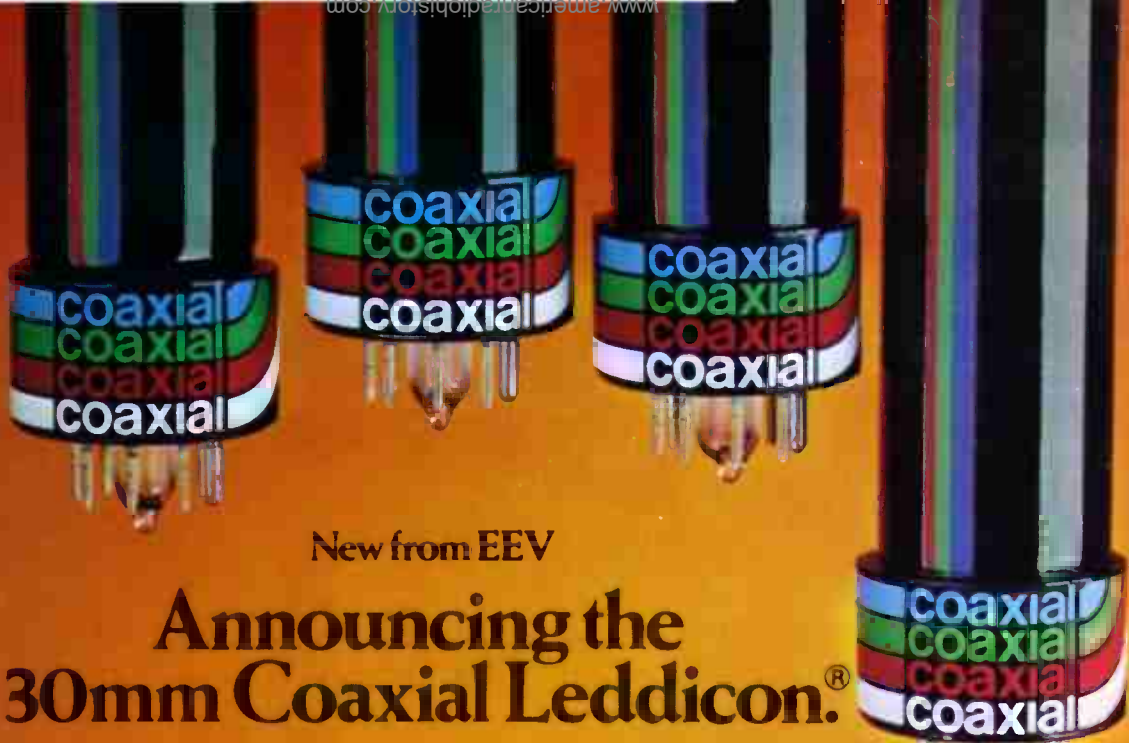
The flexible disk storage of the unit provides random access time of approximately 0.3 seconds.

RCA showed a new version of its graphics system called the Video Compared to the Video IV, it adds features such as two program channels which can be used on the air simultaneously. (The second channel can be used as an edit channel.)

A larger font capacity makes possible the intermix of three standard sizes of characters—64, 48, and 36 lines high—in a single symbol font. The system also now uses a small dot to compose characters for smoother appearance and better appearance when a second color is used for edging. Keyboard operation and remote control operation have been simplified, reducing the number of strokes necessary (compared to earlier model) to compose a message.

In the titling side of the business, a new character generator—the Q—was shown by a new company, System Concepts. Using a state of the art microcomputer from Intel (all within the 17 x 17 x 5 1/4 in. console),

continued on page



New from EEV

# Announcing the 30mm Coaxial Leddicon®

Utilizing a unique electrode structure and internal light biasing, EEV's Coaxial Leddicon is a direct replacement for separate or integral mesh Plumbicon,\* Vistacon or Leddicon camera tubes. Now, no problem with camera tube orientation – exclusive coaxial construction assures consistently accurate geometry and optimum registration. Less spurious pickup than with integral mesh tubes is an added bonus. And look at this:

- **Less smearing, better camera sensitivity** – exclusive internal light biasing reduces smearing, improves dynamic resolution even under 'low key' conditions.
- **No costly tube inventory** – stations having both separate and integral mesh equipment can use

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Add in extended red sensitivity plus fixed light bias and you will see why EEV's Coaxial Leddicon is destined to become the standard in top quality camera tubes. For detailed technical data, call us today collect.

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TWX: 710 523 1862.

67 Westmore Drive, Rexdale,  
Ontario M9V 3Y6  
Tel: (416) 745 9494. Telex: 06 965864.

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**P8131 Coaxial Leddicon**  
with standard layer and  
variable light bias.

**P8132 Coaxial Leddicon**  
with extended red layer  
and fixed light bias.

**P8133 Coaxial Leddicon**  
with extended red layer  
and variable light bias.



Coaxial Leddicon  
with extended red layer and  
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## SHOW-IN-PRINT

provided a lot of features found in more expensive computer controlled units. It offered 12 character sets, absolute centering, color graphics separators, 8-pages of memory, random and sequential page selection, color background by row, speeds of crawl, roll and flash, special displays (such as keyboard notation of three logos). Line graphics permits display of boxes, graphics. Basic price of the unit is only \$50. An unusual accessory is the cassette console which was styled on top of the console. Each cassette contains one 8-page file which can be transferred to the RAM memory in less than six seconds. Although the font shown at NAB was not "graphics" quality, a high resolution font will be available for another \$50.

Another new company in the titling field at NAB was Knox Ltd. which offered a high resolution generator of 16 pages for only \$3250. Its feature set true lower case letters and four variations. A non additive video unit added titles to the video with minimum phase and gain distortion. The unit was expandable.

Among the other character generator companies displaying their products were Laird Telemedia, as State Network and Video Data Systems. The latter showed a new \$1000 system, an economical (E155) system that featured two channels, two character sizes and 16 bits of memory.

Although we have stressed digital techniques in pattern generation in this section there is an alternative: BJA Systems Inc. offers an analog system, the Matron 14, that can add moving patterns and color to B&W camera art. At NAB was the Telestrator which overlays lines on a TV picture through a light pen input.

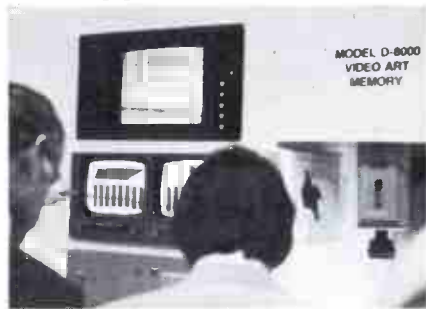
## Production switchers reveal new approaches

Coming up with some alternative approaches to simplify the size and complexity and operability of full-function switchers were Central Dynamics and American Data.

Central Dynamics, which unveiled a new line labeled the CD 480 SFX (Sequential Effects System), had its new device more than just a video switcher—it's a smart switcher, said. CDL boasted that the new concept would be more significant than the introduction of the mix-effect amplifier built in 1969. The other new approach came from American Data



Chyron's Dynamic Montage Unit created interacting graphics.



3M's D8000 demonstrated the power of a graphics generator.

Corp. Its 558 Production Switcher uses a four channel video mixer to achieve multiple functions on a single mix-effect amplifier.

While CDL demonstrated *what* the smart switcher could do, it didn't say *how* it did it (for patent reasons). The descriptive brochure issued by CDL portrayed graphically the sequence that could be achieved with the Smart Switcher. Here's a verbal description:

A single CD 480 SFX Amplifier gives complete control over four signal levels. Each level may be controlled independently or in conjunction with any or *all* of the other signal levels.

Levels 1 and 2 are used for Keying, with full transistor control (Cuts, Dissolves and Wipes) to and from the processed signals.

Levels 3 and 4 are used for the Background video signals with the ability to Cut, Dissolve or Wipe between them.

This unique arrangement makes it

## "The Week That Was" Reported By FCC Technical Panel

In their annual appearance in public to field questions on technical matters from hot or bothered station operators, the panel of top staffers from the FCC were highly persuasive, with substantive answers to most of the questions shot at them.

On the panel were Wallace Johnson, chief of the Broadcast Bureau; Phil Horne, chief of the Field Operations Bureau; Neil McNaughten, assistant chief of the Broadcast Bureau; Ray W. Seddon, chief of the Emergency Broadcast Division; and Dennis Williams, chief, Existing Aural Facilities.

A good part of their success sprang from the fact that the FCC is officially *supplying* answers, a result of the spirit of do-it-now that has been in evidence at the FCC lately. In fact, Wallace Johnson, leading off the discussion, was able to describe more than half a dozen important FCC actions just in the week before the Convention, which certainly justified his calling it "The Week That Was."

Among those actions were: finally, the long-promised rule-making on automatic transmitters, issued March 19th, which asks for industry comment on a wide range of questions (see details in news story in this issue); the development of a "short-form renewal," a one-page form with questions on both sides that will be available for most renewal operations, to be ready in a few months, along with an instruction book modelled somewhat after the IRS instruction book—the user is led through the numbered questions one after the other; a rule-making on non-commercial FM broadcasting to settle whether or not many 10-watt licensees in the lower 20 channels are blocking higher-powered FM educational assignments (as many educators have alleged), with proposals such as putting the 10-watters on commercial channels, or arranging the sharing of channels by two or more stations. Broadcasters interested in any of these matters should be sure to get copies of the proposed rule-makings and make their comments to the FCC by the dates specified.

Promised very shortly (two weeks) was a rule-making on circularly-polarized TV antennas. Described as actively in discussion, with "early" resolution hoped for, were: the proposal for VHF frequencies for wireless microphones; the National Quadraphonic FM report (called an excellent report by FCC staffers—see BM/E, Feb.); and the "clear channel" proceeding, looking toward the possible authorization of powers in excess of 50 kW for Class 1-A stations.

Johnson made the point that using "super-power" to describe these proposals (which contemplate levels such as 100,000 to 200,000 watts) would be amusing in such a country as Costa Rica, for example, which is building a *one megawatt* AM station on 625 KHz.

In contrast to meetings of some earlier years, the questions from the floor were uniformly polite, non-accusatory, information-seeking. Among them: Should a graphic equalizer be taken out or disabled during proof of performance? (Yes); In a stereo station, which channel for EBS transmissions? (The "Main" channel, or effectively, mono); Does a station with an approved sampling system for antenna parameters still have to send an engineer every other day to read at the towers? (No—once the sampling system is approved).

## NAB SHOW-IN-PRINT

possible to perform effects sequences such as:

- Wipe from a title over one background to another title over another background.
- Wipe to a new background behind a title.
- Wipe over a chroma key and a title over a chroma key.
- Wipe to a new background behind the chroma key and title.
- Wipe from a title keyed over a chroma key over a third source to a fourth source.

Transitions other than wipe could, of course, be used—cut, dissolve, soft wipe, color bordered wipe, etc.

A single SD 480 SFX Amplifier can easily perform complex sequences with no pre-planning. The CD 480 automatic preview system always keeps one step ahead of you, showing the composite result of your next transition.

The American Data Model 558 Production Switching System (shown last year in a non-working state) turns out to be a remarkably versatile, state-of-the-art package able to do things normally calling for a board with triple re-entry. The matrix is organized in a 20 input format with 10 available output buses.

Each crosspoint module contains a high input impedance amplifier with an adjustable delay of the input to effectively provide a matrix system with little or no path length variations. Output amplifiers incorporate fast acting dc restorers to eliminate "bounce" when switching between sources with APL changes.

The heart of the Model 558 is the all new "Quad EVA" control element, or, four channel video mixer. This new approach in video processing provides the tremendous flexibility. Each mix/effects system receives input signals to be processed from the following four sources: the A and B switching buses, the output of the colorizer which is associated with the particular M/E amplifier, and the video from the "Chroma Key fill video buss." The outputs of the four channels are combined, as in a video mixer, according to the logic commands or control signals provided by the logic system. The logic system is addressed by the control panel operator as to the mode of operation, i.e. wipe, mix, key, chroma key, etc. Since the logic system is not interacting, multiple functions may be accomplished simultaneously on a single mix effects amplifier. An example of these single mix/effects, simultaneous, multiple modes of operation would include mix or dissolve to



Vital's VIX-114 Switchers.



The Grass Valley APC-2000 system.



Central Dynamic's CD480 switcher.



Computer Image's 7243B switcher.

or from a preset wipe behind a chroma key or to or from an electronic spotlight behind a chroma key, etc.

The ADC one-bus-quad-split feature allows functions to be done over a quad split on either mix/effects system.

Each mix effects system, the primary matrix, the quad split, and the optional downstream keyer incorporate independent color background generators, allowing different colors to be used as borders, backgrounds, mattes and edges throughout the system.

Conventional cascaded reentries are used in the 558 system along with program output switching to place the output of M/E-1, M/E-1 or the M/E-2 "A" bus directly on line.

The 558 switching matrix uses the well known and compact ADC 900 cross point switching system which, incidentally, now uses monolithic ICs instead of proprietary hybrid circuits. These ICs are available from several sources.

The Vital exhibit, one of the liveliest at the show, was centered around last year's VIX-114 but it included several new things. To get around the almost super human effort that it takes to fully utilize a large switcher, Vital used a computer. The computer is used not just to handle preset switching but to achieve dynamic results by con-

trolling special effects. New digital special effects was an attraction of Vital booth. These included a heart, key hole, and others. By programming the computer such things as a rotary wipe, changing shapes colors could be achieved.

Another exhibit, incidentally stressing digital effects was Marconi Part of the Marconi booth covered the Vision Mixer, which used modular construction.

Grass Valley's large exhibit shared by the APC-2000 series information system at one end and a demonstration of production switcher at the other. The switcher was the 1600 7J series. Grass Valley also produced the 1600-TR switcher system designed for master control application. The system includes face connections for adding on a 2000 series automation system.

The video section accommodate sources. A combined mixing and digital effects system provides mix, and key operation. The audio section accommodates 23 audio follow sources and 10 audio only sources.

Computer Image demonstrates switchers; the 7243B production switcher and the 2241 MC Master Control switcher. The 7243B includes four mix/effects amplifiers and effects generators plus pattern

continued on page





# Bye, bye brute.

So long, spot. Ta-ta tener.  
Well, say-lite. Miss you maxi  
te and Molevator, too.  
We've got something better:  
Something you've got to see—  
I try—to believe. Belden/Lee  
Compact Source Iodide discharge  
lamps. A two-luminaire system  
it's better than a warehouse-  
of conventional film, TV, still  
and arena lighting equipment...  
especially for location work.  
Cause:  
They've got instant restrike—  
you get all the benefits of  
iodide discharge without any  
swbacks.  
They're smaller—  
13 1/2 x 12 1/2" for single head;  
25 x 12" for the twin. Fit just

about anywhere, for easy  
shipment and setup.  
They're lighter—  
20 lbs. for the single head; 35 for  
the twin. Easier on your back.  
They're brighter—  
at 100' and full spot, one 2kW twin  
delivers 200 foot candles. At 20'  
and full spot, it actually delivers  
5000 fc!  
They're flexible—  
change patterns without re-  
lamping.  
They're far more efficient—  
single requires 1000 watts (com-  
pares with 3-5000 watts and up);  
twin, 2000 (compares with 6-  
10,000 and up). In other words,  
CSI lamps draw only 1/3 to 1/5 the  
power of any comparable day-

light corrected source.  
They're more  
economical—  
PAR64 CSI bulb  
delivers lowest  
operating cost-  
per-hour of any  
large source lamp.  
They're versatile—  
output is perfect for video; can be  
filtered up for daylight; down for  
tungsten. Low heat output and  
weatherproof, too. Head can be  
operated 500' from ballast.  
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## NAB SHOW-IN-PRINT

ulators and a mid-stream chroma key.

Computer Image boasts 85 basic special effects patterns available through push button selection. In addition, an optional special pattern generator multiplies the number of basic patterns . . . creating literally hundreds of effects.

A unique third and related option, the pattern modulator, provides electronic modulation of the patterns. The operator may continuously vary the

selected pattern to create unlimited special effects. The modulated pattern may remain fixed, or can then be modulated at variable rates to produce artistic, moving patterns.

New mid-stream keying, an optional feature on the 7243B, and other models, is comparable to having two switchers in one unit and permits operations heretofore possible only by using an auxiliary switcher.

Richmond Hill was back as a production switcher exhibitor. It showed the VPM 3000 series, a full-capability board with a new RHL linear key cir-



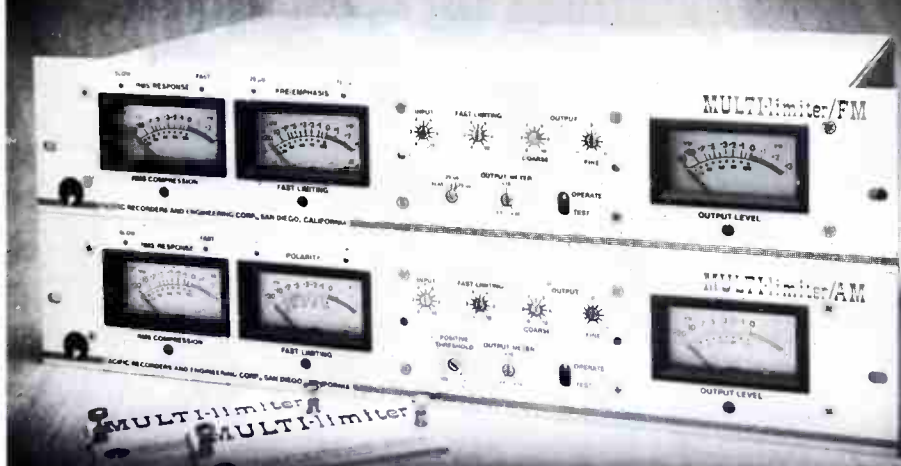
American Data's switch-module with second sourced ICs.



The TRI portable PPC-1.

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cuit. The VPM 3000 has a number of technical features built in as standard and prices are in the \$11,000 to \$33,000 range. The company put a lot of emphasis on its automated A/V switcher. The system provides full transition capability. Unique features claimed are the ease in which even can be changed (via a keyboard), data error indicator, look ahead for possible malfunctions.

Across the street at McCormick Inc. another new switcher was shown. Duca-Richardson (new company) demonstrated its state-of-the-art 400 switcher which it claimed to be the ultimate in operating simplicity. Through use of function modules, seven switcher functions can be initiated with a single pushbutton.

Editing switchers were popular at this year's NAB but we'll describe them under editors. In the medium sized switchers category were Industrial Science Inc. (which does build large customized units), Telemet (with its 7960 expandable switcher) and Ross Broadcast Products. Ross' "compact cost-effective video production switcher" boasted more production power than many four-bus switchers. It includes 24 wipe functions including a soft wipe, soft key. Ross has several models.

Also in the medium size-economic range was the 3M Model 11 switcher. It's loaded with features unusual for its price according to 3M. The preview channel allows accurate set up of effects before use, including preset wipes and modulation. 7 keys/over effects function adds a new dimension to special effects.

In the small switcher category were all of the bigger and medium sized companies plus others including SI

TRI and E&O Systems (of la). Shintron showed a small er, the 367 for ENG application. Included a SMPTE Edit Code r. TRI showed the suitcase Port-Production Console, the PPC-1. PPC-1 System includes a 5-in. Trinitron monitor for program oring, a high quality six-input al interval switcher, a five-input mixer, sync generator and all esary intercom amplifiers, pulse onution amplifiers, etc. It's priced 2,500.

E&O Systems DME-406 er is a compact low-cost unit includes five effects modes, six ey, keying with 3-way insert selec- ill designed to work with helical ssette machines. It starts at . Comtech was another company ng a small switcher.

**ers: new developments in al areas**

ere was a lot happening on sev- onments in editing equipment. In the us counting ENG area Sony an- ed a new editor to work with its 3VU-100 recorder. Convergence dited several add-ons—a program witer and a separate joy stick con- r individual video cassettes. TRI d an audio accessory, the BAA 1 (lance lines). CMX announced a lower cost ENG editor, the 34X; Datatron, the Tempo '76. Bnething new in the computer area was the appearance of g-switchers. Such units, such as mpex EDM-1, permit the ad- e of artistic special effects. CMX duced the microprocessor as an didual interface (thus freeing the rkl processor for other tasks). Both and Datatron stressed ex- mble systems. Datatron extended oncept of expandability to en- ass both pulse counting system SMPTE time code editor system. time code generator and reader here were a number of new de- ments including a small battery ed generator to add to full usa-

beauty of expandable systems is ou don't obsolete earlier pur- ts. The Datatron Tempo '76, for ble, provides the basic Control at unit for \$7,600 and allows the to add on SMPTE Time Code ca- ty with the simple addition of SMPTE readers (Model 5250).

for more information on Switch- circle bold face # on RSC: A, Data Model 558, **363**; CDL's X 480, **364**; Computer Image, **35**; Duca Richardson's 4000, **366**; 3's 1114, **367**; E&O's DME406, **368**; Comtech, **369**; Grass Valley stems, **370**; Vital Systems, **371**.

The total price is considerably below the cost of today's SMPTE Time Code units.

The key unit of this new approach is the Editing Programmer which incorporates "Time Sync." The Editor can function equally well using standard SMPTE Edit Code or the standard control track pulses. When using the standard SMPTE Edit Code, the code is recorded on one audio channel of the program material source tape and the master tape. Since each recorded event coincides with a specific time value to

continued on page 56



Datatron's new Tempo '76 editor.

# Spotmaster<sup>®</sup>

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# TK-76 PROVES ITS PICTURE QUALITY —AND MORE—WITH ITS OWN DEMO TAPE.

## Steel mill to supermarket.

Your RCA Representative has an unusual TV camera tape to show you: the TK-76 portable camera demonstrating its capabilities.

In available light situations as varied as a steel mill and the interior of a supermarket, the TK-76 proved its unusual adaptability. Even when taping the

contrast of brilliant molten metal and the mill's shadowy surroundings, the TK-76's automatic features held color balance while the camera produced excellent color resolution and consistent picture quality.

Good operating characteristics came through in overcast weather, in the bright artificial lighting of a



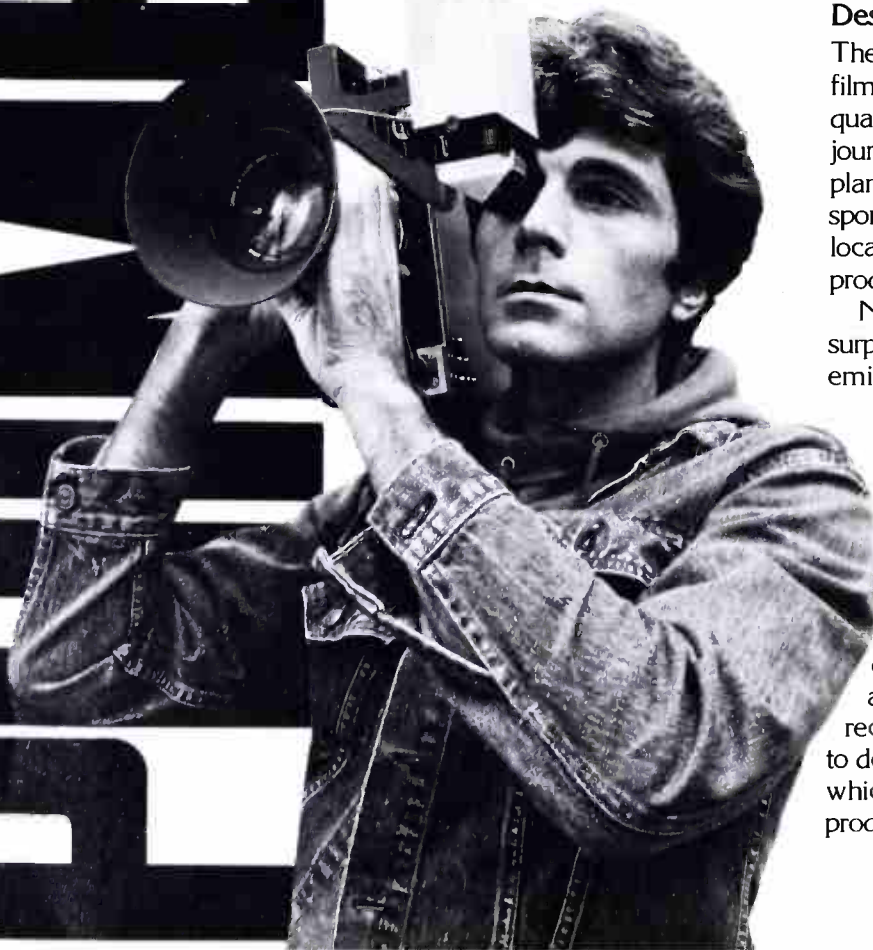
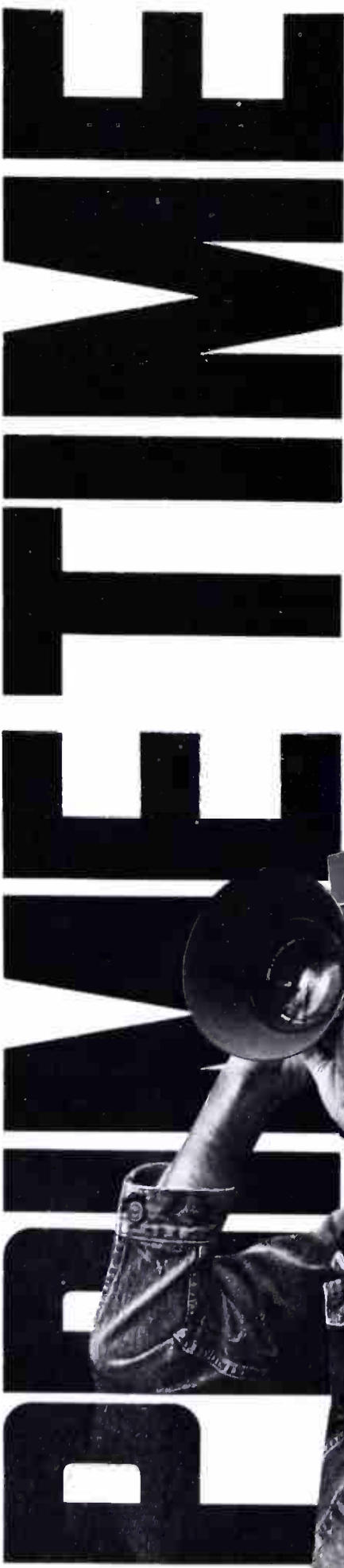
flower shop—even transmitting faces illuminated only by low light

## Designers surprised.

The TK-76 was created to bring film camera freedom and high quality pictures to electronic journalism. This new camera was planned for secondary uses in sportscasting, documentary and local on-location commercial production.

Now, its performance has surprised even its designers. It is eminently suited to its proposed application, yet it's also a surprisingly good studio camera—as its own demo tape clearly shows.

Among the studio sequences are scenes of a girl's face that show the excellent closeups and detailing the TK-76 can achieve and a slow panning across recognizable commercial products to demonstrate the clarity with which the TK-76 can show a product.

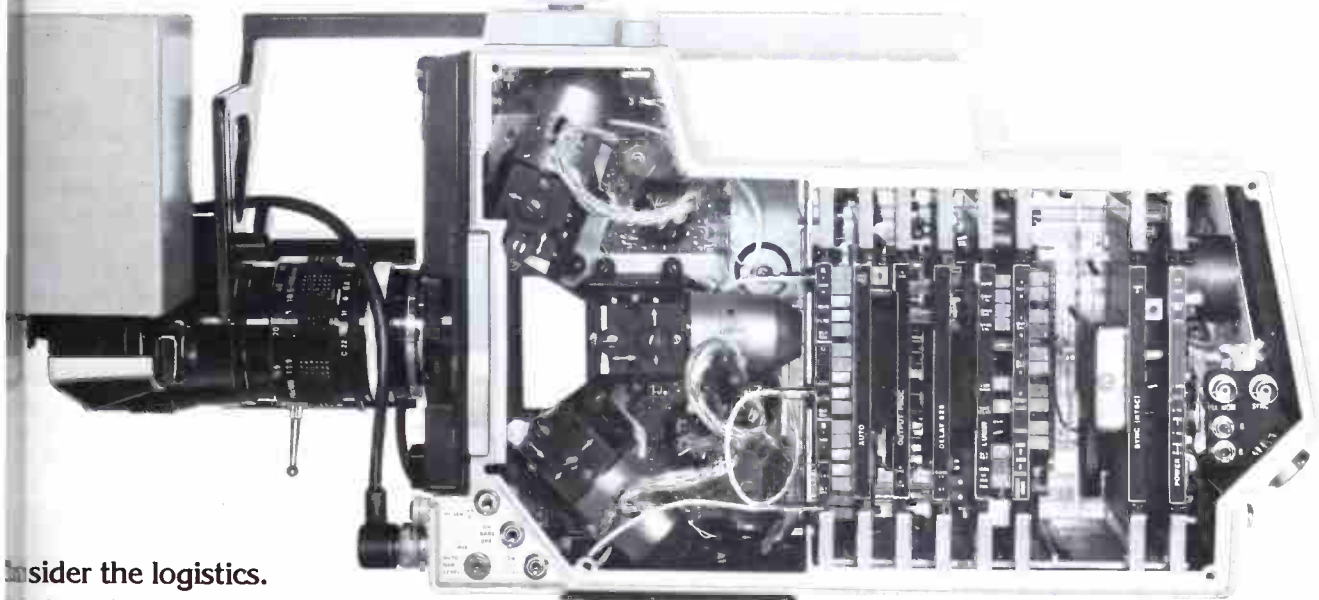


## New camera generation.

TK-76 is the first camera to pack big-camera electronics into a round package without a backpack, all at a most attractive price: under \$35,000.

Among the desirable features of new-generation TK-76 are:  
• Self-contained—no backpack or separate CCU  
• Exclusive shock-mounted optical system  
• Prism optics— $f/1.4$ ; freedom from reflections  
• Picture quality equal to or better than that produced with commonly used news film  
• Film light—less lag in low light  
• Three  $\frac{2}{3}$ -inch PbO's

- Built-in sync generator—genlocks to external black burst or complete signal
- Vertical and horizontal contour enhancement—with comb filter and coring
- Rugged cast aluminum case
- T-bone construction—holds optical alignment
- Sealed camera case
- $1\frac{1}{2}$ " (38 mm) diagonal viewfinder
- Fully adjustable viewfinder
- Interchangeable pentaprism viewers
- Automatic iris control with manual override
- Automatic white balance control
- Video level indicator in VF senses peak white or flesh level
- +9dB video gain switch—for extremely low light levels
- +12 volt DC power source
- Lightweight (6 lb.) battery belt
- Optional AC power adaptor
- Flat mounting base
- Convenient carrying handle
- Shoulder-balanced—minimizes fatigue
- Light weight—only 20 lb.
- Instant "on" from standby
- Fast warmup—5 to 7 seconds from cold start
- High sensitivity—450 LUX @  $f/1.6$
- Full bandwidth encoder
- Operates from  $-10^{\circ}\text{F.}$  to  $+120^{\circ}\text{F.}$
- Built-in filter wheel
- Flare correction



## Consider the logistics.

If you have been planning to enter electronic journalism or improve the flexibility of your teleproduction activities, you have probably weighed the cost-versus-quality of available cameras quite carefully. The prime purpose of EJ is to boost station ratings and reputation in exciting, where-it's-happening coverage. An inflexible, limited-EJ camera cannot achieve this, thus even its reasonable cost is expensive. Nor is a costly EJ camera a good return on investment if performance can be equalled by a medium-priced camera. That medium-priced high performer is here: the TK-76. It is

the first camera to combine the picture quality of expensive EJ cameras with the handling ease of a limited-capability portable. As bonuses, the TK-76 offers a high degree of studio capability, plus film camera freedom of movement and picture quality.

The logistics favor the TK-76!

## See the TK-76 tape.

Your RCA Representative will gladly screen the TK-76 demonstration tape. We think you'll find it a most rewarding twenty minutes.

Contact him today—and join the scores of TV stations and teleproducers who have already ordered new TK-76 cameras.



# RCA

## NAB SHOW-IN-PRINT



Ampex EDM-1 computer editor.



CMX 340-X with microprocessor interface.

the frame, any scene can be located by running the tape to a designated time on the Tempo '76. When editing in a control track mode, "Timesync" counts these pulses, making it possible to perform insert edits and automatically search for the actual frame of video information required to generate the EE master.

It is possible to build ultimate editing capabilities gradually. You start with a two deck Control Track Editor (Tempo Series 7610). To expand, two SMPTE Time Code readers (Tempo Series 7620) are added. Once the transition to SMPTE has been made, additional expansion is possible, such as three decks and three readers (Tempo Series 7630) or a three-deck system with memory for storage of up to 50 edit decisions and automatic assembly capability (Tempo Series 7640). A three-deck system with all of the above and special effects switcher control and teletype (Tempo Series 7650) is also possible.

The Tempo '76 Editor offers desktop ease-of-operation and flexibility for either off-line or on-line editing systems. All editing parameters are conveniently displayed in amber on an alphanumeric, gas-paneled display field of black for easy readability. Hours are indicated in addition to minutes, seconds and frames.

Expandability was the theme of CMX also—the X in the 340X and the



Cooke time code generator.



EECO's submin TCG.

34X is for X-pandable. CMX did not bridge the gap between pulse counting systems and SMPTE time code, choosing only to offer the SMPTE units. But it introduced the concept of separate microprocessor interfaces so that almost any machine could be added to a system without burdening the central processor. The CMX can inter-marry, control and mix quad, helical, VTRs, video discs, synchronous audio recorders and switchers. Up to 32 different interfaces can be added.

At the heart of the system is an interactive keyboard display and computer unit that generates signals, questions and responds to the operator's commands and replies. The computer's memory logs all edit decisions, made during the course of an edit session. This decision list can be outputted to a punched tape or other command medium for future auto assembly. The Editor works from a management list that appears on the CRT. He can restructure this list easily.

A feature of the 340X program is time compression. This is a look-ahead cue and pre-roll function which maneuvers the record VTR to be ready for the next function. This can save hours, CMX says.

The 34X ENG unit is basically a computer assisted video tape editing system. The basic 34X is a cuts only editor which links two VTRs to a com-

puter by interfaces (as in the large system 340X). Various options are available.

Both the Datatron and CMX editor were working with switchers supplied by Computer Image (2061ED switcher). These are 6 or 8 input, buss, audio-follow-video switcher designed for operation under full computer control in post-production editing situations.

The editing/switching system showing the greatest special effects capability was the Ampex EDM-1 system (using a CDL designed switcher). It featured a computer-controlled switcher with special effects and floppy disc memory which can store as many as 3200 edited scenes. It can interface with up to eight on-line or off-line video, audio, or disc recorders.

Unlike other computer editing systems which store and recall scenes by digital time code address, the EDM-1 has an exclusive computer filing system that permits individual scenes to be identified by both time code and real language. This means the operator can call up a particular scene by its real language tag without having to cross reference the scene description with a set of numbers.

The EDM-1 also has time saving features. It remembers where each scene is recorded on the master tape and calculates the most efficient way to assemble them with the least amount of shuttling. Each scene is then transferred to the precise location required for perfect sequential assembly.

Edited scenes can be manipulated so that if the change in one scene affects the time of other parts of the sequence the EDM-1 automatically calculates the change and "ripples" (modifies) them accordingly.

A unique creative feature of the system allows the director to practice dissolve, wipe or key until he is satisfied with the finished product. The EDM-1 "learns" this transition key, stores the proper instructions, and repeats it in exactly the same manner during the "execute" mode. EDM prices begin at \$95,000. Deliveries slated to begin in October.

Applying concepts used in editors to both the function of editing and the function of controlling tape machines for automatic play purposes was the key to these devices again the microprocessor.

The Edimatic 100 is one of the devices. This editing control system performs frame accurate edits with SMPTE code by counting control track pulses. The difference in performance provided by the microprocessor in Edimatic is in the push button sp-

continued on page 57

# Frezzi Belts 'em



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## NAB SHOW-IN-PRINT

with which edit points may be selected and the ability of the Edimatic-100 to perform assembly of up to ten memorized edit points.

The Edimatic-100 at \$7500, unlike many other low cost editors, is equally capable of editing tapes on quad and helical video tape recorders. On-line or off-line edits and edits from camera to VTR may be performed simply and easily.

Quad VTR editing is provided through Recortec's Reel-Servo Modification (R-MOD). This unit also provides electronic tape timing with frame accurate time display. It works directly with other buffered tape handlers such as the Ampex AVR-1, IVC-9000 and the Video Memory helical VTR, the VM-1000.

In this Recortec family of related products is the Video Spot Assembly. The VSA is a microprocessor-based system designed to do what a cartridge system does at a fraction of its cost. The VSA uses the same two VTR's used for A-B rolls for spot/spot sequences. It provides random access for up to 100 spots, access to slides and film chains; no restrictions on spot length (even 2 second spots); playing of 10 second spots back-to-back; plays up to 100 breaks without reprogramming; programming of up to eight events per break; and, last minute spot changes up to the last break time. It costs \$8,950.

Another similar device is the Tape Search Unit which stores up to ten cue points for random record and automatic search.

Central Dynamics exhibit included demonstrations of its well-known editing systems, the PEC 102 Computer Editing System—a macro system built on a modular design philosophy so that it could handle almost any job—and the EDS-200 microcomputer editing system. TRI showed its familiar EA-5 editing system.

A surprise exhibitor was TeleFilm with its TEM-V video tape editing system. This is the system used by Don Stern Productions to edit off-line such TV network shows as "All In The Family," "Big Eddie" and some 48 others. The system uses five Sony 8650 reel-to-reel decks controlled by microprocessors. Operators rock reels to see one complete field, or hear the sound track syllable by syllable. Tele-Film was selling the five unit system for \$69,325 or the three for \$43,500.

**For more Editor Information,**  
Sony 372; Datalatron Tempo 373;  
CMX 340X 374; CMX34X 375;  
Ampex EDM-1 376; Telefilm 377;  
Cooke 378; Electro Optical 379;  
ESE 380; Convergence 381;

You could work on a monthly lease plan starting at \$1,039 a month.

Several interesting cueing aids were shown: K&M Electronics demonstrated an edit/auto cue system to facilitate cueing video cassettes. Count down times are inserted and the device parks the cassette at the appropriate pre-roll time. Microprobe Inc. showed an ATS edit controller which stores edit points "on the fly." A feature was quick adjustments to the edit point made by operating trim panel buttons. System doesn't require use of control track pulses or SMPTE time code.

In the time code reader, generator and programmer category there were a number of devices on the floor. Datalatron showed, as we mentioned, a battery operated time code generator that would fit in the RF modulator slot of the Sony VO 3800 recorder. Unit is designated the 510P. It also offered a VaraScan viewing system designed to work with the new Sony BVU-200 VTR and other U-matic machines. VaraScan features slow (1/5) speed and fast (2X) speed in both reverse and forward motion. It is also capable of stop and pause action. From the freeze-frame mode, tape can be stepped forward, precisely one frame at a time. In any mode of operation, including freeze-frame, the edit point can be marked for editing.

CMX showed a small time code generator in a small box. A fist-sized TCG unit made by EECO was on the floor. It was built around a CMOS/LSI chip. Recortec had a time lock system which is a time code reader which displays accurate tape time. Beta Technology showed an editor, edit timing control and automatic timing console system including a tape timer.

A line of time code systems was shown by Cooke Engineering. These included the TCG-5000, and the TCR-6000 time code reader and character generator. An ancillary device was the DTT-4000 digital tape timer. Another source is Time Tech Corp.

A new source of time code readers (and video character generators) showing hours, minutes, seconds and frames was Electro-Optical Systems, Ltd. Features were a counter hold, an indicator hold, and a LED display. A whole range of timers was shown by ESE. Among its collection was a new ES-230 Time Calculator/Timer capable of adding and subtracting minutes and seconds. It was priced at \$275.

We mentioned earlier the Convergence PC-3 Triple Function Program Computer. What the unit does is provide automatic bi-directional tape search, continuous tape timing and insert during duration timing—all programmable with a hand-held calculator keyboard. Precision accuracy in the

system is maintained by a unique "closed loop" system of counting control track pulses of normal video cassette tapes.

## Time base correctors, synchronizers, and more

Time base correctors, as everyone knows, have made it possible to pluck inexpensive helical machines on the air meeting FCC sync and frequency requirements. Since the signal from the VTR has to pass through the TB it was natural to improve the signal in other ways if possible. Drop out compensators, proc amps, etc. were common additions. This year at NAB Microtime showed a device that dramatically improved the signal of a U-matic cassette. Not only did it correct timing deviation but it increased the signal to noise level and sharpened picture softness. Further picture breakup caused by tape deck movement during recording was solved. All of these features are incorporated in the Microtime 202 Electronic Signal Processor.

Video noise off-tape is reduced by 10 dB, resulting in a playback S/N ratio approaching 50 dB. Picture "crispeness" is provided by the built-in IMAGE-EX, with front panel control of image, compensating for the softness exhibited by 3/4-in. U-matics.

The 2020 also eliminates another U-matic characteristic, that of shifting of chroma relative to luminance as head wear progresses. A control is provided which will move chroma over a range of 4 nanoseconds.

The correction range of the 2020 is  $\pm 2H$  lines, approximately 30% greater than prior units. To eliminate picture breakup caused by a moving deck, Auto-Trac feature is incorporated.

A new digital "universal" signal processor capable of producing broadcast-quality signals from all

continued on page 4

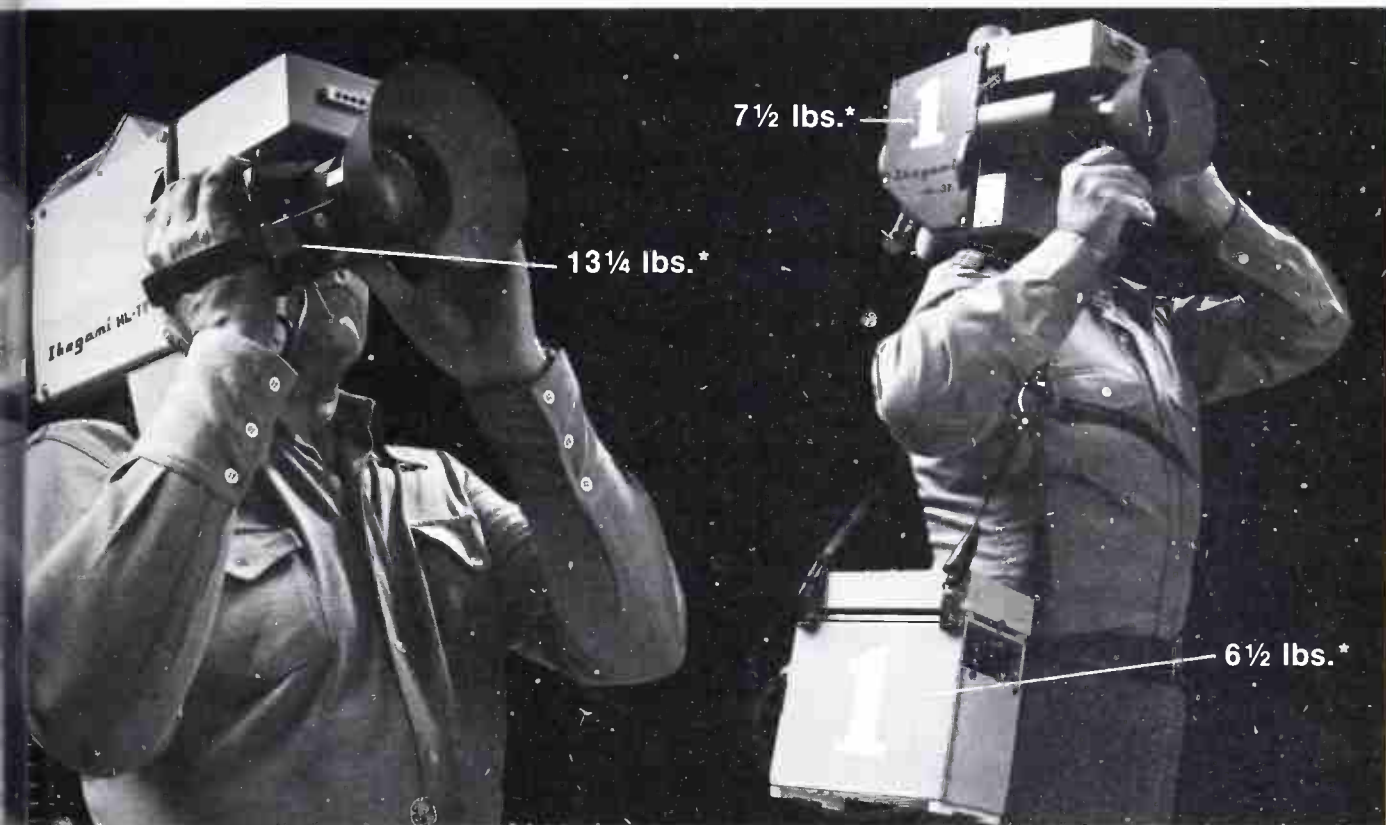


Proof of 2020's capability shown by color and S/N test equipment.



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## ONE AND ONE "MINIMATE"

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Both configurations give you F/1.4 prism optics: auto white and auto black balance; concentric color temperature compensation and neutral density filter wheel; two-line detail correction; quick start via a four-second preheat circuit; I&Q encoder; RS-170 sync (optional gen lock); +6dB and +12dB gain; picture capability at 6ft.-candles.

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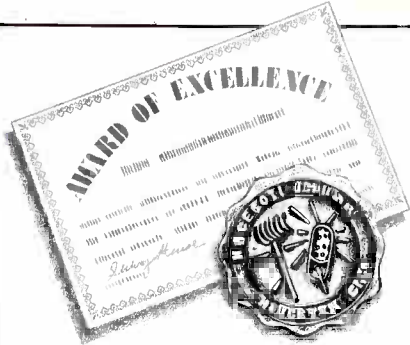
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Long Island City, New York 11101 (212) 932-2577

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300 broadcast-quality ENG Systems in the field... more than all other manufacturers combined

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3. EVENTUAL COST REDUCTION in operating expense.
4. Complete control of entire broadcast system.

### Why Dual Channel?

1. A Dual-Channel costs less than a Composite.
2. Better Reliability than a Composite. "Built in Backup."
3. Greater Channel Separation than a Composite.
4. Less Signal Drive Required to Receivers means additional system Fade Margin.
5. Less Test Equipment Necessary and more Positive System Diagnosis.
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7. Stereo Generator and Broadcast Transmitter Compatibility without Interface.
8. Having a Dual-Channel STL is like having a Spare Link.
9. Two Remote Control and Two Sub-Carrier Capability.

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7. The Marti System Delivers Top Performance with Transmitter manufacturer's Stereo Generator.
8. Marti STL Systems Log over TWO MILLION (2,000,000) Broadcast Hours each Year.
9. AVAILABLE FROM STOCK.

### The Stereo STL with "Built-in Backup."

Dual Channel System (Stereo) \$4160.00  
Single Channel System (Mono) \$2290.00

(Does not include cost of Antennas or Transmission lines).

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## NAB SHOW-IN-PRINT

videotape recorders was introduced at NAB by IVC. The new TBC-2200 works with direct and heterodyne helical machines, non-capstan-servoed VTRs, and segmented field VTRs.

The TBC-2200 has a three and three-quarter line-correction window and a five-line store. This wide correction range permits correction of extremely difficult-to-handle color signals.

A "look-ahead" velocity compensator measures errors line-by-line and corrects on that basis. A dropout compensator reinserts correctly timed luminance and chrominance of the proper hue and saturation as long as the dropout lasts.

When used in conjunction with an ENG system the TBC-2200 accepts non-standard synchronization sometimes inherent in hand-held cameras and produces a standard output.

Non-capstan servoed VTRs require the use of the MDA-150 power amplifier to play back synchronized, standard NTSC signals. Produced by Quantel Ltd., for IVC, the TBC-2200 is priced at \$18,000.

CVS surprised broadcasters by introducing a 9-bit, four times subcarrier sampling technique in its new CVS Model 520. The higher sampling rate means improved bandwidth capability, K-factor specs, and signal to noise ratio (60 dB p-p signal to rms noise).

The 520 is designed to handle quads, the IVC 9000, helicals, and U-matic machines. It will stabilize non-capstan servo (line-locked) VTRs (although maybe not to broadcast standards).

In "Line Lock," the internal sync generator can also supply drives to auxiliary equipment, allowing inexpensive VTR's to be used for live production sources. By engaging the color interlace switch, time base corrected tapes can be dubbed to any master recorder, including quads. When played back, these tapes will contain color interlaced signals.

By locking the output signal from the 520 with other sources through a special effects generator, fades, wipes, etc., are possible from inexpensive VTRs.

The window is 1.5 lines. With a capstan-servoed VTR, the lock up time is in milliseconds. The unit includes a built-in DOC, VELCOMP, and PROC AMP.

CVS also introduced a \$5500 TBC, the CVS 510. This unit employs a 6-bit, four times subcarrier sampling circuit. The window is one horizontal line of correction. Unit includes a built in EIA sync generator plus a PROC AMP, DOC and color interlace.



Microtime calling attention to the initial error correction features of the 2020.



CVS 20 TBC has 9 bit sampler at 4x subcarrier.

One of Sony's new broadcast products was a TBC. Among its features were a large window ( $\pm 2H$ ), for price range (\$12,000), a "superior S/N ratio, extremely fast lock up time a built-in DOC, VELCOMP (line line), and EIA composite advanced sync. Technical literature was not as BM/E went to press so we do have values on these characteristics:

Digital Video Systems (former DVLabs) showed the DVL-2002 which has a six-line correct window ( $\pm 3$  lines). DVS uses 4x subcarrier having pioneered that concept. The company claims improved signal to noise, wider and flatter frequency response, improved differential gain and differential phase. The dynamic line correction window makes it possible to use a motor drive amplifier provide vertical lock for non-capstan servo VTRs.

Standard with the DVL 2002 is broadcast digital sync generator, video gen-lock, a digital processing amplifier that adds reference color burst, blanking prior to digital to analog conversion, auto color phasing to correct for wrong field VTR lock-up or wrong field edits.

The 2002-01 is priced at \$13,500. The motor drive microprocessor logic board provides frequency reference, the vertical lock of non-capstan servo VTRs and costs \$950.00.

Digital Video drew particular attention to its booth by playing a non-capstan VTR to on-air standards by showing new digital effects. Each effect is that best described as 3-D. The picture can be made to revolve around various axes to give

For more information on TBCs  
Microtime 2020, 382; IVC-2200;  
VS 520, 383; CV520, 384; Digital  
Video Systems, 385; MCI-Quantel,  
386; RCA synchronizer, 387;  
Panasonic AV-7000, 388.

on of depth.  
one of the most fascinating demon-  
strations to watch was that created by  
the Digital Video Processing System,  
AV-7000 by Panasonic. This unit  
compress and squeeze pictures  
then process them through a 16-  
production switcher.

the AV-7000, through the use of a  
processor, can create remarkable  
effects. This system can take an in-  
coming, non-synchronized video  
signal, such as a microwave trans-  
mission and reference it to studio sync.  
Adjustments can be made for con-  
stant shifts in the subcarrier phase of  
the incoming signal caused by remote  
transmission. The picture can be re-  
ferred to any size in real time and posi-  
tioned anywhere on the screen. Quad  
screens (four way split screens) can be  
performed with ease. The digital wipe  
generator produces rotating wipe pat-  
terns for truly spectacular effects.

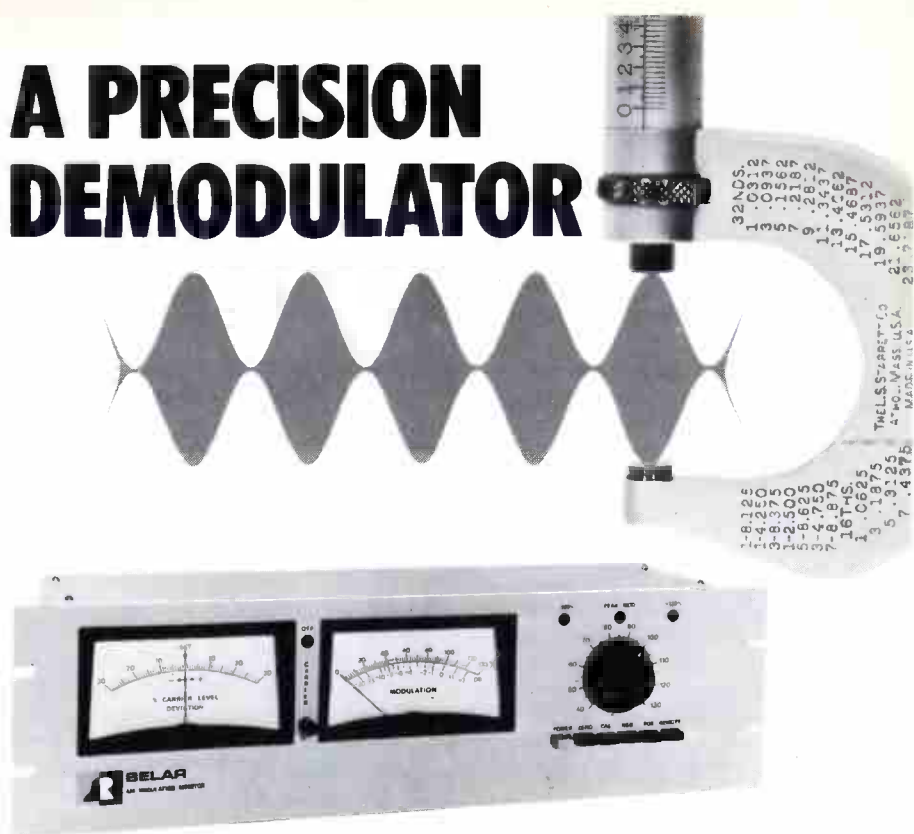
A joystick position permits desired  
movement of a compressed picture  
anywhere on the screen. No price or  
delivery schedule was set for the unit  
with so much interest shown at  
NAB, it seems likely Panasonic will  
enter the U.S. market.

The Panasonic AV-7000 was by no  
means the only new frame syn-  
chronizer present. As reported in  
this issue in March, one new source  
could be the Micro Consultant/  
Quantel device. MCI was at NAB with  
the DFS-3000 which is remarkable be-  
cause of its small size—unit takes up  
only 8 3/4-in. of rack space and stores  
complete fields. Another new  
device was RCA which unveiled its  
DFS-121 system. But first a little more  
about the DFS-3000, priced at  
\$965.

Because the DFS-3000 is small and  
uses little power (250VA), it is  
very portable. The DFS-3000 is also  
the first digital synchronizer to offer  
time base correction capability.  
Because the TBC function can be in-  
tegrated into the existing package,  
broadcasters can, for the first time,  
provide both synchronization and time  
base correction for any VTR, at  
remote locations.

A number of options for the DFS-  
3000 were demonstrated at NAB, all  
of which can be "plugged-in" to the  
basic system. In addition to the Infinite  
Window Time Base Corrector options  
is a Video Compressor that reduces  
the picture to 1/4 standard size and posi-  
tions it in any one of four quadrants on  
the screen; a Joystick Control that  
moves the compressed image; Frame

# A PRECISION DEMODULATOR



## The AMM-2 AM Modulation Monitor

- RF frequency range — 200 kHz to 160 MHz
- 100% negative peak modulation light — independent of input carrier level
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- Peak modulation light adjustable from 40 to 130%, calibrated in 1% increments — independent of input carrier level
- True peak reading modulation meter — responds to shortest duration program peaks
- Carrier level meter — indicates true carrier shift
- Phase-linear filter — no overshoots from clipped modulation peaks
- Remote outputs — outputs for both meters and peak lights
- Built-in modulation calibration
- Built-in carrier-off alarm
- Outputs for listening as well as test functions
- 115/230 volts, 50/60 Hz operation
- FCC Type Approved

The AMM-2 Modulation Monitor sets new standards in accurate AM monitoring — the first AM monitor to incorporate true ratio-type peak indicators. The AMM-2 contains a unique modulation cancellation scheme to recover unmodulated carrier to reference the modulation peaks to. Thus the instantaneous program peaks are referenced to the instantaneous carrier without the need of time-constants, as with AGC devices. True carrier is indicated even with the asymmetrical modulation encountered in today's high positive peak modulation, and the peaks are automatically referenced to this true carrier to give the most accurate indication of program peaks.

The AMM-2 incorporates a phase-linear filter that does not produce overshoots when a negative peak clipper is used in the transmitter. The true modulation peak is measured instead of a false, higher peak introduced by the non-linear phase filters found in other monitors.

With the AMM-2, you can turn up your level to where it belongs for maximum loudness.

**\$850 DELIVERY FROM STOCK**

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## NAB SHOW-IN-PRINT

and Field Freeze; and a Remote Control Panel.

The RCA unit stores a full frame and it uses a 14.3 MHz (4x subcarrier) sampling rate. In addition, since only the active picture information (120 IRE units) is coded, amplitude samples are more representative of the original analog signal, and quantizing errors are less significant, RCA said.

Still picture, joystick positioning and picture compression capabilities will be available as optional accessories. The still picture mode of operation allows a single picture to be retained as long as desired.

The RCA unit will not be available for delivery until later in the year.

Others displaying TBCs at NAB were Ampex and Kansas State Network. Other frame synchronizer sources were CVS and NEC. All of these manufacturers have been regular sources.

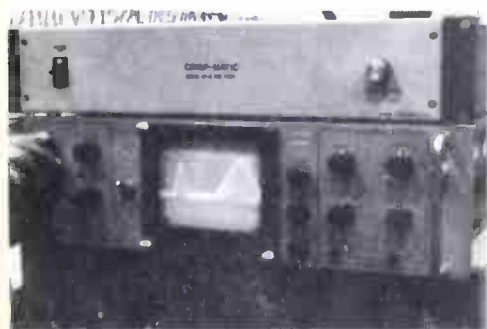
### Details on those video enhancers, chroma correctors

We made a point earlier that NAB '76 had a number of devices devoted to improving the video signal of U-matic VTRs particularly. What follows is a run down of some of these devices—for ENG and other applications.

Corning Glass Works showed a new line of image enhancers headed up by the 6100 ENG unit. The Series 6100 ENG unit is well-suited for use when minimal picture information content is



Corning image enhancer.



Crisp-Matic from Yves Faroudja.

available at sub-carrier frequency, a common circumstance at remote locations, Corning said. Unlike most available enhancers it does not adversely affect the picture noise. Key specifications for Corning's Series 6100 ENG image enhancers are: signal/noise -65 dB (rms noise referenced to 1-volt peak-to-peak); bandwidth, flat  $\pm 0.25$  dB to 6 MHz; tilt 0.5%; differential gain 0.5%; differential phase 0.5%; K factor (2T) 1%. The vertical detail range is adjustable 0 to 100%. A correction signal is automatically generated for sharp line-to-line black-to-white transitions. The Series 6100 ENG image enhancer is available for immediate delivery off-the-shelf and is priced at \$3800.

Other Corning enhancers included the Series 6200 RGB unit ideal for film chain cameras. It generates a contour signal from the green channel and adds it to all three channels. The unit can be used with any camera lacking a built-in enhancer. Again the S/N ratio is -65 dB. Price is \$3650.

Corning also showed a new Series 7000 unit for CCTV work priced at \$1750.

Another device aimed at crispening the picture and reducing the noise inherent in the picture was the Step I from TRI. It is specifically designed to interface with various "color-under" type helical VTR's to subjectively improve the image of the picture. No specifications were available but the price was right—\$1,495.00. The Model Step-I comes in a 19-in. rack mount configuration, 1 $\frac{3}{4}$ -in. high.

The unit that claimed to improve S/N ratio rather than worsen it was a Crisp-Matic shown by Yves C. Faroudja, Inc. It reduced noise and chroma/luminance crosstalk. Improvement was stated to be 3 dB for an input S/N of 40 dB or better.

Details were not available because of a pending patent but apparently the rise time of signals is improved. The Crisp-Matic does use a special horizontal enhancement process which depends upon the generation of new frequencies in the luminance path which are above 2 MHz and give the subjective impression of a full bandwidth. The residual subcarrier and other interfering modulation products are combed out of the composite signal and noise coring is used to improve the S/N ratio. Price of the unit is \$2,500.

There were other corrective devices at NAB such as the Matthey Chroma Corrector which compensates for luminance and chrominance amplitude and delay inequalities. This year Matthey came up with a new device (Television Equipment Associates booth) called the automatic video equalization device. The unit works

For information on Video Enhancers, Corning Glass 389; Faroudja 390; TRI 391; Matthey (TEA) 392.

from ITS or a VIR signal and correct the following: video gain—maintains peak white signal; tilt—reshapes the bar correcting lf distortion; sync level—maintains sync level; 2 gain—alter it to 714  $\mu$ s (no loss of fr detail); chroma gain—achieves correct color saturation; burst gain—maintain burst level; step up—adjusts video pedestal; delays—stabilizes 2 chroma and burst delay.

### New electronic still store approaches

At the Winter SMPTE Meeting Detroit CBS revealed its plans for electronic still storage (ESS) system designed to eventually replace the telecine. The ESS system described CBS (see BM/E, March) was t



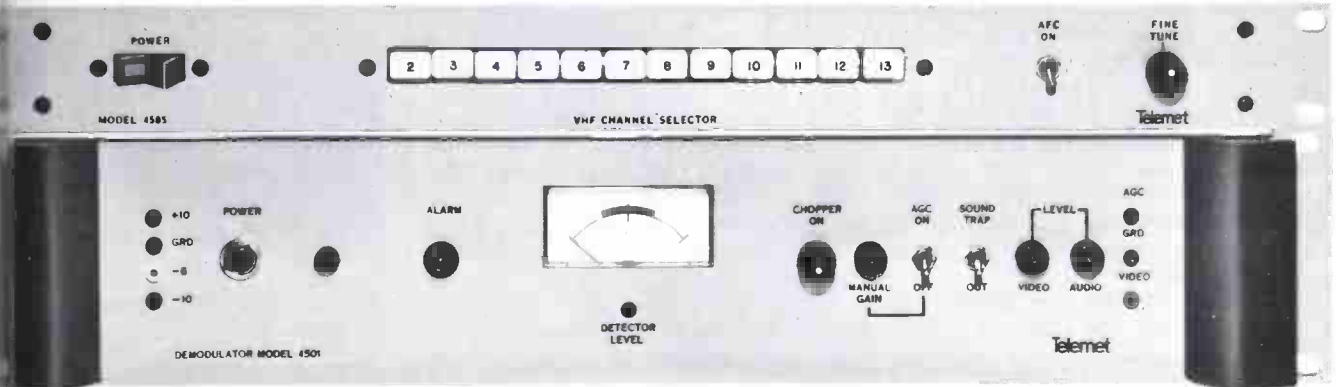
Arvin frame store device.

result of a joint effort between it Ampex. At NAB, Ampex engineer described the system further. But the exhibit floor, the Ampex-CBS approach was upstaged by a number of other companies who showed demonstrations of still other systems.

Chyron showed how it would approach electronic still storage in an "economical way" (the Ampex ESS unit a \$150,000 plus system). Using some of the same memory devices used in Dynamic Montage Unit (semiconductor memory, low-cost random access and disk storage), Chyron showed how still frame storage color was possible. Basically, frames are stored in the semiconductor memory. This memory is supplied with digital data from a megabyte disk memory which is capable of holding approximately 120 frames. In turn the main file is

continued on page

# 7 Different Demodulators for Broadcast and Cable



Now Telemet has the right demodulator for every broadcast and cable application.

- Tunable VHF • Fixed Channel VHF
- Fixed Channel UHF • Chopper
- Low Input Sensitivity

Broadcasters can now have all the quality and dependability of the Telemet 4501 Precision Demodulator in an all VHF channel version, Model 4501A1/4505A1. Whether it's your primary demod, a standby for multiple station operations or for their demodulation as an auxiliary pickup on network feeds, the Telemet Precision Demodulator remains the finest quality demodulator available today—at any price.

Telemet stations can also get the superior performance

characteristics and quality that VHF stations get through the use of Telemet's improved downconverter which minimizes RF interference. This unit is only available as a fixed channel demod, Model 4501A2.

Cable installations can now have a single tunable demodulator, Model 4502B1 for standby operation, that provides all the quality, performance and dependability that broadcasters have come to expect from any demodulator bearing the Telemet name. A fixed channel demodulator, Model 4500B1 is available for all VHF channels; Model 4500B2 is the industry's best fixed channel UHF demodulator.

Select the right demodulator for your application from the following chart.

## SPECIFICATIONS

Model No.	4501A1	4501A2	4501A3	4501A1/4505A1	4500B1	4500B2	4502B1
Frequency Range	VHF	UHF	VHF	VHF	VHF	UHF	VHF
Application	Broadcast	Broadcast	Broadcast	Broadcast	CATV	CATV	CATV
Channel	Fixed	Fixed	Fixed	Variable	Fixed	Fixed	Variable
Chopper	Yes	Yes	Yes	Yes	No	No	Yes
Video Frequency Response	±0.5 db	±0.5 db	±0.5 db	±0.5 db	±0.75 db	±0.75 db	±0.75 db
Differential Gain	±0.5 db	±0.5 db	±0.5 db	±0.5 db	±0.5 db	±0.5 db	±0.5 db
Differential Phase	±1°	±1°	±1°	±1°	±3°	±3°	±2°
Input Sensitivity (Min.)	5 mv	5 mv	1 mv	5 mv; 1 mv	0.3 mv	0.3 mv	0.3 mv
Price	\$3800	\$3975	\$3975	\$4775	\$1700	\$1750	\$2475

## NEW! SYNCHRONOUS DETECTOR \$1,050

The New Telemet Model 4504A1 Synchronous Detector, enables measurement of Transmitter Quadrature Distortion, when used with Model 4501 Precision Demodulator. Both the Synchronous Detector and Demodulator's envelope detector utilize the identical RF, IF and band-shaping networks. Comparison of the differential phase between the two detection circuits enables the broadcaster to determine the amount of incidental phase caused by quadrature distortion. For detailed information, write or call today.

A Geotel Company

# Telemet

For immediate product information, Call Ken Schwenk, Director of Marketing, Telemet, 185 Dixon Avenue, Amityville, NY 11701 (516) 842-2300. TW-510-227-9850

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## NAB SHOW-IN-PRINT

tained in magnetic tape cartridges each of 20 megabyte capacity and thus capable of holding approximately 45 frames.

By proper system organization the contents of the 50 megabyte active file (the disk memory) are readily updated on a daily basis using either manual or automatic means.

In the manual mode a keyboard suffices to direct all of the requisite activities:

- Conversion of the original artwork (slides or graphics) to the digitized form to store.
- Store and locate the active frames on the disc memory.
- Purge undesired frames from the disc memory.
- Control the "take" to air of a desired frame.

Arvin Systems showed that you could save still more dollars in still store if you used its new EFS-1 Broadcast Color Discassette Frame-Stor. Its \$12,500 system (analog) was one of the "smash hits" at the show and orders for over 60 were taken. ABC plans to use the unit in spring baseball coverage. In practice, the EFS-1 will probably not be used as a direct replacement for a slide projector but rather as a storage device to work in conjunction with a character generator. Once a frame of in-

formation is prepared it can be stored on the EFS for easy recall. The medium is a flexible magnetic disc record in a "cassette." Each record stores 400 stills (200 per side). The record is virtually crash proof, reusable, mailable, storable and interchangeable with any EFS-1 system anywhere.

The EFS-1 is compact, weighing only 38 lbs. Bandwidth is 4.2 MHz (at the 3 dB point) and S/N is 42 dB (on the innermost track). Step rates are freeze single step, and automatic rates of 1, 3, 6, 10 and 15 tracks per second. The head is warranted for 500 hours.

Yet another approach to still store was shown by RCA. It showed how lasers could be used for high density video recording. As many as 10,000 TV pictures on a single 12-in. disc are possible, said RCA.

At the convention, RCA used laboratory-built equipment under mini-computer control to show how the stored TV pictures can be randomly accessed and displayed in a fraction of a second. The demonstration recordings used only a 1-in. band on the disc. The developmental system can store one frame of TV information in only three-thousandths of a square inch (tracks for 30 TV pictures occupy space only as wide as a human hair).

While the demonstration covered only still pictures, RCA said the technology also was capable of recording motion, from film, video tape or

"live" sources. In making a recording, a medium power laser, modulated by an electro-optic modulator, is focused to a very fine spot on the disc spinning at 1,800 revolutions per minute. The disc has a special thin film coating which, when affected by the laser, provides a permanent recording of a single TV frame in one revolution of the disc.

Movement along the disc radius is accomplished by using a mechanical actuator, permitting rapid access to approximate location of the desired recorded track. Precise location is made possible by using an electronic system to deflect the laser beam. The system's mini-computer keeps track of the pictures in storage and controls preparation of picture sequences for broadcasting.

**For more information on Still Store, Chyron 393; Arvin Systems 394. Circle Reader Service No.**

## Studio cameras galore

In the studio camera class there were some new developments at NAB adding to the already ample supply. Harris came out with what it calls its first American built Triax camera, TC-80. Its remote range extends one mile. At McCormick Place, Harris strung some 3000-ft. of cable to get the roof and showed scenes of

## A Look At TV's Future

TV programming is like a pendulum—if a show is popular it is imitated until the audience tires of that type and then it swings back to something else. As the medium gets more competitive it will turn to program sources not used before. The creative sources in Hollywood are structured, those in London are not . . . . New York is in the middle. Television is now tapping the New York market where there are theater, book and emerging writers not found in Hollywood. [However,] this is a great risk because the writers do not know television. —Oscar Katz, CBS TV Network.

Audiences are becoming more sophisticated and want something different—not just the series programming . . . . Proof? The enormous success, and high ratings, for such shows as "Rich Man, Poor Man," the Olympics, "60 Minutes" and the recent PBS program "The Incredible Machine." —David Gerber, David Gerber Productions, Hollywood, Calif.

Television will be going more for the long form of programs and that the creative people are gravitating toward feature films because there is more time to make them and more money spent on production . . . . Unlike the medium's early days, television audiences want more realism. —Phil D'Antoni, producer/director of "French Connection."

Television stations, like radio, will become individualized in order to survive and it will not be in the too distant future that there will be all-news television stations . . . . Anchormen on news shows will not be as we now know them. Their primary function will be to question reporters—who will be specialists in their fields—and their knowledge will be derived from their many sources . . . . Anchormen will act as surrogates for the viewer. —Richard Wald, President, NBC News

The future already is here in bits and pieces . . . . The prime time access rule is stimulating new productions . . . . This Fall nine new series have been produced, and local stations are producing more programs at that level. —Marvin Shapiro, Group W Station Group, New York, N.Y.



The new Harris TC-80:



RCA TKP-45 on new Ford van.

## STRAIGHT TALK FROM YOUR DITCH WITCH MAN



# "Let's talk about the reasons the Modularmatic concept can save you a lot of money!"

"A Ditch Witch Modularmatic can do more different underground jobs than any other machine!

One vehicle using interchangeable work modules — that's what our Modularmatic concept is all about. An example of what this can mean to you: Let's say you have a big trenching job now — buy the right Modularmatic vehicle with a trenching module. When that job is finished, a vibratory plow contract comes up. Your major investment — the Modularmatic vehicle — is already bought and paid for. All you need is a vibratory plow module and you're ready to go. Modularmatics get the job done, give you greater job flexibility and help spread equipment costs.

We'd like the chance to tell you more. We'd like to give you a free demonstration to show you what a Modularmatic can do. Remember, at Ditch Witch, we tell it to you straight!"

**Call (800) 654-6481 Toll Free**  
for the name of the dealer nearest you.



This Ditch Witch Modularmatic is equipped with the Combo module for both trenching and vibratory plowing; a backhoe module is mounted on the front

*Ditch Witch... equipment from 7- to 195-HP.*

**CHARLES MACHINE WORKS, INC.**

P.O. Box 66  
Perry, Oklahoma 73077



Circle 144 on Reader Service Card



7000 camera.



LDK-11 and LDK-5.

brago skyline, Meigs Field, etc. All and operational controls were located at the CCU. Camera is heavily automatic—digital black and white balance, H and V centering, a three and automatic iris, etc. The sealed optical system included integral light for minimum lag at low light levels. A unitized optical bed-plate assembly is used; ACT Plumbicons can be used.

The convention served to introduce A's newest studio TV camera, the TK-46, an updated and improved version of its widely-used predecessors of which more than 1,000 are in regular service in this country and abroad. The TK-46 is described as a deluxe camera and incorporates new preamps for improved S/N performance, yield pictures that are sharp and low in noise. A new tiltable viewfinder rests into the camera profile for stowage and improved transport.

Complex had one of the most elaborate camera displays ever and an entirely new line since a year ago. Headlining the list was the BCC-1, a high quality studio camera followed by the BCC-2, a portable field studio camera, the BCC-3, a lower cost studio camera. The hand portable ENG line rounds out the line and it is headed by the BCC-4.

CEI introduced a 52-lb. 287 studio camera to complement its model 280 studio camera and 290 portable projection camera. It features a 7-in. tilt viewfinder, a low lab optical system and a 50 dB S/N ratio. CEI's camera on a price-performance basis the camera couldn't be matched.

CEI also introduced a small medical camera offering broad quality. Displaying this unit was popular for CEI since the Chicago

continued on page 66

## NAB SHOW-IN-PRINT

show tended to draw visitors from disciplines outside of the broadcast area.

Among the other traditional camera manufacturers showing "standard" cameras were Philips, Bosch Fernseh, Marconi and IVC. Thomson-CSF which made its debut last year was back this time stressing the ENG Microcam as well as the TTV-1515 Triax and TTV-1515P portable. As last year, Ikegami stressed a high quality studio camera, the HK-312, a unit which features a push button micro-processor for fast set up. Hitachi and Panasonic showed quality lower-priced cameras. Top of Panasonic's line was the AK-900, a three Plumbicon camera for less than \$30,000.

In the tubes-for-cameras category, English Electric Valve announced a one-inch Leddicon replacement for the X1070 Plumbicon. Tubes feature short lag, high sensitivity and low dark current. RCA Electro Optics also showed substituted tubes. Three series of one-inch Vistacons were shown including an extended red series.

### Camera Lenses

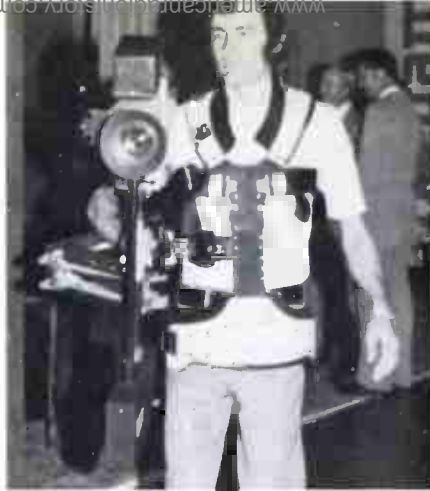
As might be expected, lenses continue to proliferate to keep pace with camera developments. Canon introduced the PV 18X12B2 as a new ultimate lens for  $\frac{3}{8}$ -in. Plumbicons and the P18X16B2 for 1-in. tubes.

This series is a 16-288 mm zoom. With its f2.1 maximum relative aperture, 18x zoom and 0.7 meter minimum object distance, Canon says it offers the best relative aperture in its range plus superior wide angle and short MOD.

Canon showed a wide number of lenses but the PV25X16B-D2 stood out as one of the largest low-cost lenses designed for  $\frac{3}{8}$ -in. tubes.

TeleCine also showed a huge array, to numerous attention. Among them were a 30X Schneider field lens with a focal length of 34-1020 mm rated at f2.1/f5.3 (weight 35-lbs.). Another was a new wide angle close work 15x lens with a focal length of 12.5 to 190 mm. It's a f1.6 lens with a close working distance of 15 inches.

Fujinon also had a large array of lenses including a high power zoom for  $\frac{3}{8}$ -in. ENG cameras. The A22X12.5RW has a zoom of 22x, a focal length of 12.5 mm to 275 mm and a f 1.6 rating. Angenieux took the prize for the largest zoom with its new 42X16E11/f 2 studio lens. It also showed a new 15x12.5 f 2.5 2-lb. lightweight 24-in. close focussing lens for ENG. Comquip showed fixed lens adaptors. Dynasciences showed a lens stabilizer system.



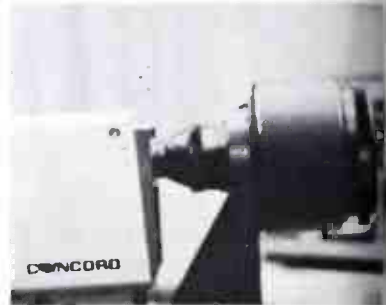
The CP/TK-76 Camera Stabilizer.



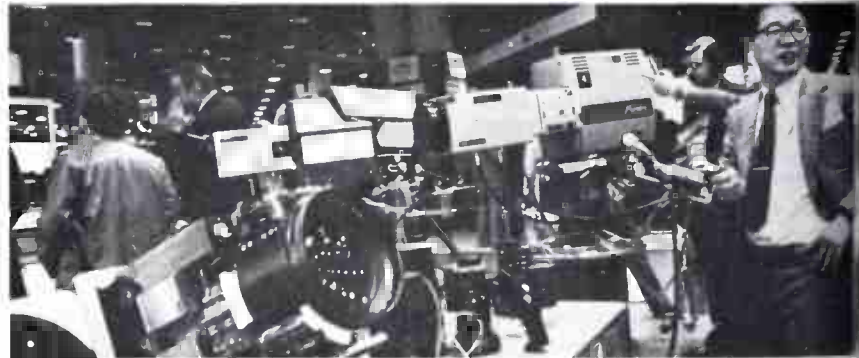
Quick Set TV stands.



Listec (Vinten) crane.



Dynasciences lens stabilizer.



Fujinon lenses.

### Camera Accessories—Something New

Normally, this topic is not terribly exciting. True the Listec (Vinten) low angle dollies and cranes are attention getters but you don't marvel over them. This year there was a show stopper—the Cinema Products ENG camera stabilizer. Designed to work

For more information on Studio Cameras, Harris TC-80 395; RCA TK-46 396; Ampex BCC1 397; Ampex BCC2 398; Ampex BCC3 399; CEI 287 250; Leddicon tube 251; Vistacon.Tube 252.

For more information on Lenses, Canon P18 series 253; Schneider 30X 254; Schneider 15X 255; Fujinon ENG 256; Angenieux 42 X 257.

For more information on the Cinema Products, TK-76 Brown Stabilizer 258; Dynasciences lens stabilizer 259.

with the RCA TK-76 camera, system permits a cameraman to weave or jog and still come up with a stable picture. The full designation of the unit is the CP/TK-76 Stabil Video Camera System incorporating the Brown Stabilizer.

The system consists of a body and support arm connected to a camera through a free-floating gimbal. It includes a high-intensity 3-in. monitor so that the picture can be seen with an eye glued to an eyepiece. The system complete with the TK-76 camera is priced at about \$45,000 and is available from Cinema Products.

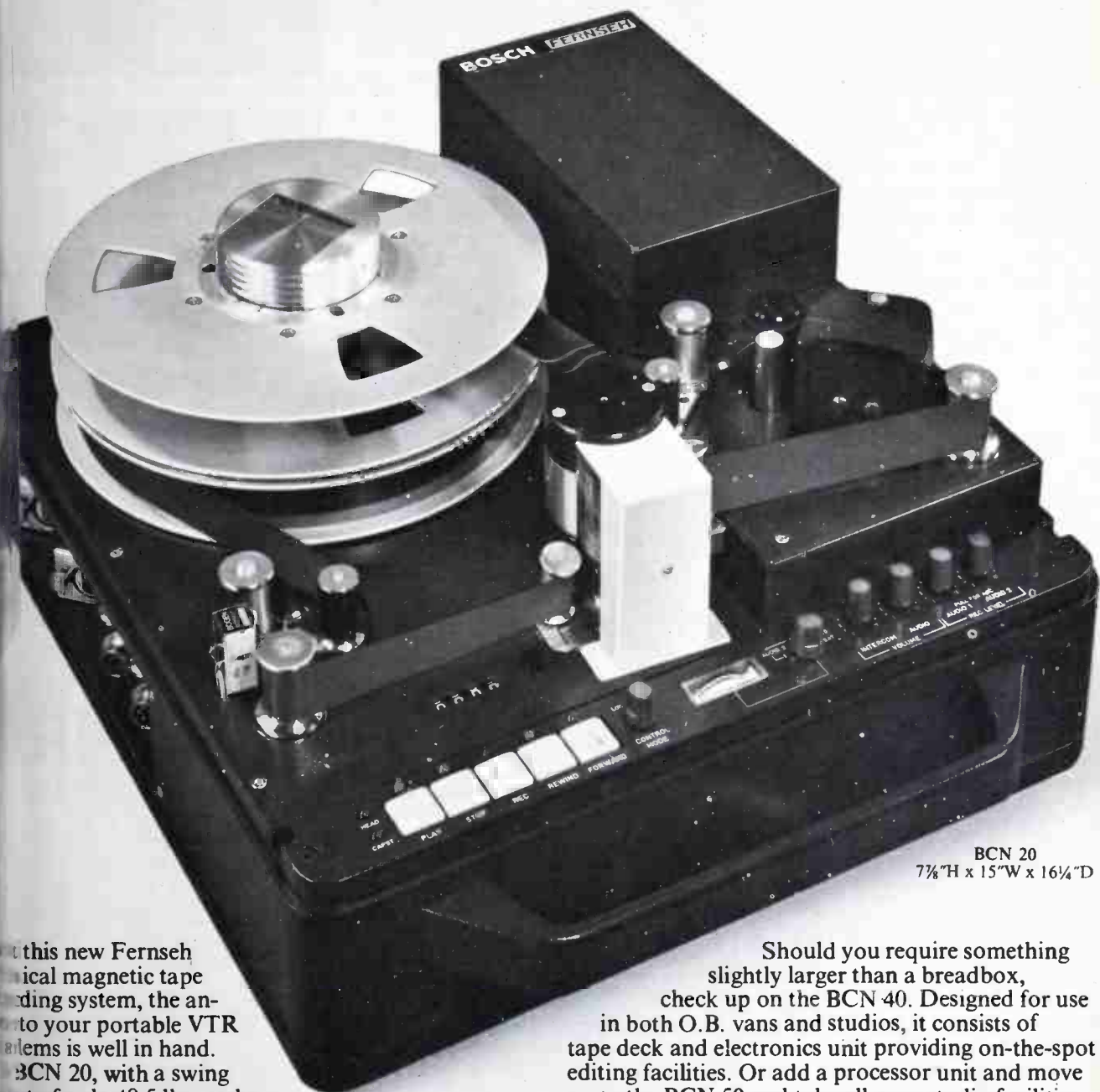
In the traditional pedestal, dolly stands area, were Listec, as mentioned, showing a complete Quick-Set, Innovative Television Equipment and a new exhibit, O'Connor Engineering.

Quick-Set was featuring the newly acquired Houston Fearless products as well as ENG stands. ITE had a

continued on page



# Full broadcast quality color VTR no bigger than a breadbox.



BCN 20  
7 $\frac{7}{8}$ "H x 15"W x 16 $\frac{1}{4}$ "D

This new Fernseh mechanical magnetic tape recording system, the answer to your portable VTR systems is well in hand. BCN 20, with a swing weight of only 48.5 lbs. and a recording time of 52 minutes, offers full broadcast quality color VTR in a completely portable, battery-powered package. Equipped with an automatic assembly system, the BCN 20 allows immediate production of "on-air" tape from recorded takes. Used in conjunction with the portable KCN reporter camera, the BCN 20 can open up new perspectives in field production, while lowering your operating costs.

Circle 145 on Reader Service Card

Should you require something slightly larger than a breadbox, check up on the BCN 40. Designed for use in both O.B. vans and studios, it consists of tape deck and electronics unit providing on-the-spot editing facilities. Or add a processor unit and move up to the BCN 50 and take all your studio facilities into the field.

Fernseh BCN systems. Setting new standards of recording efficiency in studio and field production equipment.

For detailed information concerning the new Fernseh BCN, VTR system contact Fernseh, Robert Bosch Corporation, at one of the offices listed below. Saddle Brook N.J., Headquarters (201) 797-7400/ Chicago (312) 865-5200/ Houston (713) 688-9171/ Los Angeles (213) 649-4330.

**FERNSEH** means television.

BCN 50



## NAB SHOW-IN-PRINT

hydro head for ENG cameras and Listec had new models for ENG applications. O'Connor showed a line of fluid camera heads and hydro pedestals. Power Optics showed remote control camera pedestals.

In the connector area, Boston Insulated Wire stressed field repairable connectors. Mohawk and Kings Electronics showed connectors, the latter specializing in Triaxial types.

### Telecines

The big news in telecines this year was the fact that Harris introduced a new telecine unit, the TF-100, featuring true-film gamma corrector and flexibility. A number of marketing shifts have taken place: the Cohu 1550 telecine is now marketed by Thomson-CSF. TeleMation is no longer selling the TCF-3000 to broadcasters—its requests in that area have been turned over to Harris. Cohu continues to market directly the lower cost telecine the CAT (Cohu Automated Telecine) and TeleMation offers the TCF-3000 but only to closed circuit or instructional TV customers.

In the category of automated telecines, Marconi stressed the features of

the B3404. This basic unit has been shown before, but never with such a degree of automatic operation. RCA showed the automated TCP-1624 film cart.

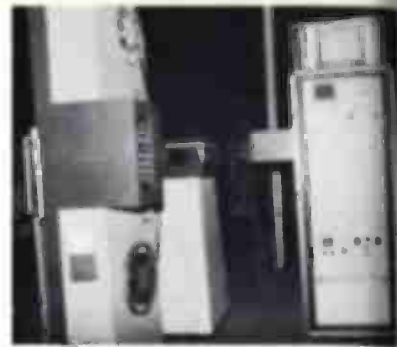
Showing a super quiet telecine was Rank Precision Industries. Also on the floor was a TKC-950 film chain from Ikegami, a flying spot telecine from Thomson-CSF, the TTV 2520. Philips showed the LDH-16 integrated color telecine. L-W Athena showed the 4000TSM film chain including an image rotating device.

### Film and videotape

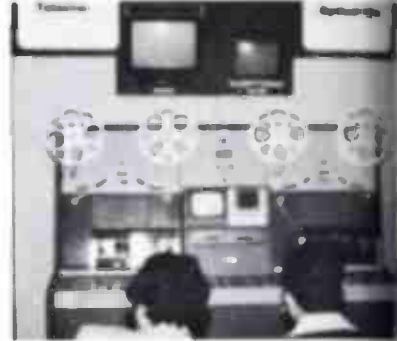
Eastman Kodak built its exhibit around film—the basic medium—and stressed film for quality news. Ektachrome Video News Film 7240 (Tungsten) was introduced which allows shooting as low as five foot candles—with extended processing. As usual E-K's literature rack was filled with excellent educational material.

For more information Telecines, Harris TF100 260; Marconi B3404 261; Rank Precision 262; Ikegami 263; Thomson-CSF 264; Philips 265.

For more information Videotape, 3-M 8250 266; Ampex 195 267; Tentel gauge 268.



The new Harris TF-100 telecine.



The Marconi automatic telecine.

It was videotape's 20th anniversary and several new products were announced to celebrate the occasion. 3M unveiled Scotch High Audio 82. This new tape regains the high signal to noise loss that results from

continued on page

# R-MOD AUTOMATES YOUR OLD VTR

**LAST YEAR** we said R-MOD is for all quads except AVR-1.

**THIS YEAR** they even R-MOD'D AVR-1 into AVR-3.

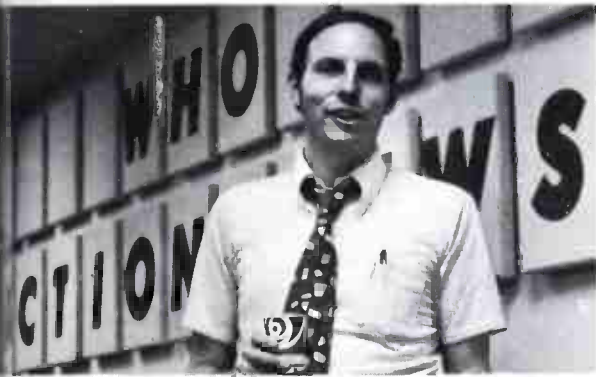
**NOW** we can safely say R-MOD is good for all quads.

R-MOD upgrades the transport portion of your old VTR giving it many more years' of operation at the same performance level as new VTRs. It's not a new VTR but it is the best investment for your VTR. Every R-MOD owner is a good reference. Call us toll free for details, (800) 538-1586.

**RECORTEC, INC.** 777 PALOMAR AVE., SUNNYVALE, CA 94086 TEL: (408) 735-8821 TELEX: 910 339 93

# WHO-TV Eyewitness News is all over town, doubling news on film.

"There isn't a single piece of newsfilm equipment in this studio that hasn't paid for itself, one way or another," claims Lisle Shires, proudly. And that's only one aspect of their film production facility that has doubled the amount of film coverage for half-hour shows in one year.



Lisle Shires, Newsfilm director of WHO-TV in Des Moines, Iowa.

Jack Cafferty, WHO's Television News director, recalls: "WHO-TV used to average about six film reports per show. Then, management made some drastic changes in news programming.

"We jumped from six to twelve film stories per news show, as a result, and we now have a dozen reporter-photographers.

"WHO-TV has always had a high percentage of film footage winding up on the air. Now we're shooting two to two-and-a-half times as

much as before. Lisle's Lisle with Robert Kress in the smooth-functioning, surgically clean environs of WHO's deluxe processing lab.



much film and one-third of it is still being broadcast.

"Our field reporters have some of the finest film equipment available today. And although some of our film is still shot with silent cameras, we have a continuing program to upgrade our sound equipment.

"Presently, we're shooting all prestriped Kodak Ektachrome EF film 7242 (tungsten). You never can tell when we may want to add voice-over later or use silent footage as a B roll with sound effects. We're in the process of converting to the new Eastman Ektachrome video news film 7240 (tungsten) and while 7242 looks good on the air, we're looking forward to the finer grain and low-light capability of 7240."



One of the most popular film features is "Cafferty is —," in which Jack takes on different jobs. Like driving a semi or in this case, working in a hospital where he first gives — and then gets — a cardiogram.

Cafferty anticipates continued heavy use of film. "With film, I can send a man out with a 16-pound camera and he'll come back with pictures that are simple to edit — and to store, too.

"One more thing — our news is getting a lot of attention. We've been getting very good response from our viewers. And that's what it's all about, isn't it?"

Film is good  
news. 

## NAB SHOW-IN-PRINT

splitting the audio track into stereo. Ampex introduced series 195 premium grade video tape. Tape is said to surpass industry specs for drop out (particularly high frequency), chroma noise, S/N, and picture performance. Each roll is 100% tested, said Ampex.

Fuji Film stressed the superior performance of Beridox video cassette tape as well as H701 quad tape. Its line now includes audio tape. More lines will be coming, spokesmen said. Memorex, as last year, stressed Chroma 90 (Is it live or is it Memorex?) The Video Tape Co. stressed VTC 1000 as mastering tape costing only \$160. Studio Tape Exchange Inc. was at NAB buying old tape as well as selling reprocessed tape—\$45 for a half hour.

Incidentally, a very interesting device at NAB was the Tentel Tentelometer for measuring tape tension in a U-matic. (If you set tension properly, interchangeability is assured.)

### Lighting—for all occasions

Lighting control was the dominant theme of exhibitors in the category of lighting—a category that included a company making NAB for the first time, Electronics Diversified Inc. This company showed a range of studio lighting control equipment. Kliegl hammed it up a bit by presenting a "Perils of Pauline" drama (involving a model railroad). Idea was to demonstrate how complex situations could be



Lighting control at Berkey-Colortran.



Electronics Diversified's lighting system.



Characteristics of 3M 8250 demonstrated.



The Tentelometer tape tension gauge.



Video Tape Co. stressed VTC-1000.

controlled by Q Level 2000, "an advanced lighting memory control system." The Q Level system controlled the model train.

Berkey Colortran emphasized memory assisted lighting but also showed a multi-purpose Mark III grid system—and custom dimming systems. Skirpan stressed how its lighting control systems have been key to the success of professional theatres and studios. Strand Century showed a modular memory system.

Lighting fixtures, kits, etc., were the products most stressed by Mole Richardson. Rosco Labs showed filters for shooting under fluorescents and a 200-watt portable daylight source. Sylvania exhibited lamps, as usual.

### Picture monitors

Four new broadcast monitors were introduced at NAB by Conrac, the 6000, 5700, 5300 and DZB.

The Model 6000 is a completely new precision and compact (19-in.) color television monitor designed for NTSC, PAL, or SECAM operation. The 6000 has been designed for the utmost stability and incorporates a new Conrac development, beam current feedback (BCF), which automatically stabilizes CRT color temperature reference. Color temperature stability in television monitors has been limited by the stability of the cathode-ray tube itself. This system samples the beam

For more information on Electronics Diversified Lighting 269.

For more information on Picture Monitors, Conrac series 270; World Video 271; Rohde and Schwarz (Barco) 272.

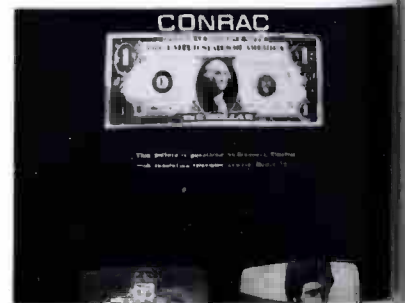
current from each CRT gun and corrects for any deviation from a set reference. Circuit modules are accessible from the front without removing the monitor from the rack. The 6000 takes up only 15¾-in. of vertical rack space.

The Model 5700 is a compact high resolution, shadow-mask, 13V color monitor for VTR over-console 10 in. tape bridge mounting. Model 53 is a 19V professional broadcast monitor specifically designed for budget limited applications in broadcast and teleproduction. The Model DZB

continued on page

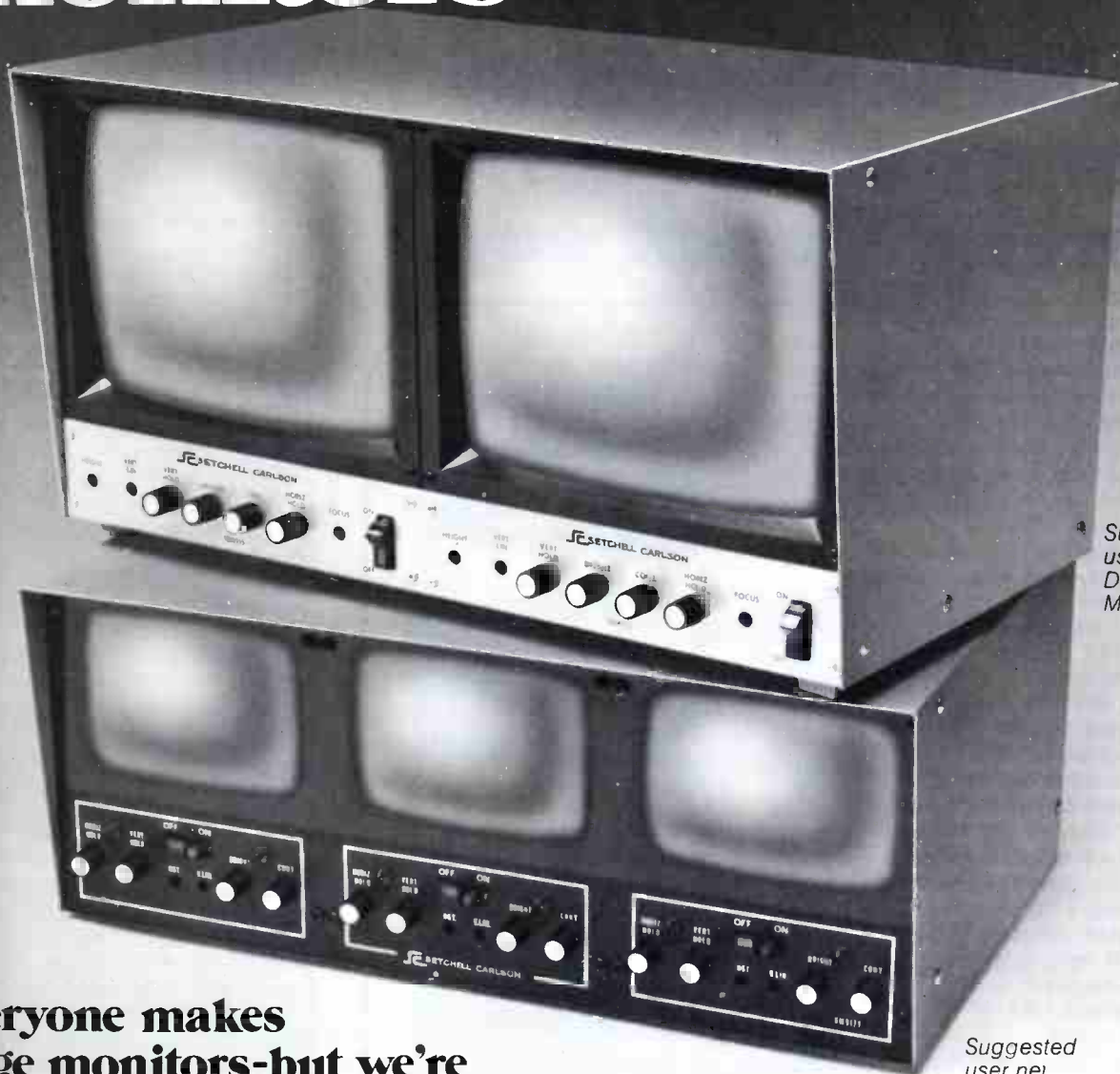


World Video's CDR 990 twins.



Conrac demo'd high resolution monitor.

# Your best buy in small screen monitors



*Suggested  
user net  
Dual Ten  
Monitor \$485*

*Suggested  
user net  
Triple Six  
Monitor \$690*

Everyone makes  
large monitors-but we're  
the leader in small screen units.

Setchell Carlson gives you a definite advantage in small screen video monitors with 9 different models to choose from, in 5", 6" and 10" screens. No one else offers such a wide selection.

Singles, duals and triples combine compact size with Setchell Carlson's well-known features. Like UNIT-IZED® 100% solid state circuitry, up front controls, regulated power supply, front panel screwdriver adjustments for vertical linearity, height and focus.

Feel more secure with Setchell Carlson.  
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Circle 148 on Reader Service Card

## NAB SHOW-IN-PRINT

a newly styled 15V professional monochrome broadcast monitor for VTR 12½-in. tape bridge mounting. Deliveries for these new monitors are scheduled for the last quarter of 1976.

Compact CDR 9000 color rack monitors were a feature attraction at World Video. The 9000 will directly replace console-mounted monochrome monitors using 8¾ inches of vertical rack space.

Electrohome stressed a full line of

monitors as did Ball Brothers. The latter showed a 23-in. unit for data display. Tektronix was of course another exhibitor of monitors. The famous Belgium Barco line of monitors was featured this year in the Rohde and Schwarz exhibit area. R & S is now the U.S. distributor. We saw a new monitor in the Sony exhibit area but no detailed information on it was available.

### Microwave gets a big play at NAB

Microwave Associates was not



Terra Com's compact portable ENG transmitter.

# We've packaged our compact Criterion three different ways.

**Criterion I** ... only 8-1/2" wide. Direct capstan drive comparable to the finest reel-to-reel machines. Speed accuracy of 0.2%. 1, 2 or 3 cue signals available for automatic equipment. Handles A & B cartridges. Mount two units side by side in a standard 19" rack.

**Criterion II** ... offers both record and playback in a single unit. Handles A, B and C cartridges. Fits in 7 inches of standard rack space.

**Criterion III** ... combines three playback decks in a single compact unit. One, two, or three decks may be operated at the same time, each feeding a different program input. Handles A & B cartridges. Mount twin playback units side by side in 12-1/4" rack space.

For more information, write Harris Corporation, Broadcast Products Division, Quincy, Illinois 62301.



**HARRIS**  
COMMUNICATIONS AND  
INFORMATION HANDLING

**Harris...originators of the tape cartridge machine.**

alone. Competing on a number of fronts with them were Farinon, TerraCom and a newcomer, Tepco.

Farinon stressed the FV P system which it called "Frequency Adaptive" (finger tip tuning) heterodyne system imaginatively designed for the high quality transmission." The all solid state system is available in the 2 and 13 GHz bands. Convenience and reliability in using the system in temporary situations was stressed. It could be optimized for ENG through special low-pass filtering, aural carrier, video equalization and rowband filtering.

TerraCom made its first appearance at NAB showing their ENG portable microwave systems, featuring a TCM-5 Series transmitter and receiver. Available in the 2, 7, and 13 GHz bands, the TCM-5 is designed for portable or remote pickup. The unit weighs only 23 lbs. and is 3½-in. high, 15¼-in. W × 12½-in. deep. It operates on either 24 volt battery power or 120 VAC.

The TCM-5 Series is patterned after the widely used TCM-6 Series and incorporates the same test and alignment features. The unit features total flexibility in mounting and operation, and can be used with a wide choice of antennas.

With all solid-state, modular constructed and removable printed circuit boards, the TCM-5 offers an optional program subcarrier and the picture quality essential to good news gathering. Completely compatible with the TCM-6 Series the TCM-5 offers a small, light weight package for use in an over-stuffed vehicle or helicopter.

TerraCom also offers a TCM-5 manpack operation. (The TCM-5 is available in tripod or rack-mounted unit.)

Although Tepco may be not as well known to many broadcasters it has been around 15 years. It showed at NAB with an all solid-state receiver REM-4A, and a solid-state-excitation-for-the-klystron transmitter, TEM-4A (1 watt through 13 GHz). The company claims high

ance, high reliability and low  
For Television Auxiliary Broad-  
Stations, the TEM-7 and TEM-13  
els were shown. The company  
has a 1 watt VHF TV translator.  
Microwave Associates stressed its  
ular ENG line but had a number of  
products—a new all channel re-  
r the MA-2GE (the unit covers all  
2GHz auxiliary broadcast chan-  
and offers remote control selec-  
a PA-1202 Power Amplifier to  
the output of the AM-12G trans-  
fer to 2 watts, a universal power

pack for the 13 CP, a video clamber  
and other products.

In the ENG antenna area, Nurad  
showed a dual-band quad polarized an-  
tenna and a low-windload 2 GHz  
Goldenrod antenna for vehicles.

The new dual quad polarized an-  
tenna is capable of both simultaneous  
and independent operation in the 2  
GHz and 7 GHz bands. The antenna  
is the key element in the unique 20/70  
QP1 Receive Antenna System. The  
system embodies four of the dual-band  
antennas. Each antenna covers its own



MCI shows how transmitter polarization  
overcomes obstacle.



on FV-P series for ENG.



's golden rod transmitting antenna.



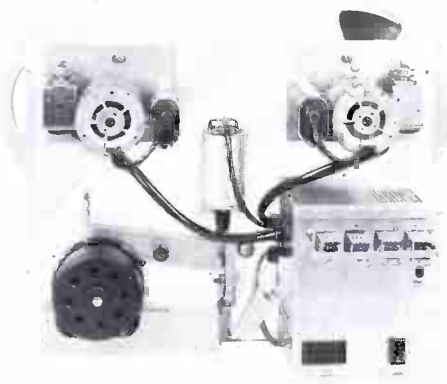
transmit and receive antenna tower.

## Built for Professionals



### ITC's 750 Series Reproducer

1/2 Track Stereo \$1150



Check with any leading automation  
company for more information  
or call ITC collect (309-828-1381).



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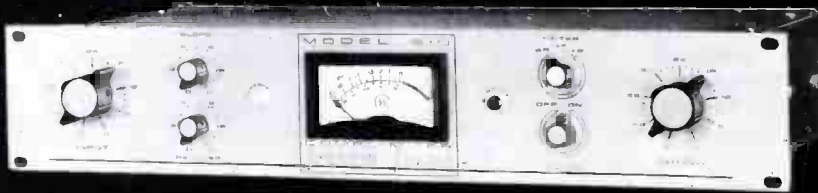
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# COMPLIMITER™



MODEL 610

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## NAB SHOW-IN-PRINT

directional quadrant and is fully independent of the other three. Further, each antenna is quad-polarized, that it can be operated in clockwise-circular, counterclockwise-circular, horizontal-linear, or vertical-linear polarization modes. In addition to dual beam operation two or more simultaneous originated pickups, the system offers the ability to obtain the best available signal by selection of the optimum polarization mode while rejecting other modes, thereby eliminating undesirable multipath effects as ghosting or smearing.

Micro Communications stressed the series 94300 van-mount transmitting system that uses a polarization corrector to handle situations that occur in "real-life." Continuous control of the corrector allows for an infinite set of polarizations opposed to the traditional four modes (H, V, LC, RC). In a working demonstration at the show, MCI showed how its system could quickly compensate for obstructions added between the transmitter and receiver.

A microwave antenna for the 1 to 13.25 band was shown by Anixter-Mark. Andrew showed several microwave antennas.

## Miscellaneous video devices

As we scan over what we've reported so far and look over what notes have left, we find we haven't put in perspective several observations. Routing switchers for example. Last year we had a lot on the contribution of American Data, Comtech, Dyr TeleMation and Datatek. These companies again stressed routing switchers but the products were the same as those shown last year.

Lenco had an overwhelming amount of video accessories on hand as part of its 300 series universal system—generators, test signal generators, pulse and video distribution units, processors, encoders, switchers, multiplexers, etc. This line is growing, if you aren't up to date, check them out.

Television Equipment Association had a couple of unclassified goodies—an ENG portable test signal generator (puts out an NTC-7 composite signal) and a video cassette cleaner and evaluator.

Power Optics showed (in addition to the remote camera control system which it is well known), an electronic color analyzer. This unit (made in Japan) is available for sale.

continued on page 74

For more Microwave information:  
Farinon 320; Terracom 321; MCI 322; Nurad 323; MCI 324.



# 5 Good Reasons to See the Datavision D-3000 Video Character Generator Before Making a Purchasing Decision.

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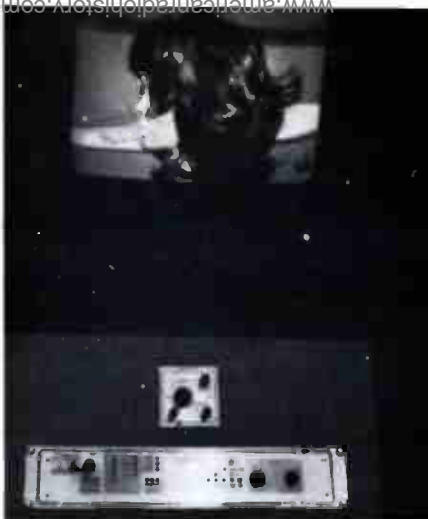
## NAB SHOW-IN-PRINT

Grafikon) is designed for fast, accurate and objective color balancing of TV monitors.

We could have mentioned them under production aids but we didn't—we're referring to the new RGB linear chroma keyer from Dynair and the Downstream Chroma Keyer from Dynasciences (also new).

The Dynair SE-361A unit (formerly made by Chromatech) offers proportional soft keying in a standalone unit. It combines two sources of signals into one composite picture without ragged or tearing edge effects. The unit will key from red, green or blue foreground scenes.

The Dynasciences 7200 chroma keyer is capable of keying on any color in the NTSC spectrum. A comb filter is provided for minimum noise and chroma crawl. The output is delayed exactly 280 nanoseconds relative to the inputs. Since this is exactly one cycle of 3.58 MHz subcarrier, the output signal appears as if it had zero color phase shift.



Dynair soft key chroma keyer.

Richmond Hill offered a chroma keyer to be used with an SEG having an external key input. Unit features a 360° potentiometer to get the desired keying color.

Video Aids of Colorado got a big play on its general purpose video line isolator—apparently there are a lot of stray current problems in the field. These units using an electro-optic isolator provide 80 dB power line isolation. Prices are \$250 each. Another popular item was the burst phase meter (introduced last year) which is a \$437 substitute for a Vectorscope.

A radically different transparency illuminator which eliminates cleaning problems was shown by Telecommunications Industries. The unit provides even illumination over the entire area of an 8 x 10 in. transparency. It's

**For more information on Video Accessories** Lenco 274; Dynair keyer 275; Dynasciences keyer 276; Video Aids Of Colo. line isolator 277; Telecommunications illuminator 278.



Lenco video modules.

R



Matthey automatic video equalizer.

a 20-in. diameter sphere the inside which is painted with E-K white reflective coating 6080.

In the VTR related area were unusual units: Microtime showed D itrol 2, a device for controlling eight hours of programming stored videocassettes. Oregon Magnetics showed a multi-purpose servo to upgrade line-locked VTRs to true vertical lock—for correct speed, vertical interval editing etc.

### TV transmitters—plentiful, too

There were fewer TV transmitters on the floor than in previous years, but there were still more than plenty of broadcasters looking to upgrade their plants.

Harris and RCA, of course, long-standard suppliers of TV transmitters, included their TV lines in the elaborate show stands.

Harris was emphasizing the low level IF modulation of visual and audio carriers, as the source of very high  
continued on page



The Studio Compact Shown With Optional Accessory Shelf

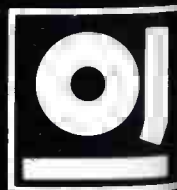
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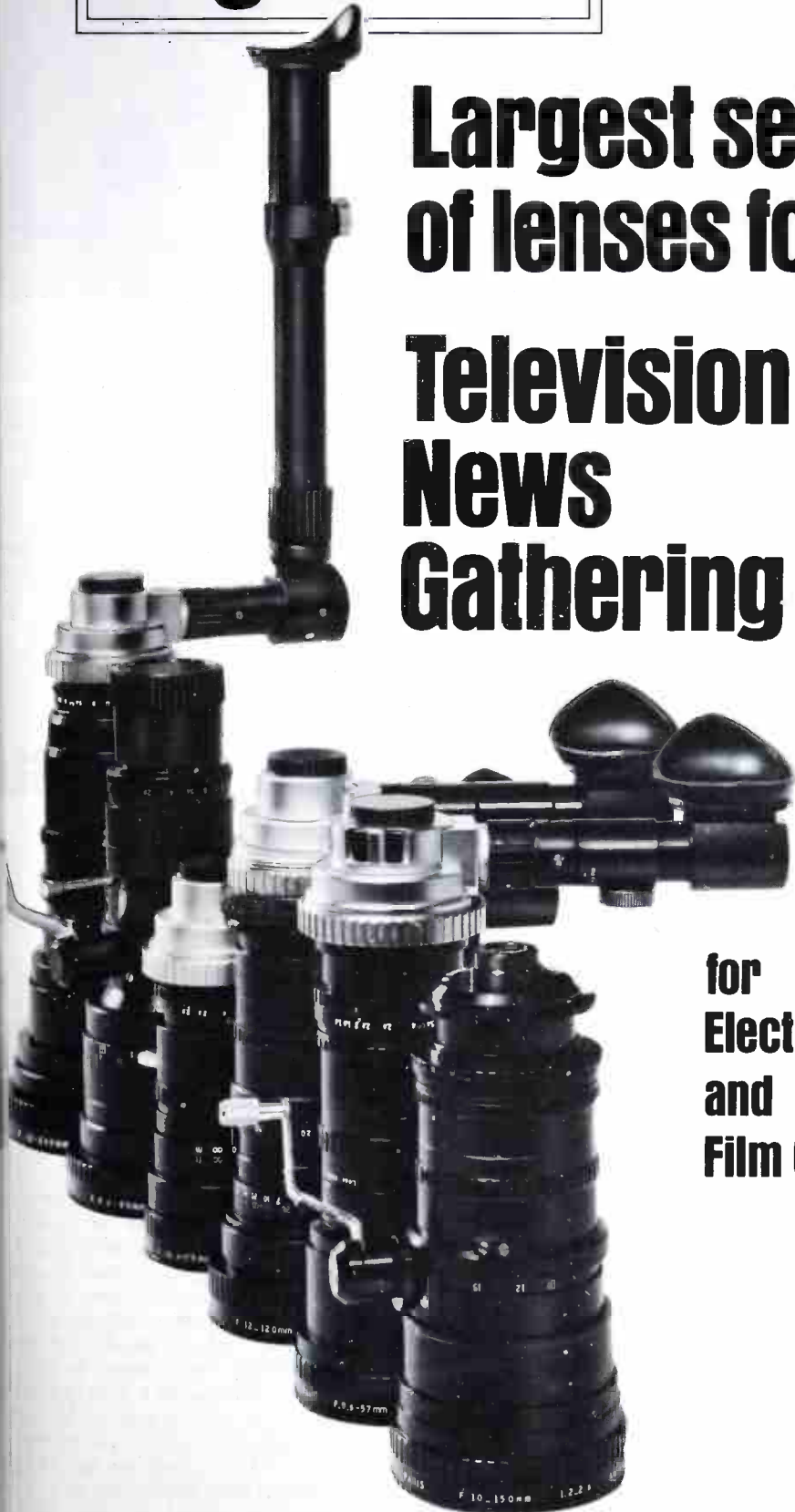
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## NAB SHOW-IN-PRINT

efficiency.

CCA, as part of its "comeback", announced a whole line of TV transmitters, 1 to 12.5 kW on VHF, 15 to 100 kW on UHF.

Another name of the past reappeared—Townsend Associates. Its current product was an exciter for UHF, the TN-2EU. It had literature on hand describing a new series of VHF (1200 W to 35 kW) transmitters and UHF klystron amplifiers (30 kW and 55 kW units).

Acrodyne showed their line of TV translators, powers from 1 W to 1 kW, with a new model, the totally solid state T-210V for 10 Watts output on VHF.

EMCEE showed new S-band TV transmitters for ITFS and MDS, a new 5 watt backpack transmitter for VHF, along with their established line of low-power TV transmitters for all bands.

### TV Antennas—CP in many models

As described in the March issue, several firms have developed circularly-polarized (CP) antennas for

TV, anticipating a change in the FCC rules that will make such antennas legal. Harris, Jampro, and RCA have been the pioneers, and all three were showing their CP designs at the show. Jampro president Peter Onnigian, in a talk at the convention, summarized the findings of a two-year test program of the Jampro antenna at station KLOC (Channel 19), Modesto, CA. All the expected benefits were found in comprehensive on-air tests, including a reduction of ghosting and improvement of the S/N with practically every kind of indoor receiving antenna. The complete Jampro report has gone to the FCC to encourage and guide the rule-making on CP antennas, understood to be nearly ready for issue.

Another firm, CCA, joined the CP antenna movement with an interesting design (developed by Bogner): a horizontally-polarized TV antenna which, with the bolting on of an additional member, becomes a CP antenna.

Two other firms emphasized their involvement with CP antenna designs—Micro Communications Inc. and Alford Mfg. Co. MCI, in fact, has had its designs in use for several years by stations outside the U.S. Alford showed a model of a twin-Z design



Harris' BT-25L1 VHF transmitter.

that was promoted as suitable either FM or TV CP use.

All of the developers of CP TV antennas also showed lines of horizontally-polarized types for intermediate applications.

**For more information on Transmitters, Antennas,** Emcee 5-watt backpack unit **279**; Emcee S-band **280**; CCA TV transmitter line **281**; Acrodyne, 10-2 translator **282**; CCA CP antenna **283**; Townsend **284**; MCI CP ant. **285**; Alford CP ant. **286**.

# The NAB's Radio Show: It Was Go From The Start

From transmitters to cart players to turntables, through tape recorders and audio consoles, and especially in automation and audio processing, the spirit of *radio* at the 54th Convention was strongly upbeat, with plenty of new products, high broadcaster interest.

What kind of *radio* show did the NAB put on during its four-day stand at McCormick Place in Chicago?

On the two most important counts, the radio show was the best in recent years. The radio broadcaster had more relevant, useful information directed toward him, from people who really knew the score, than he could possibly handle in four days. And the exhibitor of radio hardware had a wonderful four days on the exhibit floor, with enough sales and promises of sales to more than wipe out any distress from last year's show at Las Vegas, or distress from his battle with the unions at McCormick Place, a very common complaint on the floor.

Radio did not set this high selling pace by competing with television in glamour and excitement. Television had the pretty girls under bright lights, the far-out new devices, the big new trends like ENG (see the preceding report on the TV show). Radio hardware sold well because radio broadcasting had had a good year and station owners were ready to replace, up-

grade, expand, hoping to make next year even better. There were plenty of new, better products to make this upgrading, replacing, process seem attractive and cost effective. Also contributing to the show's success, as our "Panel of 100" survey discovered, was a general feeling that Chicago is more accessible than Las Vegas. A much higher proportion of radio managers and engineers made the trip than did the year before.

So maybe it takes a combination of good business, an accessible location, and care on the part of the NAB that radio gets a fair shake, to make radio broadcasters and hardware producers happy at NAB conventions. Now, here is our show-in-print report on the radio show at McCormick Place.

### More of everything from nearly everybody

If one word could cover the radio show it would be "more"—there were more firms moving into radio

hardware from related fields, and there were more products from both old and new firms than ever before. The tendency of specialty firms to move toward full-line coverage was strong. The radio station owner is a cat with perpetually pushing bowls of cream toward him. The intensifying competition means that radio hardware makers have to offer better performance, new kinds of efficiency, to stay in the game.

Among the long-established firms moving strongly into broadcasting is Sony, with a whole line of products and Matsushita, (Panasonic) placing heavy emphasis on several products for broadcasters (details below).

An example of a firm expanding coverage greatly was McMartin, with enough new radio transmitters to fill most of the slots in the assignment scale. Other firms with new kinds of products added to old ones are Philips, moving into audio consoles; Collins, into radio automation; and Dynacord on these and other similar developments follow below.

continued on page

**CMARTIN**



BA-25X shown

**AM TRANSMITTERS**  
1000W • 2500W NEW



BF-25X shown

**FM TRANSMITTERS**  
10W • 100W • 1000W • 3500W NEW  
5,000W • 10,000W NEW  
27,500W • 55,000W NEW

**MONITORS • AM Modulation**  
**FM Frequency/Modulation**  
mono  
stereo  
SCA



TBM-3500B shown

**CONSOLES 5 and 8 Mixers**



BP-800 console shown

**FM Relay and SCA Receivers**  
**RF Amplifiers**  
**Power Amplifiers**

1956 twenty years serving the broadcast industry 1976

## NAB SHOW-IN-PRINT

### Some General Comments

The all-solid state transmitter, a big splash at Houston and Las Vegas, was not a tidal wave, but it showed real strength and clear promise of a big future (more below). Radio automation was very strong, with a number of new systems giving broadcasters more options. Open reel tape recorders and audio consoles, which were one and two on this year's "most wanted" radio list, were on the floor in the greatest abundance, with many refinements over last year but no major technical breakthroughs. There was a micro-explosion in wireless microphones. There was a movement toward automation in testing and measurement, with several new systems that put measurement operation onto pushbuttons, guaranteeing very high accuracy automatically.

### The transmitters march in strong

Transmitters were not on everyone's shopping list but for some NAB visitors they were a high priority item. Awareness has been growing that

today's transmitter is superior to yesterday's. Transmitter makers were prepared to cash in on this renewed interest.

The "breakthrough" in radio transmitters is, of course, the all-solid-state design, with all that means in higher reliability, higher efficiency, and ultimately, better performance. At last year's show in Las Vegas, Harris and Westinghouse stood out as the pioneers, Harris with its ready-to-go 1 KW AM, Westinghouse with its prototype 5 kW AM.

This year, Harris' MW-1 is a widely-used broadcast transmitter, on the air in many stations and proving out all the expectations for the superiority of the solid-state design. Westinghouse was not on the floor, but the influence of its design was felt in another way: just before the show, RCA announced that a series of all-solid-state AM transmitters were "on the way," including a 5 kW and 10 kW model, with higher powers to be readily available by paralleling. It is understood that RCA has taken up the Westinghouse design, and will put it through extensive further development to produce a series of transmitters realizing all the potential advantages of all solid-state. RCA spokesmen would not furnish a date for appearance of ready models, but trade



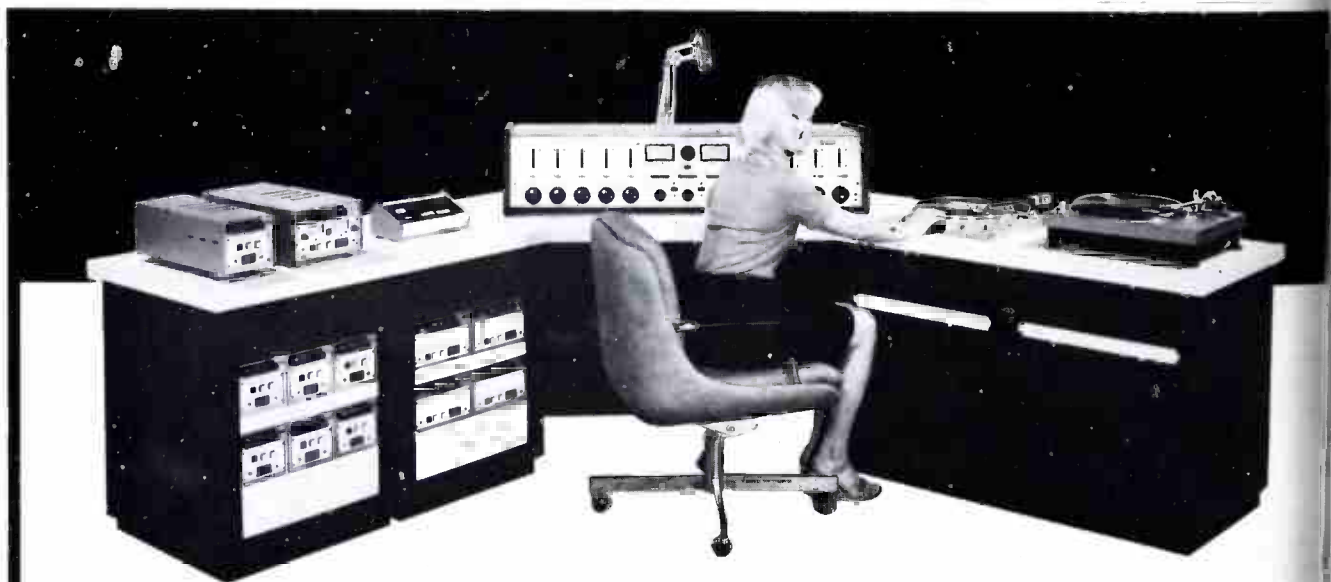
McMartin's 2.5 kW AM transmitter, part of full line.

rumors said the aim is for late this year or early next.

In any case, the logic of the all-solid-state transmitter is so strong that it is clearly a sure thing: an additional push for it comes from the relevance, its reliability and simplicity to the automatic transmitter, which is all surely coming (see news story, this issue).

There were other all-solid-state transmitters on the way, too. Spatski staked out a strong position in solid state with the new SS AM series, which will be

continued on page



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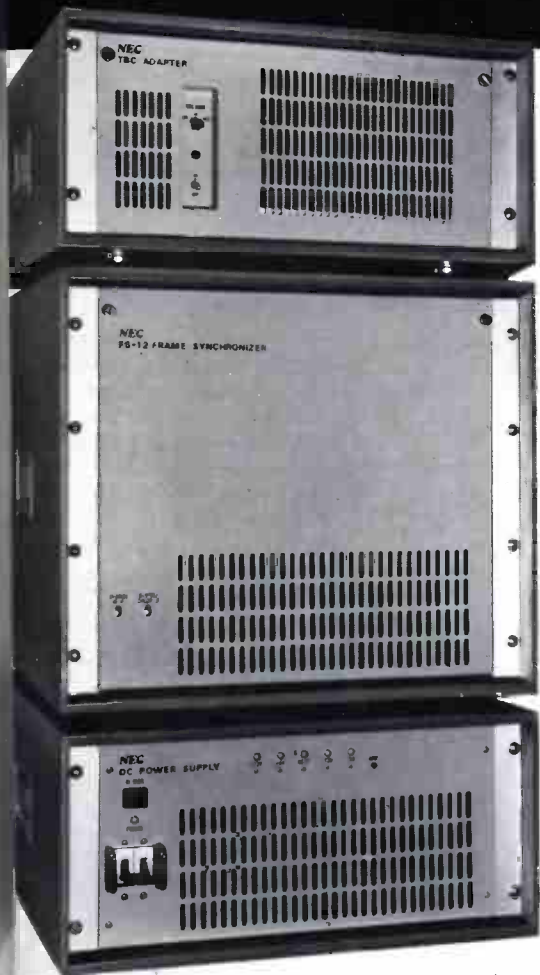
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## NAB SHOW-IN-PRINT

1 kW, 2.5 kW and 5 kW models projected: the 1 kW is promised for early this summer. The design includes a high-level modulator with a 650 watt



CSI showed line of AM, FM transmitters.



American Electronic Labs had new 5 kW FM and AM series.

“super-hi-fi” amplifier to drive the transmitter. Sparta also added the new SS500F, a 500 watt all-solid-state FM, to their SS250F, 250-watt FM, available for a couple of years.

Further, a new all-solid-state FM transmitter, at 250 watts, was brought in by Wilkinson Electronics, a standard source for broadcast transmitters for a couple of decades. Wilkinson's addition to the solid-state trend should be ready before this sees print.

But solid-state was not the whole story. There was a spate of new transmitters with at least one vacuum-tube apiece. They came from nearly every established manufacturer. McMartin, as already noted, added several models, both AM and FM design, so that their line now runs from 500 to 27,500 watts in FM, up to 3 kW in AM. CCA, with every show of vigor after the recent change in management, came in with a large line of AM, FM, transmitters and a new 40 watt stereo exciter with precision characteristics. AEL had a new 5 kW FM; CSI showed total AM and FM lines, from 25 W to 13 kW.

Collins emphasized their “Generation Four” line of FM transmitters, and their “Phase 4” stereo exciter, new last year and now selling widely in this country and abroad. Sintronics had FM designs from 10 watts to 25



Sparta introduced a totally solid-state kW AM.

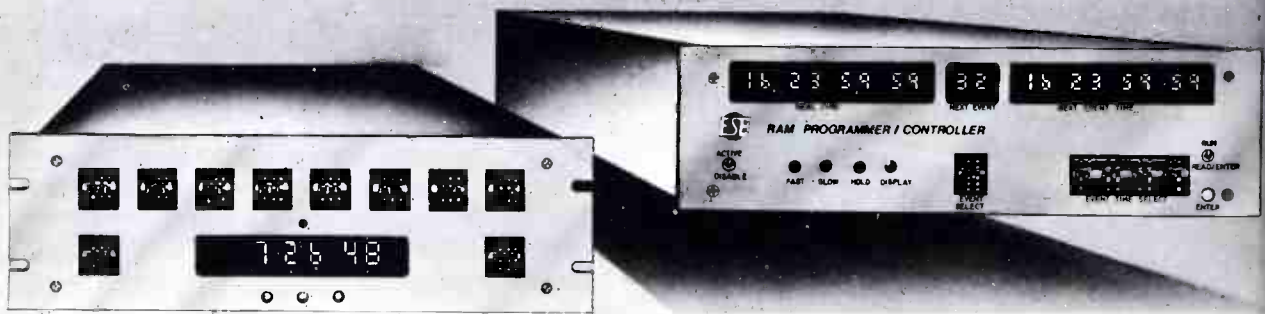
kW; Continental Electronics, known primarily for super-power AM transmitters (up to 1 megawatt and also used in other countries), showed the 5, 10, and 50 kW AM designs that aimed at the American market.

The radio transmitter section of the show gave the lie to the idea that transmitter design is on a no-advance plateau. The competition is fierce, like that in the audio console field, forcing design ahead, besides giving the broadcaster far more choices that he can easily sort out.

Moreover, FM quadratics is on the horizon and AM stereo is not far beyond: RCA was demonstrating

continued on page

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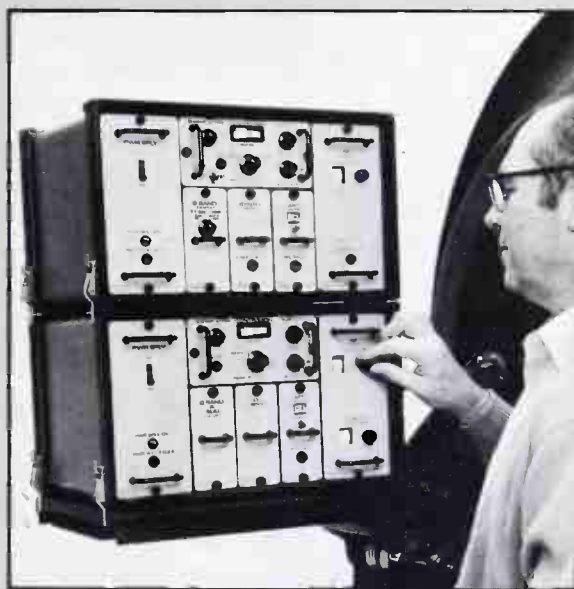
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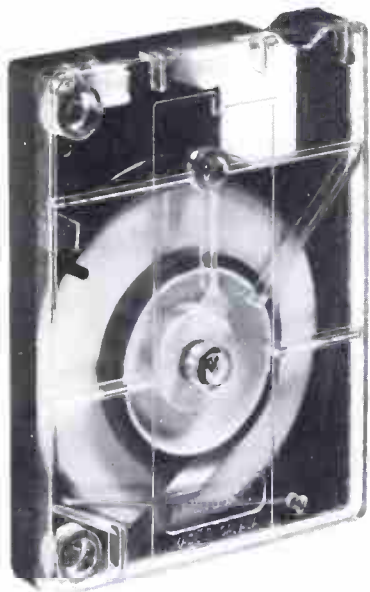
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## NAB SHOW-IN-PRINT

their proposed AM stereo design in a complete turntable-through-receiver system. And the newly formed National AM Stereo Committee of the EIA already has three proposals before it, as reported in BM/E in February.

### Tape recorder/players

The broadcasters who put these units at the top of their shopping lists could swim in top-grade machines. Ampex demonstrated their new MM1200 studio machine, which handles up to 2-in. tape, introduced just a few months before the show—an all-out try for the total studio recorder. Scully/Metrotech had new options for the 280 series—a DC capstan servo drive, a variable-speed accessory to go with it. There was also a new Scully model, the 285B, a play-only machine.

Studer showed their established A80 series, and their less expensive A67. ITC had a new series—the 750, billed as “professional at a moderate price.” Revox showed their long popular A77 and A700; introduced a new remote control and variable pitch system for the A700. Otari had their line of moderately priced machines—and also showed a new cassette machine, the MX-555, aimed at professional users and available before the end of the year.

United Recording's Auto-Tec line, among the best available for a number of years, was on display. So were the machines of MCI (in the Pacific Recorders and Engineering booth). The JH series by this Florida maker are extremely interesting, as noted in BM/E's coverage in the February, 1975 issue, with plenty of automation in controls, a “joy stick” that lets you move the tape forward or back any distance at any speed, and specs on the frontiers of the art.

Others were Telex, with their “1400 Series” introduced two years ago; and U.S. Pioneer, which is making a very strong impression with their expanding series of open-reel machines. Nagra was on hand with the small battery portables, in three sizes, that are used everywhere. And Electro-Sound showed their very popular ES-Series, to round out a tape-recorder display of extreme richness and variety.

### Cart recorder/players

All the established makers of cart equipment were on hand, and there were some new ones. Sparta had a new Century II series, with optional fast forward, in all configurations of one to



Multi-channel tape recorders shown by Scully/Metrotech.



ITC had new Series 750 open-reel recorders.

three units, with cue tones, speed finder, peak reading meters. Broadcast Electronics had three series—the 1000 (economy), 2000 and 3000 top of the line. Harris had their QRK the Citadel line, Rapid-Q the Ampro showed their widely-used as did Telex.

Two newcomers were UMC, with a completely new set of cart machines built around the Beau inside-out motors and called “Beaucart”; Audi-Cord, a new firm out of Bloomington, Illinois, promising a line of new cart machines by midsummer, with emphasis on serviceability, operating ease, and ability. Most of the new carts show advances over earlier designs in details, but not great leaps ahead. The standard cart becoming central to the operation of more and more stations, we can expect more and more emphasis on cart quality.

Both Fidelipac and Capitol Records emphasized the ability of

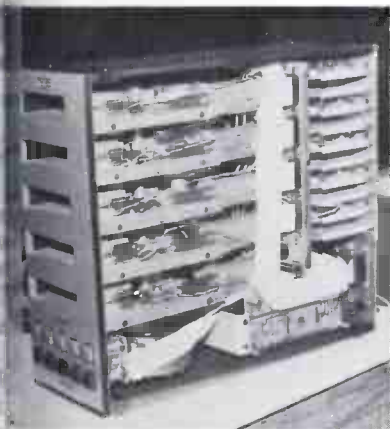
s to handle stereo material with minimum phase error. Fidelipac had new Master Cart on active display with equipment for reading the performance of any of 400 carts, led by the observer. Capitol Magazines showed the internal features of Audiopak aimed at precision performance. International Audio also showed line of audio carts.

**Audio heads: new, refurbished, rebuilt**

any broadcaster who has lost his confidence in the heads on his open-tape machine, or the audio heads on his VTR, can get new heads, or rebuilt heads, or have his old ones rebuilt new, at any of several firms specializing in this service (new heads also come from the makers of the machine, of course). On the exhibit were the following:

Minnesota Magnetics offers to rebuild audio heads for virtually any machine with "new head" guarantees. They provide roughly the same kind of service: total reconditioning of tape machine heads, or audio heads on VTR's, at considerably less than cost of brand new heads. Garner also showed their comprehensive line of accessories for tape machines, especially their well-known erasers.

Garnertronics had data on their very complete line of replacement heads for practically any tape machine on the



Garnertronics had heavy-duty machines.

**For more information on:**  
**Transmitters:** Sparta, SS AM series, SS-F series **200**; Wilkinson, 50-w FM **201**; McMartin, new FM series, **202**; CCA, 40-watt stereo exciter, new AM, FM models, **203**; MEL, 5 kW FM, **204**; CSI, new AM, FM models, **205**.  
**Tape recorders:** Ampex MM 1200, **206**.  
**Cart recorders/players, carts:** Sparta Century II, **207**; UMC Beaucart, **208**; Audi-Cord, **209**; Fidelipac Master Cart, **210**.



UMC introduced new line of cart machines called "Beaucart."



For more info on NAB products circle bold face numbers on reader service card.

Garner's conveyor eraser for carts was shown by McMartin.

### The Third Radio Conference at the NAB, Chicago

President of the RAB, Miles David, presented five radio consultants, with their expectations and predictions for the future of the radio industry.

Dwight Case, RKO Radio president, spoke on the rise of the computer and the decline of the typical salesman. Predicting the use of computers for buying, selling and evaluating radio space, he indicated that one of the real advances in this area would be the ability to determine almost immediately what the sales on a given product are following the airing of their advertisement. Instead of the traditional salesman, Case sees the development of a well-educated marketing man, making contact with the client at the highest levels, rather than at the advertising agency.

Clint Fornby, president of Fornby Stations, Texas, discussed the future of the small market radio. Interpreting changes in America as prime movers for changes in the small market radio industry, Fornby predicts that 1/3 of the small market radio stations will be located in depressed areas in the next 5-7 years. As city populations decline, the economic environment will affect the market. He sees computers as helping cut costs and providing more capabilities. Additionally, he predicts that program automation will be a part of every small market within the next 5 years; AM Stereo seems likely. As challenges to the success of the small market radio stations, cable penetration will be higher and will therefore present continued and substantial competition. Mr. Fornby made two other observations: He foresees an absence of qualified engineers in the future and he expressed his disdain at the lack of industry support for field internships.

Richard Harris, president of the Group W Westinghouse Broadcasting Radio Stations discussed the most serious challenges facing radio as a continuing viable medium. He advocated continuous evaluation of the listener, the advertisers and the position of the owner as a profit-maker. With the expansion of news commentary and investigative reporting, costs will jump—and to be responsible to the needs of the community these costs must be evaluated in light of the coverage required. In other words, the cost of news is rising, but news is a necessary function of programming. The radio industry must adopt a competitive attitude and programming direction must be kept relevant and responsive to sustain radio as a viable, profit-making business.

Donald G. Jones, president of PSB Radio Group, addressed himself to the question of finance—he sees continued expansion for the radio industry, with qualifications. He advised that every owner, investor, or manager must now also be a business man. He suggested evaluating the profit margins of radio in relationship to the Gross National Product. And he advised the audience that salaries are now going to constitute 50% of radio's costs.

George Wilson, President of Bartell Broadcasters, attacked radio automation and expressed his feeling that automation (machines) would not be necessary if more attention was paid to the listener and his programming needs. Also attacked by Wilson, was the amount of money spent on contests—money he feels would be better spent for research in the local community as to the real listening preferences.

## NAB SHOW-IN-PRINT

market, plus specialty heads of various designs for particular purposes. Nortronics also introduced some new items in their extensive line of tape recorder maintenance items and operation accessories. A new *lapping block* for hand-polishing down to an even surface on audio heads uses three grades of replaceable lapping paper, with the finest grade having roughness of only three microns dimension: cost of the block and an initial supply of paper is \$50. A new *semi-automatic splicer* is a slide that fits over the splicing block, guides the razor blade across the tape at the right angle.

Optek showed a new automatic bulk tape degausser with some useful new ideas. Their Model 7400 takes a reel of tape (up to 16-in. diameter) on the hub, and on the push of the "operate" button moves the whole reel horizontally into the field, while rotating it slowly. At the end of the rotation the reel is automatically moved slowly out of the field again, which is turned off when the reel is fully removed. The whole cycle takes about 45 seconds. The field pattern can be horizontal or

vertical or both, so that either audio/helical VTR, or quad VTR, can be efficiently degaussed. Claimed degaussing levels are -90 dB for audio and digital recordings, -70 dB for quad video tape.

### Audio consoles

If tape machines were plentiful, audio consoles were overflowing; more than 20 firms showed consoles, many with extensive lines. Some new lines were imported from England: Philips brought Pye consoles, Rank brought Audix, both long established in the Old Country. Studer brought in a new series. Roughly, there were three classes of console (with some in between): portables, often battery operated (and there were some good new ones); boards of five to ten channels, in the older box-with-knobs-on-front style, appropriate both in cost (up and down from \$5000) and in capability for the smaller radio stations; the bigger "flat-tops," (\$10,000—\$50,000) now practically always with each of the 12 to 30 channels in a thin modular case, together with adjustable equalization, cue controls, elaborate in-



Cetec showed new console.



Micro-Trak had operating studio assembly.

### What The Experts Said—Contemporary Music Panel (All AMers)

Most important—do more music research but don't trust the charts.

—Rick Sklar, Moderator, ABC, N.Y.

Charts at best are accurate for only three to five records. The hot hundred have become a reflection of ego trips—the record company, the artist, the artist's manager. It is virtually impossible to use the top 100 as a reflection of what is happening in your market. Surveys and chart analysis have been overworked. The classical research designs are contaminated with variables . . . . We should be following CapCities slogan "We talk to the people." Do we live with our audience, understand them, set up responses for them and do we talk to them? I suggest that we got out of the record business and back into the music radio business.

—Mardi Nehrbass, Music Director, RKO General, Los Angeles.

At WFIL (Philadelphia) we are "home town radio." We try to select the music preferences of our listeners in our playlist. Rock-and-roll is a stigma to be erased entirely.

—Jay Cooke, Manager, WFIL.

At KEEL (Shreveport) we have been contemporary radio and not rock-and-roll for 14 years. We go for the 18 to 49 age group. Because of strong ethnic station competition, because the largest single age group is 34-49 and because it is the teenager that buys records, we do not stick to the top 100 lists. We do survey local outlets (which vary according to the section of the city). After 10-14 weeks we move a hit to the old gold—and still play it. We censor sex-oriented music. Announcers can make a difference in keeping the older audience. Commercials must not tune listeners out.

—Marie Gifford, Manager, KEEL.

Trust only credible promoters (those who tell you which of their records are not good for your market). Trust your own ear. We play the top 40 per week plus three to seven more depending on what is released. During peak time we play 20 minutes of commercials. They have to be produced right to keep listeners. During drive time, use just the most popular—two short records are better than a five minute one. With a slight adjustment of our play list, we have not lost to ethnic stations.

—Gary Lane, Manager, WMID, Atlantic City.

and out switching, and all the "fancy" features integral with module.

Ramko provided some innovation with a totally-dc control system, audio on the front panel, point toward extremely low noise. It's solidstate, with ceramic metal controls—not only the level control, the switching is accomplished the way. The metering is also solidstate string of LED's follow a peak stantaneously up, but with VUistics on the way down. With appropriate filters, a set of these LED meters can function as a spectral analyzer.

These classes of consoles have been developing for a number of years—the big flat-tops, borrowing technology from recording studio practice sweeping in but not displacing older knob-on-front types, which continue to be designed, improved, to state-of-the-art standards. Thus broadcaster today can choose to be simple or as complicated as he wants in a console. It was obvious comments gathered by BM/E that these classes were popular.

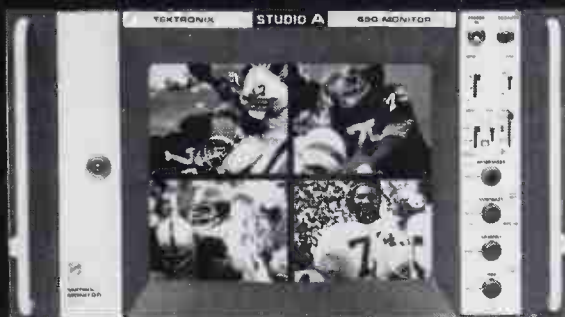
The under-12-channel, knob-on-front class was represented by I Ampro, Broadcast Electronics, C. C. McMartin, Russco, Sparta, Co. Big flattops came from C. C. Auditronics, Neve, Automated Processes, Ward-Beck, Dipol: some

continued on page

# THE ADC 1290-B

Two years ago we introduced the 1290 OBQS (One Bus Quad Split). It afforded you with new versatility in both studio and remote applications.

Today we bring you a new and more versatile package which offers an optional **Quad Pattern Selector**. Now standard splits and split vertical displays are available — along with a new diagonal split. Each display provides adjustable positioning and adjustable width borders on standard and split vertical displays. Also available is an internal border colorizer and full relay tally. As the 1290, the 1290B can be used with any switcher or used as a stand alone device.



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Circle 162 on Reader Service Card

## NAB SHOW-IN-PRINT



Broadcast Electronics' new "Spotmaster" console.



Custom console by Audio Designs and Mfg.



Automated Processes radio console.



Console series shown by Ampro.



Ward-Beck audio board for TV production.

intermediate would be Robins, Audix (Rank), Pye (Philips), Revox, McCurdy. Good portables came from Studer, Revox, CCA, Pye. Nearly all the consoles showed design innovations of one kind or another, mostly in the area of making operation easier, more fool-proof. For example: Automated Processes brought a new multichannel board designed specifically for broadcasters (WBEN has bought several), with pushbuttons for nearly all functions (mono, stereo, quad, air, cancel, preset, etc). To expand from stereo to quad takes only a few new plug-in cards—controls are already set up.

Each mike input is gated to eliminate noise when there is no acoustic input, and has a limiter to hold peaks. Screw-driver controls set balancing levels. The objective, said Automated Processes, was to take all engineering adjustments off the controls, let the engineers do them, make it simple for

the DJ or other programmer to run the board. Similar design philosophy was in evidence on boards from Cetec, Ward-Beck, Auditronics, Neve, and others.

### Audio processing equipment

There was a little excitement here, with the introduction of Orban's radically new Optimod, FM generator-limiter-compressor, (described in detail in BM/E's October, 1975 issue), and the new FM Volumax by Thomson-CSF. Orban reported excellent sales right on the floor.

The new FM Volumax, Model 4101 (mono- \$1065) and 4111 (stereo- \$1860) is being delivered from stock, according to Thomson-CSF. The design is aimed at very low distortion control of FM signals, at high modulation levels. It splits the signal into low, middle, and high-frequency bands and controls each independently. As in the earlier Volumax, the control is with dynamic frequency compensation, which eliminates the need for steady-state clipping, often a source of harmonic distortion. Along with the Optimod, the new Volumax reflects and enhances the trend to higher audio quality in FM signals, a trend noted in BM/E over several years and still gathering force.

Sine Systems, a new firm, showed

new peak limiter designed for AM vice only, called the PL-1. The m claims an extremely high level of a age modulation with very low tortion, based on automatic circu the only adjustments are for input le output level, and the desired amou positive modulation (continuous 1 to 130%).

Several units by the California Inovonics were shown by distrib David Lint, of Mountain View, These included the Model 201 ave and peak limiter, the Model 210 quency selective broadband peak iter, and the Model 220 audio optimizer. Prices range from about to about \$700.

Other audio processing equip was on the floor from Pacific Re ers and Engineering, Broadcast tronics, Orange County, Mic PR&E's Multilimiter, shown last is a flexible system adaptable to AM or FM with appropriate plug and with widely controllable characteristics.

Orange County showed a two "audio shaping" system with new ideas. The sweep equalizer tion covers the complete audio trum twice, once with narrow anc with wide bandwidth control, c 40 dB range. Selected parts c spectrum can be emphasized w

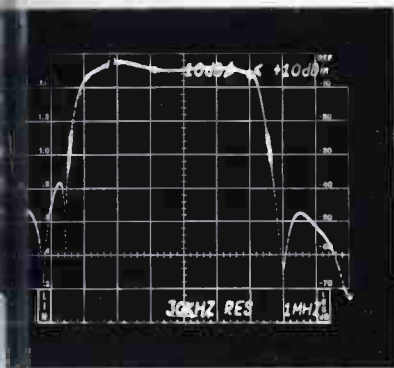
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#### For more information on:

**Audio consoles:** Ramko DC Control, **211**; Philips (Pye), **212**; Rank (Audix), **213**; Cetec, **214**; Robins, **215**; Ward-Beck, **216**.

**Audio processors:** Broadcast Electronics CLE-FM, **217**; Orange County audio control system, **218**; Orban Optimod, **219**; MicMix Series C reverb units, **220**; Sine Systems peak AM limiter, **221**; Thomson-CSF FM Volumax, **222**.

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sponse of a TV transmitter. The  
1405 generates a composite video  
signal, the picture portion of which  
is a constant amplitude sine wave  
signal that sweeps from 15-0-15  
MHz. When this signal is used to  
modulate the TV transmitter, the  
sideband response of the trans-  
mitter will be displayed on the  
spectrum analyzer. The 1405/  
spectrum analyzer combination  
can be used to display the fre-  
quency response characteristics of  
rf and if stages of any vhf or uhf  
transmitter used today in the world.  
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can also be analyzed.

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## NAB SHOW-IN-PRINT

affecting other parts, for example, 30 to 40 Hz can be boosted up to 20 dB with no "muddiness." This unit looks especially attractive for broadcast stations or recording studios looking for strong musical "effects." The second unit is a compressor/limiter, with variable threshold, and an expander/gate to cut noise at low levels. The peak limiter uses FET circuits to reduce transient distortion; flat response or FM preemphasis are switch selectable.

Broadcast Electronics introduced the CLE-FM Sound Britener, a compressor/limiter/expander for FM which further contributes to the higher-quality-in-FM movement. It provides a maximum of 30 dB compression before clipping, 20 dB of expansion; it has controls for average/peak ratio, expansion rate, for normal or limiter use only, for flat, 75, or 25 microsecond preemphasis. The maker says it is fully compatible with the Dolby B encoder, and can be used ahead of the encoder for compression, or behind it for limiting only.

MicMix, steadily expanding their

line of reverb units, brought their new "C" series, packaged for mono or stereo, with electronics built in with variable decay controls, mixing amplifiers, built in delay, etc. A stereo system starts at \$1795, mono at \$950. The new series further extends the MicMix reverb philosophy of re-creating the timing, amplitudes, etc., of actual room reverberation.

### AM and FM monitoring units

New AM and FM monitors at the

show continued the advance in monitor design that has been evident for several years. Belar showed their new M-3, an FM modulation and frequency monitor with digitally tuned RF amplifier, which reads the carrier frequency, the pilot frequency, the modulation percentage, and in addition has an indicator display which shows instantaneous modulation with a row of LED's; overmodulation peaks light red indicators at the end of the row.

Time and Frequency Technology brought in their new Model 753 A

continued on page 91

## Recap: NAB Engineering News Highlights

John D. Silva, winner of NAB's Engineering award last year, urged TV broadcast engineers to learn all they can about digital techniques—as soon as they can. Predicting that the whole videotape process will be mostly, if not entirely, digital in 5 to 10 years, he warned that time is running out. In the near future for digital TV, Dr. Silva sees the following: automatic film cartridges and special effects equipment; video switchers; frame synchronizers; and electronic slide apparatus that may eliminate the need for multiple standard TV slide projectors.

A third-dimensional "time" element improves high fidelity music. This element is the reverberation that comes milliseconds after direct reception and echoes from the stage. William Hall, vp of engineering for MicMix Audio Products, advocated use of what he calls "auditorium ambience." Such an effect can be synthesized through echoes from recording studio patterns or artificial chambers having good reverb characteristics. To achieve this, addition of a good delay-type reverberation chamber to the rear channels is needed.

Operating on ultra high frequencies, a wireless microphone system with a range of up to 1/2 mile, was described by Vincent E. Rocco of the CBS TV Network, New York. The new device overcomes crosstalk and other problems related to simultaneous operation, by the use of a high dynamic range into the receiver front-end, and by a signal processing technique designed to improve receiver selectivity. The transmitter design achieves proper stability at the 950 MHz band. Power is supplied by two 9-volt transistor-type radio batteries and one 1.5-volt AA cell.

Do as the FCC does when making checks for overmodulation. This was the advice given radio engineers for monitoring their stations. Use of a tunable receiver with a good IF strip and an oscilloscope of good quality was recommended. Overmodulation is generally caused by variations in power line voltages, due to severe cold or extreme heat. Care in setting the limiters and their proper levels will not insure protection from voltage variations. The safest and most effective way is to follow the same procedures used by the FCC.

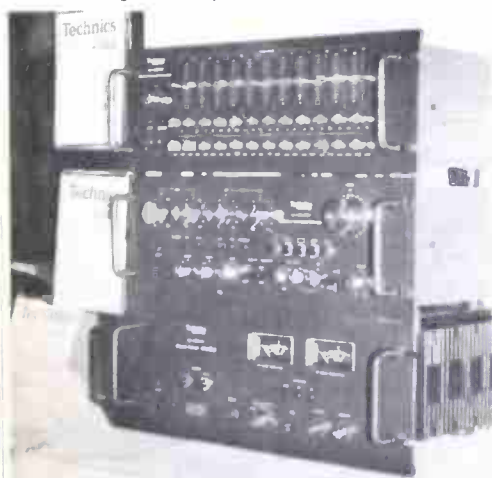
Christopher Payne, chief engineer of KYW Radio, Philadelphia, a 24-hour-a-day, 7 day-a-week, all news-operation, described how his station established its own 2-way communications system for on-air or taped broadcast from almost anywhere in its community. This remote pickup system features UHF base stations arranged for automatic repeater and full duplex operation. The multiple receiver installations incorporate a "voting" system whereby one of the receivers of a multiple series set out around the city, locks onto the signal from a portable transmitter. The receiver receiving the strongest signal activates, the other, receiving weaker signals, passes. Each "voting" receiver is connected to the main studio by 5 kHz telephone lines resulting in program quality voice connection. Also described was a hand-held portable unit called the "lunchbox." It is used with a broadcast microphone with tape input as well as full duplex capabilities that enables cues and talkback while on the air.

John B. Bullock of RCA's Missile & Surface Radar Div., described an anode pulser that regulates the output of a station's power amplifier—resulting in power savings that can amount to \$14,000 annually in UHF transmissions. He predicted that anode pulsing will become both an effective energy saver and a worthwhile investment.

A circularly polarized antenna system capable of reducing ghosting was described by R.E. Fisk and J.A. Donovan of Gates Broadcast Equip. Div. This method can overcome most aberrations, caused by multi-path signals. Two major features of the design are the exceptional pattern and impedance bandwidth capability, and the excellent on and off axial ratio.



New audio processing system from Orange County.



Graphic equalizer, control unit, amplifier by Panasonic.



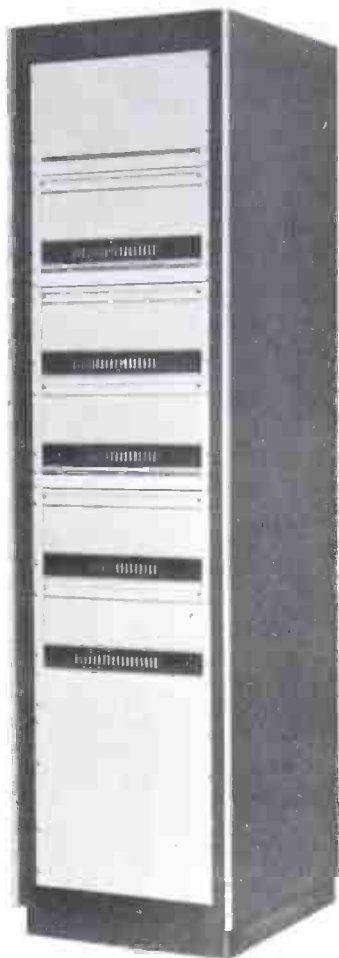
# Shopping for a Distribution Switcher?

## SAVE SPACE.

One of our competitors describes their 40 x 60 AFV switcher as occupying only two equipment racks. An equivalent TVS/TAS-1000 switcher takes about 2/3 of a single rack — without compromising performance specs (audio hum and noise measures -80 dBm on the TVS/TAS-1000 vs. -57 dBm on the competitive unit) and without use of single-source custom hybrid components.

## SPEND LESS.

Another competitor boasts of video switching at less than \$30 per crosspoint. The TVS-1000 sells for as little as \$23 a crosspoint, and this price includes professional quality vertical interval switching, on-board electronic latching, and 100% computerized testing of all parameters through all crosspoints.



40 x 50 AFV Switcher

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The TVS/TAS-1000 is more reliable because its simple design requires fewer active components in the signal path. This reliability has been proven at installations throughout the world in configurations ranging from 10 x 10 to 80 x 50. To find out more about the one switcher offering compact, cost-effective signal distribution with true broadcast quality and reliability, contact the nearest TeleMation sales office.

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## NAB SHOW-IN-PRINT



TFT had new precision AM monitor.



FM monitor from Belar with LED peak indicators.



QEI showed line of AM and FM monitors.

McMartin had AM, FM monitors, EBS units.



To help you get information on NAB products, reader service numbers are given for selected products in the various categories. Circle the appropriate number.

### Self-discipline By Radio

Exert self-discipline to avoid strangulation by government regulation . . . . The corner cutters in our profession are few, but that's all it takes to justify the regulators. It would not take more than one rape of our Representative Republic to get us all gelded . . . . Equal time is a nuisance, until you think of it this way: Many Americans believe that the news media has proved itself capable of overthrowing the United States government.

—Paul Harvey, veteran newsman.

### Harvey Observations

People feel bedeviled with so many little problems these days mainly because they have no big ones.

These are challenging days for newsmen. We're having to try to make something out of an FDA suspicion concerning the red dye in jello. TV newsmen, with nothing to cry about, try laughing.

We cover a one-state political primary with more manpower than we used to commit to a world war.

People have the impression things are worse than ever today . . . . It isn't that the world is worse, however. It is just that the coverage of news has gotten better.

—Paul Harvey, veteran newsman.

For more information on:  
**AM/FM Monitoring:** Belar, Model M-3, 223; T&F, Model 753, 224; QEI, 225.  
**Microphones:** Beyer (Revox), M320, 226; Shure head-band mikes, 227; Sony ECM-50P, C37P and MCX, 228; Vega diversity system 229; Electro-voice M221, 230; Swintek line, 231; Comrex, 232; Thomson-CSF diversity system, 233.

modulation monitor, which shows forward monitor trend with line phase filter to cut transient overshoot modulation meter and peak flasher separate digital flashers for 100% negative and 125% positive modulation built-in calibration. The optional preselector, Model 754, adds 100 microvolt sensitivity, thumbwheel tuning with 10 KHz resolution. Carrier-to-noise and noise level are also covered.

Other high-quality AM and FM monitors were familiar units from Marconi, McMartin, Harris, RC Rohde and Schwarz, Sparta, Wilkerson, QEI.

### Microphones, turntables, studio equipment

Every important maker of broadcast-quality microphones was on the floor with a comprehensive mike display. Shure had two new mikes, headbands, for hands-free use; one assembly includes a headset. Shure also had a new miniature lavalier mike with a clip for attaching the cable to belt.

Revox showed, as in earlier years, the Beyer mikes, a very complete line. A new model is the M320, a ribbon mike with the up-to-the-minute design features that are helping this classic mike design pull off something of a comeback. Studer showed its line of condenser mikes. Philips had the AP microphones. Sony showed the ECM-50P, a new small clip-on condenser mike, finished in black to avoid flare reflections in the ENG pickup. Sony also had the C-37P, a new, improved version of the C-37; and the new condenser shotgun mikes, M16 and 17, to be ready later this year.

The five brands of wireless mikes on the floor gave the broadcaster more choices than he ever had before in the area. Vega showed its well known line, with the addition of a new diversity system: two receiver paths, with automatic selection of the better. Electro-Voice, in addition to its long established line, came in with the new Model 221, a wireless system with diversity capability, on the 150-170 MHz band. Swintek, an English manufacturer with a most elaborate line of wireless mikes, got a U.S. outlet via American Gordon Enterprises of Hollywood. Comrex showed its line, also on the

continued on page

# CVS Introduces the First Digital Family of Time Base Correctors.



**CVS 520**  
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The proven standard

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"Low Cost" digital TBC

CVS 520 satisfies capabilities desired by broadcasters. Standard segmented (Quads, IVC, etc.) and non-segmented (Pal, U-matic, etc.) video signals time base corrected utilizing a 4 times subcarrier, PCM digital sampling technique.

Specifications include:

Signal-to-noise greater than 60 db

Differential Phase less than 2°

Differential gain less than 2%

Standard Features include:

Line-by-line velocity correction

All color modes

Automatic Direct/Heterodyne

Color switching

Built-in Drop out compensator

Built-in adjustable Proc-amp

Video level meter

Multiple outputs on rear panel for

Future expansion capability

Small size, low power

Requirements

CVS 520 provides full flexi-

bility with high quality performance

any in any studio facility.

The CVS 504B NTSC and CVS 503 Pal/Secam digital TBC's have become the standard of the television industry worldwide. The proven dependability and capability of these TBC's have and will continue to contribute substantially to the advancement of this industry.

The CVS "TBC buying guide" is a great success. Do you have your free copy yet? If not, contact CVS. We'll help you in evaluating the real world of digital time base correction.



The CVS 510 is designed to satisfy the requirements of the non-broadcast facility where the technical needs are great but the budget small. Standard heterodyne color and B/W video signals are time base corrected utilizing a 6 bit, 4 times subcarrier digital sampling technique.

Specifications include:

- 1 h window of correction
- Signal-to-noise 48 db
- Differential phase 3°
- Differential gain 3%

Standard Features include:

- Built-in Drop out Compensator
- Built-in Proc-amp
- Operation with V-lock, line lock and non-standard sync VTR's
- Dub-up to quad capability
- Front panel video level controls
- Small size, low power requirements.

The CVS 510 can do much to add dependability and quality in performance in any Cable TV, Pay TV or Closed Circuit TV facility.



**Consolidated Video Systems**

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Original and largest manufacturer of digital TBC's.

Circle 165 on Reader Service Card for more information  
Circle 166 on Reader Service Card for a demonstration

## NAB SHOW-IN-PRINT

play last year in Las Vegas, designed specifically to free mikes of cable runs in ENG including a new diversity system.

Thomson-CSF announced a brand-new variety, developed by R.F. Technology and operating in the 950 MHz band, with the objective of getting more bandwidth than on the 26 MHz or 450 MHz bands. It also has diversity capability and the maker claims very high stability, freedom from drop-outs, a useful range of one-half mile. Very low intermodulation makes it possible, says Thomson-CSF, to use up to 15 channels in a single studio.

### Turntables continued to show forward movement.

Panasonic, in their Technics line, came in with an improved direct-drive SP-10 (the machine now in use in many broadcast stations), called the SP10 Mk. 2, which reaches full speed in 25 degrees of revolution from a dead start. A combination of mechanical and reverse electrical braking provides a 0.3 second stop. The table also has a new speed control system: a crystal-controlled oscillator provides a

reference for the turntable speed, and the servo, says Panasonic, then keeps speed within  $\pm 0.002\%$ , or  $\pm 0.036$  second on a 30-minute side. Suggested retail price is about \$700.00.

Russco showed a completely new turntable, using a synchronous motor and electronic speed control, with belt drive to the outer rim. Because of requests from radio operators, Russco has included an optional 48 rpm speed (along with the standard  $33\frac{1}{3}$  and 45) for "speedy rock," evidently a spreading practice allowing the DJ to pile more tunes in per hour.

QRK showed their familiar and widely used tables as did CCA, Harris and RCA.

In phono pickups, Stanton showed a new series of extra-rugged units, 680 EL and 680 EE, designed primarily for

disco use but probably also attractive for broadcast applications. Stanton's extensive line of other units, many of them very high on broadcaster's lists, were also there. Shure, the other major supplier of phono cartridges to broadcasters, also had data on their line pickups.

There was a new entry among firms supplying complete studio systems, with all furniture, disc and tape units, consoles, etc., in place. Ampro. This firm has developed a line of modular studio furniture units, in which the equipment can be installed with the whole designed to the customer's need.

McCurdy, long a principal supplier of such custom studios, had a complete system in operation on the floor. McCurdy introduced a "reel-to-tape switcher," a push-button unit switching among several tape sources with remote start-stop capability.

Microtrak also showed studio units assembled into complete systems. Introduced was the new System D, compact audio control center, turntables with control console in between in a unit with folding legs transportable in a station wagon and set up in minutes. Also new was Model D1 production controller which remotely controls two turntables and two tape machines. It provides time-delayed sequenced starts making spots directly.

### Radio antennas—some new designs

There was no shortage of radio antennas, all power levels, all shapes. CCA showed a new series of FM

continued on page



Russco showed new turntable, consoles.



### Session on Automated Programming, NAB, Chicago

The benefits and future of automated programming were discussed by a panel of four. Andy McClure, of Schafer Electronics spoke to the time efficiency and personnel productivity that can be achieved through automation. He views automation as a tool that will cut costs without sacrificing quality.

Lee Bayley of Drake Chenault, believes that automation, as a function of modernization, works. He feels that the listener does not know or care if the station he is listening to is automated—provided he likes what he hears.

Marlin Taylor, Bonneville Broadcasting Consultants, discussed the consistency and control that automation permits. He sees its function as more than a cost-saver—as a contribution to quality radio, provided that programming is kept relevant to the listener.

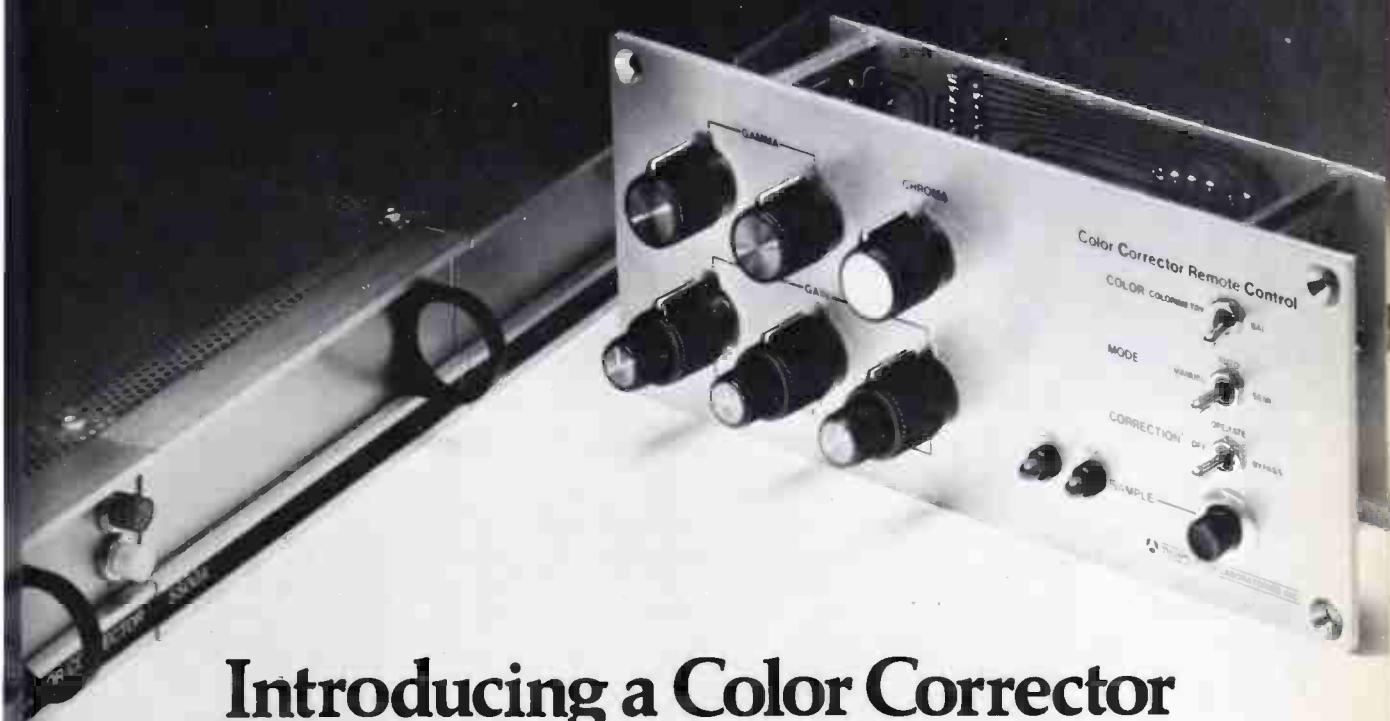
Chris Dante, WTSV-WECM-FM, Claremont, New Hampshire, included advertising as an element of radio requiring audience appeal. Through automation, Dante feels, the creative talents of the staff are freed-up to devote more time to improving the quality of advertising and the quality of the overall program format.

All panelists were in agreement that radio automation is not a panacea, but that as a tool it can improve the existing product, that it can save money, and, that it is here to stay.

#### For more information on:

**Turntables, etc.:** Panasonics, SP10 mk2, **234**; Russco, new belt drive table, **235**; Stanton, 680EL and 680EE, **236**; Ampro, studio furniture, **237**; McCurdy, reel-tape switcher, **238**; Microtrak System D, **239**.

**Antennas:** CCA, high-power FM antenna, **240**; Harris Corp., high power FM antenna, **241**; Delta AAM-1 antenna monitor, **242**.



## Introducing a Color Corrector for Electronic News Gathering.

Electronic News Gathering makes tough demands upon the broadcaster. Color imbalance and colorimetry problems are frequently encountered. Matching remote camera shots to indoor studio programs or assembling tapes from different locations or cameras is "chancy" at best. Often that fast-breaking story doesn't allow for camera rebalancing!

Thomson-CSF Laboratories now provides a solution to such difficult encoded signal color problems. With the Model 5500A Color Corrector, you'll be able to rebalance and match video signals *after* encoding. It can be used either after the play-back tape machine or following the microwave receiver during live coverage. In most cases, a noticeably improved color picture will result. For ease of operation, a Remote Control unit is included as standard equipment.

As an added feature, an optional automatic Sensor unit is also available to control the Color Corrector for telecine use.

Whether for Electronic News Gathering, tape production or telecine use, the Thomson-CSF Laboratories Color Corrector System should be working for you. Interested? Give us a call.



### **THOMSON-CSF LABORATORIES, INC.**

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(203) 327-7700 / TWX (710) 474-3346

Circle 167 on Reader Service Card

## NAB SHOW-IN-PRINT



CCA had hi-power FM antenna with "strap" elements.



Alford showed "twin-Z" FM antenna.

tennas, with a high-power unit handling 50 kW in one bay; low-power, 10 kW. The large gap form factor eliminates the need for feed point straps and insulators. The design has circular polarization with the same phase center for horizontal and vertical components.

Other firms showing lines of antennas were: Phelps Dodge, with their comprehensive FM series; Harris, with a new 40 kW endfire antenna, the energy all contained in the large tubular members until radiated.

Alford Manufacturing described their long-known line of high-power antennas for FM, including circularly-polarized types. RCA showed their established line of AM and FM antennas.

### Antenna monitoring

Potomac Instruments showed its line of digital and analog antenna monitors. Delta, as noted below, introduced a new antenna/transmitter remote control system which can be interfaced with their antenna monitors. There was also a new monitor, the AAM-1 digital system for AM directional arrays; it can handle up to eight inputs without external switching, and reads both the relative phase and the current ratio simultaneously, on two front-panel meters. The unit has FCC type approval.

### Transmission line and cable

Several firms were on the floor with complete lines of coaxial cable and high-power transmission line for broadcast applications. Cablewave Systems showed their many cables, including a 50 kW, 3½-in. "Welflex" cable with polyethylene helix dielectric. Andrew Corp. showed Helix

coax cables and rigid lines. Phelps Dodge showed their very comprehensive variety of rigid coaxial lines and accessories (in addition to their FM antennas, mentioned already).

### Remote control, pickup

The established suppliers of remote pickup, remote control and STL equipment were on hand, in most cases with improved equipment. Delta brought a new combined antenna-transmitter monitoring and remote control system, the TMCS-2, with up to 30 channels of monitoring, complete transmitter control, interface to regular antenna monitors.

Moseley had an innovation: a color CRT data display for remote control systems, allowing groups of data to be segmented by color for quick, accurate reading. Moseley also showed a new STL transmitter, Model 505, with RF amplification at the carrier frequency of 960 MHz, with a claimed reduction in noise. McMartin showed their complete line of remote pickup equipment. Marti also showed their long-established remote control and STL systems, with a new system, RMC-20, providing digital remote control, telemetry, and status-limit alarm. It is available with 5, 10, 15 or 20 channels, has single button channel select, can use radio or wire connect; accuracy of telemetry is 0.1%, based on digital transmission with a system crystal clock.

Comrex showed their "radio ENG" system, high quality remote pickup on the high VHF band, for remote triggering of car-borne mobile transmitters.

A new firm, Teledata Systems, introduced a digital remote control system, Digital X32, with interesting features. Digital control data are sent twice, on two separate channels, and

control relays are activated only if parallel words match, reducing error greatly. The system also provides status indication of relays, switches etc., plus analog telemetering; interface is 2-wire telephone, voice grade, or radio equivalent. Another introduction by the firm is a unit, Digital X-10, for pushbutton remote control receiving antennas in live journalism

### EBS Signal Equipment

With that April 15th deadline closing in on them, broadcasters who have not yet bought their new EBS two-ton signal equipment were naturally looking hard at what the show offers

continued on page 9



Teledata introduced digital remote control system.



Marti had line of remote control, STL systems.



Moseley had aural STL, sub-carrier equipment.

# DFS-3000 Digital Framestore Synchronizer

would take a wall full of equipment to handle the job that DFS-3000 does in just 8.75 inches of rack space. In fact, every synchronous treatment needed for the full spectrum of NTSC compatible broadcast activities is literally at your fingertips in this light, rugged, fully portable system that goes anywhere.

Just check this list of available features:

- Two complete fields of store for full broadcast versatility.
- Infinite window TBC corrects time base errors on any VTR including ENG.
- Look Ahead Velocity Compensator cleans up color vectors on direct color VTR's for truer color presentation across entire picture.
- Video Compressor enables producer to insert second live image in any quadrant of screen.
- Joystick Control allows compressed picture to be positioned *anywhere* on screen.
- Broadcast Quality SPG permits synchronizer to be used as station reference.
- Memory Analyzer ensures system integrity.

- Frame or Field Freeze for special effects.
- Remote Control Panel for production flexibility.
- Synchronous clean-up of non-synchronous switches eliminates picture tearing and rolling.

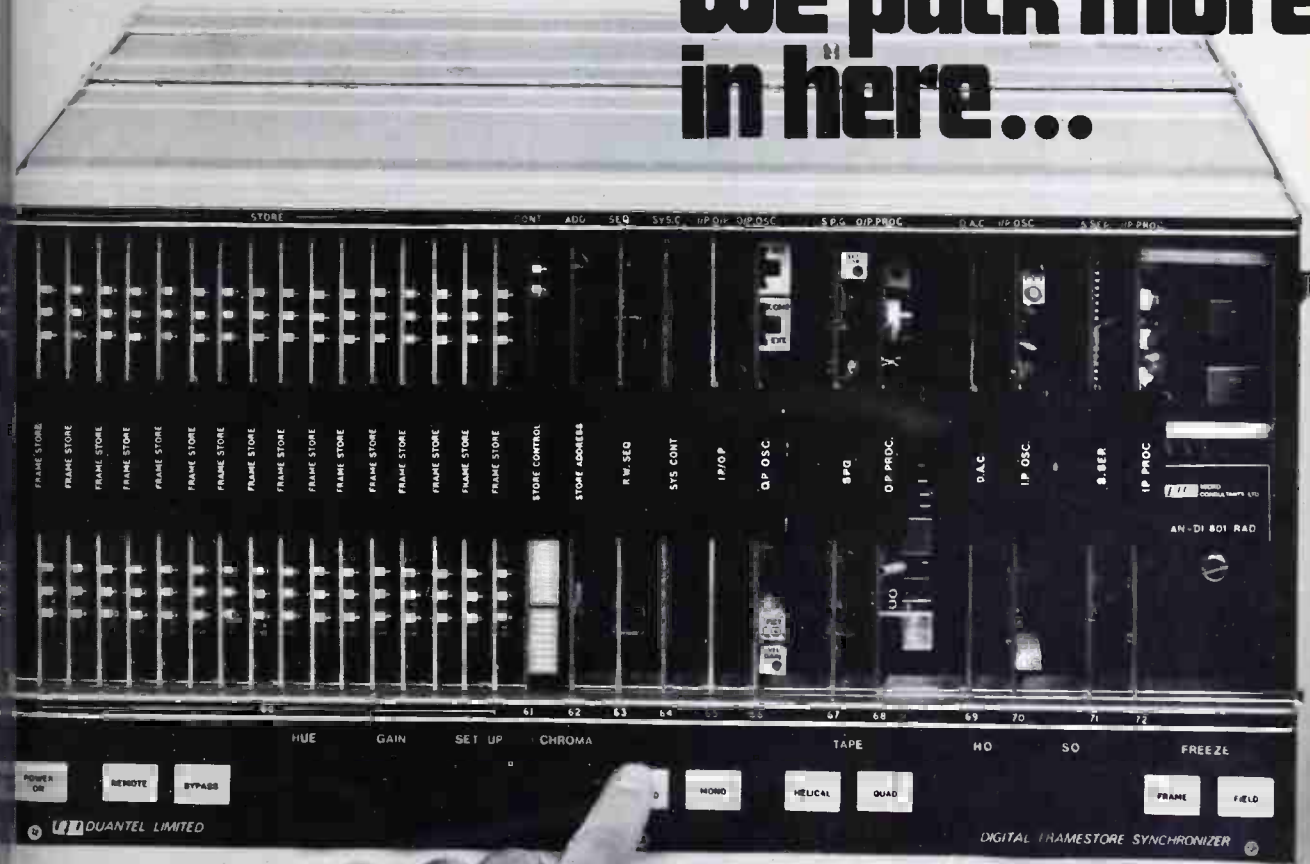
All these features, and broadcast quality too, are packaged complete with power supply and analog circuitry in this fully modular system that weighs less than 60 lbs. Even more significant, power consumption is a mere 250 VA, keeping heat problems to a minimum.

For information on our demonstration program, call or write George Grasso, MCI, P.O. Box 10057, Palo Alto, CA. 94303. Phone: (415) 321-0832.



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## so you do less out there

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## NAB SHOW-IN-PRINT

Only two firms, Time and Frequency Technology, and McMartin, actually had EBS units on the floor, and both reported excellent sales. ESE announced an EBS encoder-decoder for somewhat later delivery; it had been put on the market too late for inclusion in BM/E's December and January summaries. It has a crystal oscillator with solid-state division down to the 853 and 960 Hz tones, phase-locked loop frequency selectors in the decoder, a switch to connect generator to decoder for test, decoder operable on receiver output from 100mV to 5V,

and FCC approvals.

### Automation

Radio automation looked even more vigorous than in prior years. There was plenty of new, more cost-effective, more versatile equipment; radio broadcasters signed up for automation in larger numbers than at any previous show.

One major trend is the use of the micro-processor or mini-computer to enable full-scale automation systems to do more than ever, in very compact space and at reasonable cost. In another direction was continuation of the

movement, noticeable at the two previous shows, toward somewhat less costly systems that give the DJ flexible push-button call-up capability, with extended sequential cart play made easy.

Examples of the newer, more versatile systems: RCA's new PAC using a mini-computer, with storage for 3000 events, control of 15 sources readily expandable to 10,000 events and 100 sources, with CRT display of show present and future event status; the new Schafer 903E, 8,000 event memory, control of 19 sources; the new SMC DP-2, using a micro-processor for 2,000 to 8000 event status

continued on page 11



TFT piled up new EBS two-tone units.



Marc VII was new automation system from IGM.



Microprobe had new 100-A auto programmer.



Harris showed improved System 90 automation.



Collins introduced A-7600 automation system.

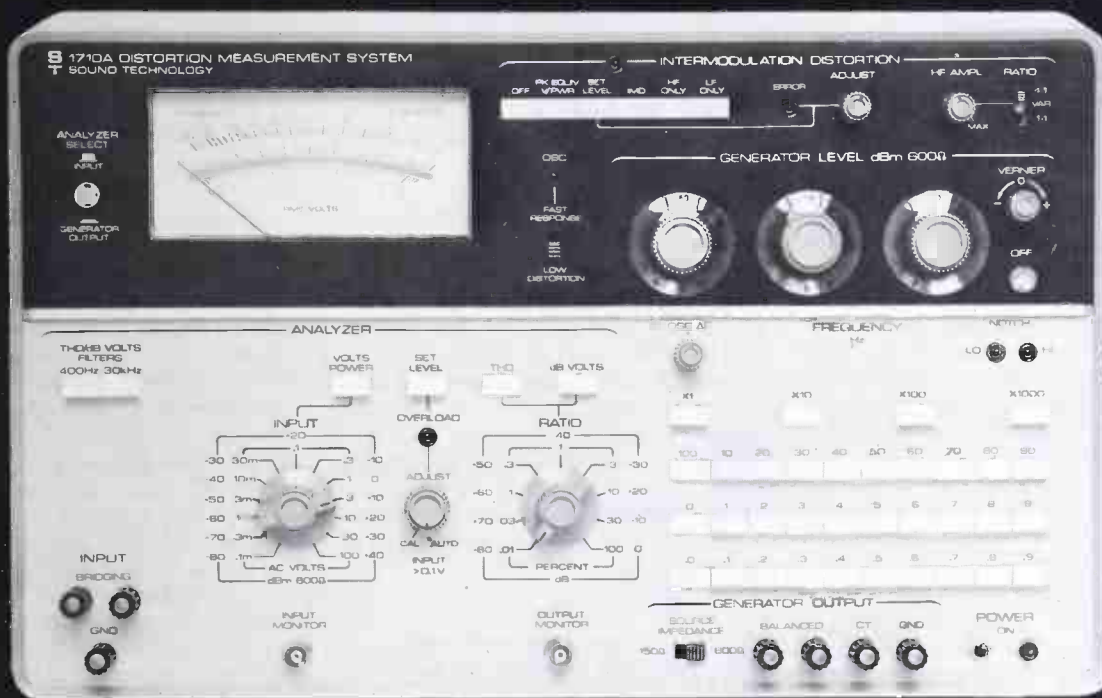


SMC showed new "RAS-PR" automation.



Schafer's new 903E automation has "three day" memory.





# Your new automatic distortion measuring system for balanced measurements

**REDUCED OPERATOR ERROR**  
 There's something you'll like — Sound Technology's new distortion measuring instrument for use in balanced work. The new 1710A is much more than a distortion analyzer. It's a system. It contains its own ultra-low-distortion generator tracked with the analyzer. It's a system that greatly simplifies measuring — gives you fast measuring and simple operation that reduces operator error. For example, push the frequency button and you set both generator and analyzer. Push "Distortion" and you have a reading. Automatically. No slow, manual null-searching. Features in the new 1710A include:  
 • a balanced, floating output (600/150 ohms)  
 • a balanced (bridging) input  
 • a high-level +26 dBm signal

- +26 to -90 dBm attenuator
- distortion measurements to .002%
- fast 5-second measuring speed
- automatic nulling, optional automatic set level.
- both harmonic and optional intermodulation distortion measurements.

## SPECIAL OUTPUT CIRCUIT

In the 1710A you get a transformerless audio generator output that's balanced and floating. No transformer means no transformer distortion. Floating and balanced means you can connect to virtually any audio circuit regardless of configuration. And you can set the output from +26 to -90 dBm in 0.1 dB steps.

## FAST, SIMPLE MEASURING

Automatic nulling and the automatic set level option (ASL) give you ex-

tremely fast measuring and little chance for operator error. You can measure in 5 or 6 seconds. *With ASL you can measure distortion vs. frequency, and distortion vs. voltage or power without resetting level.*

## IM OPTION

An additional optional bonus is that the 1710A also measures intermodulation distortion. After you've made a harmonic measurement, just push the "IMD" button. In 3 seconds you'll have the IM reading. With this option you'll be ready for future IM requirements.

## CALL/SEND NOW FOR LITERATURE

It's worth while getting the information on this major new distortion measuring system. Call Larry Maguire or Bob Andersen now and get our new product brochure. It's ready and waiting.

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## NAB SHOW-IN-PRINT

age; the Harris System 90, introduced last year but available in an improved version, with similar large event storage; the IGM/NTI 700 series, computer controlled, available for several years. All these systems will run the programming of a radio station just about totally for extended periods, (up to a week) handling the most complicated programming assignments, but allow "live" intervention at any time for announcements, DJ chatter, or changes in the program set up, right up to air time for any segment. They will do everything but answer the front door, and that could undoubtedly be programmed in with the addition of a few external relays, and an automatic telephone answering device. It would be a far simpler operation than many the systems do.

Control Design, another major source of "full scale" automation, was also on the floor with its series of systems familiar from earlier years. These include the Control Design rotary multicart machine with the removeable drum, handy for storage of carts and for quick change of the total cart assignment.

Collins Radio introduced some full-scale automation systems based on Control Design components. A major effort is toward specializing the design for the customer's need. Response, as to all the suppliers of "large" systems, was strong.

In the direction of "easy DJ control and sequencing" for somewhat less money, there were two important new systems: the SMC "RAS-PRO" and the IGM Marc VII. The RAS-PRO has a basic 1000-event random access memory into which format is entered directly, controlling up to 20 audio sources. The system will random-access up to six multicart machines, each of which can have its own memory for sequencing play. A small keyboard allows entry of all programming instructions, and controls play; the digital switcher allows for overlapping, fading, logging, as well as start and stop.

The Mark VII is somewhat similar in results: it also has a very compact keyboard for entry of cart identification into the memory, a CRT screen on which playing and upcoming sequence are shown through their digital designations.

A new unit for an even simpler—and less costly—kind of automation, somewhat like a number of others introduced in recent years, was the Model 100-A Programmer introduced by Microprobe Electronics. This will play, from up to six tape machines, up to 24 "events" in any chosen se-

quence, automatically. By adding two multi-cart machines in place of two of the open-reel machines, says Microprobe, the system becomes a mini-automation system, playing commercials within a five minute window at each break time, and providing about three hours of walk-away time, before the four open reel machines would need reloading.

A system with similar performance was shown by ESE, their ES780 series of RAM programmer-controllers. These will hold up to 32 events in memory, with entry by thumbwheel and pushbutton. Time for each event is entered; LED readouts show real time and next event time. When the start button is pushed the controller will automatically play each event at the specified time. Internal crystal oscillator, with battery back-up, supplies the time base. Prices are \$1200 to \$1500.

### Syndicated programmers—an excellent first year on the exhibit floor

This year the NAB let the producers of syndicated radio programs on the exhibit floor for the first time, and the results abundantly justified, in the syndicators' view, their push to get there. The five firms actually on the floor all reported their finest selling period in years. Some half-dozen others did turn up in hotel suites, and they mostly liked the results. But evidently, as might be expected, those on the floor were much better placed to sell their product.

The floor exhibitors were: Broadcast Programming International, of Bellingham, Wash., a 16-year old firm now serving roughly 250 radio stations; Drake-Chenault of Los Angeles, another long-established syndicator with something like the same number of stations; Radio Programs, Inc., a new firm, with headquarters in Las Vegas, and a full complement of varied "formats" that parallels more or less the offerings of the others; Camex International, of Los Angeles, which supplies automation systems and the programs to go on them; and HG Productions of Scottsdale, AZ, with a variety of formats.

Each of the syndicators has a corps of "personalities"—announcers, interviewers, DJ's—who can be "bought" along with the programs, and integrated into the station's own programs so thoroughly that they become, in effect, part of the station's staff. But the station's own staff, and local effort, are vital to success—they cannot be totally replaced by syndicated programming. As Drake-Chenault's Art Astor said in a pub-

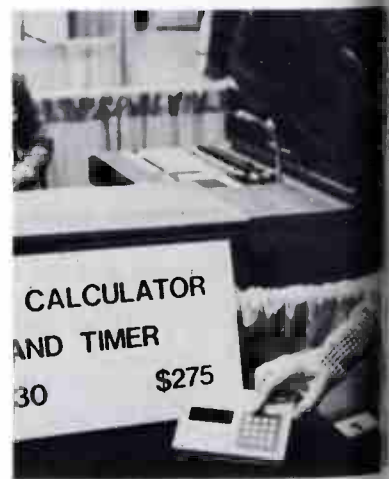
lished interview (see BM/E Aug. 1975, for a full story on this) automation doesn't replace local programmers: the good programming vice makes room for local creativity.

### Time: counted, measured, added, etc.

Several firms showed products having to do with time. ESE, who specializes in this area, showed representative models from their extensive line of digital timing devices—clock up and down timers, etc. A new unit is the ES 230 time calculator, which can add or subtract minutes and seconds and can be switched to serve as a straight 60-minute timer. Another is the Master Timing System, a five unit system with a master clock, a remote digital display, an impulse clock driver, a battery and charger, and a remote impulse display.

Pacific Recorders showed a tape velocity indicator, the TV1, digital variable speed drive for the MCI JH series tape recorders. They also showed the DT-2 "digitimer family," a series of digital clocks with real and elapsed time on pushbutton selection. Another unit has digital readout in the center of the RED's around the edge to show seconds sweep.

Chronotron Systems, of Mineola, NY, had a digital timing system based on a WWV receiver-synchronized master clock, a power driver for



ESE showed ES 230, time calculator and timer.

**For more information on:**  
**Remote control, etc.:** Delt TMCS-2, 243; Moseley Model 505 244; Marti RMC-20, 245; Comrex radio remote, 246; Teledata Digital X32 and Digital X-10, 247.  
**Automation:** RCA, PAC-1, 248; Schafer 903E, 249; SMC DP-2 287; Collins automation, 288; SMC "RAS-PRO," 289; IGM Marc VII, 290; Microprobe 100-A, 291.

clocks, and an extensive line of  
 clocks from 5-in. to 16-in. in  
 meter, a number with self-  
 ignition from circular fluorescent  
 tubes. The master-clock-receiver in-  
 cludes an internal crystal-controlled  
 base oscillator phase locked to a  
 signal derived from WWV recep-  
 tion. Outputs are: 1 pps on time,  
 TTL pulse; 100 KHz, locked to  
 WWV; serial time code.

Radio Engineering showed their  
 line of digital clocks, based totally  
 on CMOS circuits. Included are day  
 of week and calendar clocks (showing  
 month, day of month, hours minutes,  
 seconds). Crystal-controlled 1 MHz  
 reference oscillator, or line frequency, is the refer-  
 ence. Standard output is computer  
 compatible BCD-1248, serial by  
 RS-232C.

**Radio miscellany**

An interesting exhibit not classi-  
 fied in any preceding group: Key  
 Systems Corp. showed their "In-  
 telli-Tel", system for automatic tele-  
 phone polling and recording of the  
 callers. A recorded message is de-  
 livered to any phone dialed; the  
 system automatically records the  
 responses, which can be tabulated at  
 a later date. The system has been used not  
 only by broadcast stations, for audi-  
 ence surveys, but also for political

Flash Technology's latest strobe  
 light system for antenna towers was  
 demonstrated, with the low-level (night)  
 light directed into the structure-filled  
 interior of the hall. Called the FTB-  
 100, it puts out 200,000 or 100,000  
 pulses during the day, automatically  
 dropping to 20,000 at twilight and 4000 at  
 night. A "hot tower" version is avail-  
 able. Installation and maintenance are  
 simplified by having two low voltage  
 lines, and no others, from controller  
 to tower.

Three firms had exhibits specially  
 devoted to high-power electron tubes.  
 Sylvania, an extremely alive old veteran  
 in high-power vacuum tube history,  
 showed on display their X2159 tetrode,  
 with 1.25 megawatt plate dissipation,  
 1 megawatt output, and the X2170, a  
 similar design with exactly half the  
 power ratings. They are naturally  
 widely used in other countries, but  
 they furnish an impressive "top" for  
 their varied Eimac line.

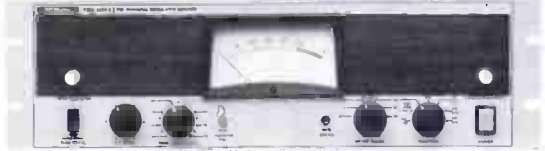
Thomson-CSF had a special booth  
 showing the high-power tubes of the  
 French manufacturer, especially their  
 100 kV Klystrons that are heavily used  
 in HF TV applications.

Radio Communications entered the  
 market as a distributor for professional  
 vacuum tubes of all makers.

continued on page 102

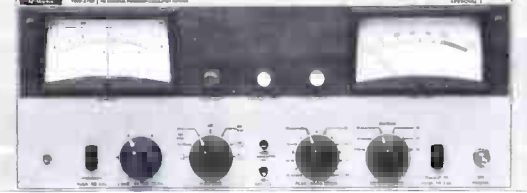
**MC MARTIN announces LOW FM MONITOR PRICES**

**FM MODULATION TBM-3500B**



with STEREO or SCA (TBM-2200A or TBM-2000B) . . . . \$2,625.00  
 with STEREO and SCA (TBM-2200A & TBM-2000B) . . . . 3,950.00  
 for "OFF-AIR" drive, add the LL-35B . . . . . 180.00

**FM MODULATION and FREQUENCY TBM-3700**



with STEREO or SCA (TBM-2200A or TBM-2000B) . . . . \$2,810.00  
 with STEREO and SCA (TBM-2200A & TBM-2000B) . . . . 4,135.00  
 for "OFF-AIR" drive, add the TBM-2500C . . . . . 533.50

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**FEATURES:**

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- Circularly Polarized to Eliminate Multipath Signals
- Suitable for Tower, Mobile or Helicopter Mounting
- Usable for Transmitting or Receiving Applications

**NURAD MODELS 20 CO1, 70 CO1, 130 CO1**

These circularly polarized omnidirectional antennas are designed to be employed in either transmit or receive operations. Their gain is 6.0 dB referenced to a like polarized isotrope. Coverage is a full 360° in azimuth and 19° in elevation at the half-power level.

Now through the use of Nurad's circularly polarized antennas, multipath signals that cause "ghosting" or "smearing" are greatly reduced or eliminated entirely.

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## NAB SHOW-IN-PRINT

# Testing—By Push-Button

Accuracy and versatility of broadcast test equipment have been rising year by year and so has the availability of automated and full-system testing. Marconi introduced a new one, the "television automatic monitoring equipment." It samples in rapid succession all the wanted parameters of a TV system while it is in operation, and not only reports "findings" at any remote location, but can be set for tolerance limits and will give warning if any tolerance is exceeded. The search for a faulty section of the transmitter is by push-button, with each section called "on the carpet" in turn. It can be interfaced with a computer for complete automation of testing and adjustment sequences.

Philips showed their automatic VITS analyzer, PM5578, which measures automatically 21 parameters of the VITS signal. It has front-panel data display plus teletype output of all

data; alarm settings for out of tolerance findings; external inputs for house-keeping functions.

Tektronix showed a whole sweep of equipment for AM, FM, TV and audio testing, including their spectrum analyzers, wave form analyzers, vectorscopes, generators. A new item was the Model 1450 demodulator, aimed at the higher accuracy of the best current TV testing systems. It has a synchronous video detector, for no quadrature distortion of the video signal, zero carrier reference pulse, digital signal strength readout, audio monitoring, other advanced modes. Also new were the 1410 sync pulse and test generator, and the 1470 CCTV color sync and test generator.

Further, the Tektronix "Measurement Theatre," on a seven-show-a-day schedule, had Tektronix personnel demonstrating, successively, TV, RF, AM and FM proof of performance and maintenance measurements, with complete systems simulating broadcast stations set up. The "show" was SRO over and over, and the lively questions left no doubt that the subject matter had strong appeal.

Several other firms brought new TV demodulators to make it a whole gen-

### For more information on:

**Test equipment:** Marconi, auto TV test, 292; Tektronix 1450 demodulator, 1410 generator, 293; Telemet demodulators, syn detector, 294; Scientific Atlanta, 6250 demodulator, 295; Comark 2400 demodulator, 296; Sound Technology 1710 audio test, 297; W.&G. ROR audio analyser, 298; R.&S. RF power meters, 299; Telcomex programmable oscillator, 334; Tentel H12L5 gauge, 335; Potomac FM71 field-strength meter, 336; Bird high-power RF wattmeters, water booster, 337; Electro-Impulse hi power loads, 338.

eration of higher precision units this essential in TV testing. Telen had new Models 4501A1 and 4501 with push-button channel selection, all VHF channels, with high sensitivity, (one millivolt), and with a optional synchronous detector allowing accurate tests of quadrature distortion. Scientific Atlanta introduced their demodulator, Model 6250, which similarly has a number of features aimed at extremely low distortion. Synchronous detector is an option, supplied, switching shifts from synchronous to envelope detection at will. Comark Industries showed their Model 2400, which uses Schottky barrier diodes for detection with a video



"Instructor" discusses test in Tektronix "measurement theater."



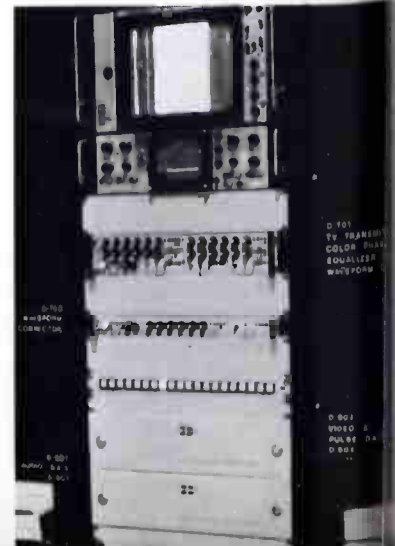
Sound Technology showed automated audio distortion test



Dielectric had series of RF wattmeters, dummy loads.



Bird showed FM filter couplers, RF wattmeters.



Datatek had video test, waveform correctors, color equalizer.

izer at the detector output to provide a flat response.

und Technology showed their automated audio distortion measuring instrument, Model 1710A. It has automatic tracking of the signal from a built-in ultra-low distortion generator; automatic nulling of the fundamental; automatic calibration of the output: all these operations are done by a pushbutton, and the measurement accuracy is to an accuracy of .002% of the full scale, with no "tweaking" of the controls. A new option adds pushbutton intermodulation testing to the instrument. It would be hard to imagine a better approach to audio distortion measurement—married, in this case, to accuracy at the limits of the art.

Rohde & Schwarz (American Instrument) for the German-made test instruments of Wandel and Goltermann) showed another automated audio test instrument. Their ROR 300 Audio Analyzer system uses a special plug-in module, the Tektronix Model 5103-D11 oscilloscope (no modifications), which sets up the test with switches and pushbuttons for more than a dozen important tests including: frequency response, with 1/12 octave resolution; transmission meas-

urement; level and noise test; harmonic distortion; low distortion sweep generator; stereo phase and level differences; return loss and impedance; and with optional accessories, many more.

Rohde and Schwarz, as always, had a great array of test units and systems, including automated TV test systems introduced in earlier years. Among the new items this year: in-line RF power meters for the 1 GHz to 4 GHz band; new video noise meter; new video demodulators for waveform analyzers and other TV test systems. Added to their test line this year were the Barco picture monitors, made in Belgium and introduced in the U.S. last year by Barco U.S. of Los Angeles. Distribution will in the future be by R&S.

Datek had their series of TV test instruments, including units for measuring differential phase and gain, envelope delay.

Some other test units brought to the show: the Telcomex (distributed by McCurdy) programmable oscillator, with a sequence programmed and controlled by internal clock; Tentel's new tape-tension gauge, the Model H12L5, for Sony 2600 and 2800 series;

Potomac's new FM71 field-strength meter, like most of the new test units advancing the sensitivity and accuracy of its section of the art; and the same firm's SD21 frequency synthesizer, for bridge measurements of antenna impedance; Bird's new high-power RF wattmeters, continuing the long tradition of innovation by that company in RF power measurement.

A new unit in that firm's termination equipment is the Water Booster, which allows equipment to be operated safely on weak or intermittent water supplies.

A very complete line of RF directional wattmeters was introduced by Dielectric of Sola Basic, along with RF loads for every power level, both dry and water cooled. Series 1000 wattmeters, for example, are portable instruments measuring forward and reflected RF power, with plug-in elements that provide ranges from 5 watts to 10 kW.

A third firm showing comprehensive equipment for RF power testing, with directional wattmeters and dummy loads, was Electro Impulse. Coaxial watercooled loads go to 80 kW; air-cooled AM loads are available to 400 kW, TV-FM to 75 kW.

## Business Automation— Flourishing

the principal suppliers of business automation for radio and TV stations were on the floor, and all reported the best industry response of recent years—Paperwork Systems, for example, said they sold all their "demonstrators" off the floor and accumulated further orders as well.

Now, the advantages of automated data processing in the handling of sales, traffic, accounting etc. are universally known; the fresh trend is toward "total" automation, based on an interface between the business man and automated switching. This has been gathering force for several years as reported in BM/E and elsewhere, but has reached something like "total acceptance" on the evidence of the 54th NAB, with every important exhibitor either doing it or preparing to. Data Communications Corporation demonstrated on the floor the interface of its BIAS system with Vital, Central Dynamics, and Grass Valley automated TV switchers. Kaman Sciences showed the same with their new BCS 1100 system, which can handle AM/FM and



Paperwork Systems showed compact, on-location automation.

TV simultaneously. Jefferson Data, which has specialized in automation systems tied by line to their large computers at headquarters in Charlotte, NC, is readying a new optional system with an "on location" mini-computer that does the whole job on the customer's premises. Called System 80, it has a 65 K processor, has CRT readout as well as printout, supports up to 8 input. Jefferson is also about ready with an interface system for connecting to either radio or tv automated switching.

Paperwork Systems brought a new top-of-the-line system, Bat 1750, that packs very high versatility into roughly the same space that earlier systems took. PSI systems use on-

location computers, are sold outright. Base price for the Bat 1750 is about \$57,000. PSL also announced installation of a Bat 1500 system at WBEN, in Buffalo, which will interface with that station's AM and FM automation. So "total automation" is here in radio as well as in television.

Cox Data showed their new completely in-house system, which handles either radio or TV. They also demonstrated their interface to automated switching in the Grass Valley booth near theirs. Like the other automation suppliers, they were delighted with the response of broadcasters on the floor, and considered it the opening of another excellent year for the business.

# How to Measure Short Term Time-Base Error, Simply, Inexpensively

By Robert W. McAll

Timing errors that occur between sync pulses in a video signal have been largely ignored, both in measurement and in correction. With a reliable, inexpensive measurement technique apparently worked out, we can't avoid the second problem: How are we going to correct the error?

A 1971 NAB Subcommittee report mentions that in typical network remotes as many as six proc amps can be in the circuit on a remote feed. It also states that, "It is evident that four processing amplifiers are used on a typical network feed by the time the signal reaches the station transmitter . . ." The report goes on to indicate that proc amps add jitter (time base error) to the sync of an incoming signal only, to the detriment of recording and subsequent playback.

The point is that in a modern TV plant quite often the sync/luminance/chrominance/burst are separated from each other, either separately or in groups, processed for some legitimate reason, and subsequently put back together again. It is immediately obvious that if time base error (jitter) is added to just a portion of the signal and then the signal is recombined, a "burned in distortion" is created that is very difficult to correct.

An example is the VTR, in which the playback is error-corrected on the assumption that sync edges represent the true time base error of the picture. They do not necessarily do so. They do represent the error introduced by the recorder, however. The time-base-corrected picture with the VTR's error added to incoming error now enters the output proc amp of the VTR. Here new, stable, plant pulses are added, more or less successfully.

Thus, with one pass we have burned in time base error of a kind which up to now has been almost impossible, or very expensive, to measure. Moreover, with these processing techniques in use, time base error of this kind is additive.

There are numerous other examples. A technique is needed that will measure the time base error of sync/luminance/chrominance/burst separately without reference to each other. Such a technique should take advantage of equipment already found in a broadcast facility, be accurate, repeatable, and easy to make on a routine basis.

## A faintly remembered fact about the color bar signal

Have you ever wondered what the "Bow Tie" shaped trace is at the center of the color bar on the vector display? Actually, there are several "Bow Ties". One is caused by the harmonic of the edges of sync which lie at

**Mr. McCall** is Northeastern Regional Manager for Vital Industries, Inc. He is also chairman of EIA Subcommittee TR4.4.1, which is revising the RS170 standard for color.

3.58 MHz. (See Fig. 1.) The vectorscope unblanks after the leading edge of sync has passed, so only the trailing-edge "Bow Tie" is seen. It occurs just prior to burst so that burst tends to "modify" it and make it less visible. The timing angle of burst with respect to that edge of sync determines the angular position of the "Bow Tie".

The second "Bow Tie" occurs later in time than burst and is caused by the leading edge of the first (grey) bar. In other words, it is caused by picture related luminance. (See Fig. 1.)\*

The last elements or sections of the signal can be broken into two parts; namely burst and chrominance. These are represented on the vectorscope by the burst vector and the various six-bar vectors. Thus, the vector display presents, at one time, all four parts of the television signal, sync/luminance/chrominance/burst.

The next thing we realize is that any short-term angular rotation of the vector display, or any portion of it, represents jitter (time base error) over the period of time you are viewing it, provided that the subcarrier you are using to demodulate the encoded signal is stable and itself has no jitter!

The action of the vectorscope is to demodulate the TV signal on a radial time display somewhat like a revolving weather radar. The vectorscope display is a radial time base in that it displays the electrical signal behavior of 360° of modulation information in 279 ns. In other words,  $279 \text{ ns}/360^\circ = 0.77 \text{ ns/deg}$ . Or, rounded off, 0.8 ns/deg. There is a one-to-one relationship between jitter on sync/luminance and jitter on their harmonics.

Since that is the case, then any angular rotation of the "Bow Ties", or burst, or the vectors, represents jitter (time base error) of the affected part with respect to the external subcarrier supplied to the vectorscope. Thus the accuracy of the vectorscope is not a consideration here. We are only making a relative measurement.

A word is in order to explain further the behavior of "Bow Ties". The amplitude of the "Bow Ties" is a direct function of the sync/luminance amplitude. The larger the sync/amplitude the larger the peak-to-peak amplitude on the vector display. The "broadness" (the side-to-side width in degrees) is an inverse function of the risetime. That is, the faster the risetime the smaller the "broadness" of the "Bow Tie". The "Bow Tie" is

continued on page 10

\*To see the Bow Tie from the leading edge of sync it is necessary to delay the video in to the vectorscope (externally synced). This will overcome the inherent unblanking delay. Be careful, however; too much delay will allow the vectorscope clamps to clamp on the front porch rather than the sync tip.

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At Duca-Richardson we consider it our greatest challenge to design and build the finest and most advanced switching systems equipment on the market. What you see below\* is the result of our breakthrough technology and common sense effort. It's the heart of the most advanced switching system you can own.

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It is the ultimate in simplicity of operation, achieved by grouping ALL of the operating controls on ONE unified FUNCTION MODULE subpanel, where any of seven switcher functions can be initiated with a SINGLE pushbutton. The result is a cluster of controls within easy reach and a display of switcher status easily visible at a glance.

You can preselect any of 99 wipe patterns, 9 key codes, and automatic transition rates from 0.1 second to 9.9 seconds by depressing pushbuttons on an innovative KEYBOARD, similar to those on hand calculators. The numbers corresponding to selected modes appear on a display Register. By depressing the Transfer Button, the numbers shift from the Register to one of the Mode displays and simultaneously enables the appropriate mode control in the FUNCTION MODULE.

With a special dual function transition, you can display a CHROMA KEY in the foreground, AND

independently controlled MIXES OR WIPES, in the background. INLINE KEYERS added to the buses give you a titling capability BEHIND the chroma key so that title keys can be wiped or mixed as transitions are made from bus to bus. Bilevel techniques eliminate the halos and edge noise and allows you to chroma key over very thin shadows.

You can do INSERT KEYING from any source (PWV Bus, B Bus, or External) and these can be bordered in the DOWNSTREAM KEYER. You can adjust borderline luminance from black to white, and outlines can be COLORED in the outline mode.

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SHOWN HERE IS THE FUNCTION MODULE

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A LITTLE KNOWLEDGE CAN  
SOMETIMES BE A DANGEROUS  
THING!



And what you don't know can hurt you.

You may not know all the problems common-mode ground loop can cause - especially when using your video equipment in an unfamiliar remote location.

With your video equipment connected to one AC power source and your camera connected to another, you can get common-mode ground loop hum that tears up video signals. Dangerous voltage potentials due to faulty AC power distribution can damage equipment and be hazardous to personnel.

Traditional devices reject typically less than two volts peak-to-peak common-mode noise, and you still have problems. AC re-routing is usually impractical. Video transformers cause low frequency tilt, high frequency roll off, and loss of levels. Clamping leaves glitches that can roll through the picture. Differential amplifiers don't always meet differential gain and phase specifications in color. Humbucking coils create phase shift.

Circle the bingo card. Learn more about VACc VL-1 video line isolator. It passes your DC to 8 MHz video signal over an integrated circuit light pipe giving you 80 dB isolation at potentials as high as 1500 Vac. A warning indicator on the VL-1 tells you when ground loop potential is greater than 70 V. You know when a hazardous condition exists.

A little knowledge can be a dangerous thing. Don't let what you don't know hurt you or damage your equipment. Play it safe with VACc's self-contained video line isolator.

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## TIME ERRORS



Fig. 1 Expanded center of color bar showing "Bow Tie" leading edge of grey Bar (No. 1) and modified "Bow Tie" sync (No. 2). Note absence of jitter both with respect to other and also over the two-field period of the exposure.



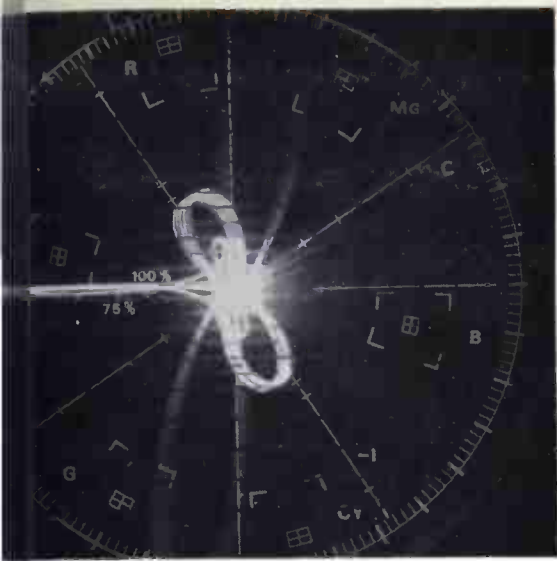
Fig. 2 Expanded center of color bar. One (1) line of 52.5 half of "Bow Tie" from Grey Bar (luminance) and half of B from sync. Photo time is one second. Therefore, this is the line integrated 15 times. Note stability is excellent of all components (burst, sync, luminance).

a symmetrical figure 8 because the NTSC subcarrier phase alternates every line. Although the harmonic sync/luminance is always in the same direction, vector display inverts this harmonic's apparent phase every line, thereby creating the figure 8. (See Fig. 1.)

We should mention the period of time over which measurement is made. The vectorscope normally blanks for two fields and therefore presents the composite addition of all 525 lines. However, it is possible to use the line strobe output from a waveform monitor to control the unblanking of the vectorscope (be sure to consult the vectorscope manual for the unblanking mod.). In this manner, it is possible to look at the behavior of 1, 2 or 15 lines of video. The last (15) shot will be of help when looking at velcomp performance.

It is apparent that by measuring the peak-to-peak angular deviation of the various elements of a color





Color lock of test signal generator (pulse and bar).  
 1. First lock is jitter free while approximately 3 degrees of  
 2. Present on the luminance harmonic. There is negligible  
 3. sync "Bow Tie." 3 degrees of jitter is approximately



Double exposure of a color bar signal before and after  
 through a proc amp. Note: No. 1 is sync incoming  
 No. 2 is sync outgoing—3 degrees or approximately 2.4  
 Subsequent recording and playback results in  
 jitter added to the picture with jitter free sync added  
 stable for subsequent generations of tape.

when demodulated against external, stable, sub-  
 that it is possible to draw accurate repeatable  
 ions about the short-term time base stability of  
 ous parts of the TV signal with respect to each  
 The measurement may be stated in so many  
 of subcarrier or converted directly to ns by  
 ying by 0.8 (an approximation obtained by round-  
 0.774 ns/deg. at subcarrier).

possible to resolve one degree on the display  
 Therefore, the sensitivity of the technique is more  
 equate. When using several fields for unblanking  
 technique holds up well in severe signal to noise  
 ments. Previous techniques utilized (using the  
 on voltage of a T.B.C.) were limited to 4 ns  
 on and were expensive. This technique takes ad-  
 of equipment normally found in a broadcast

BM/E

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## GUYS THAT OUTLAST THE TOWER

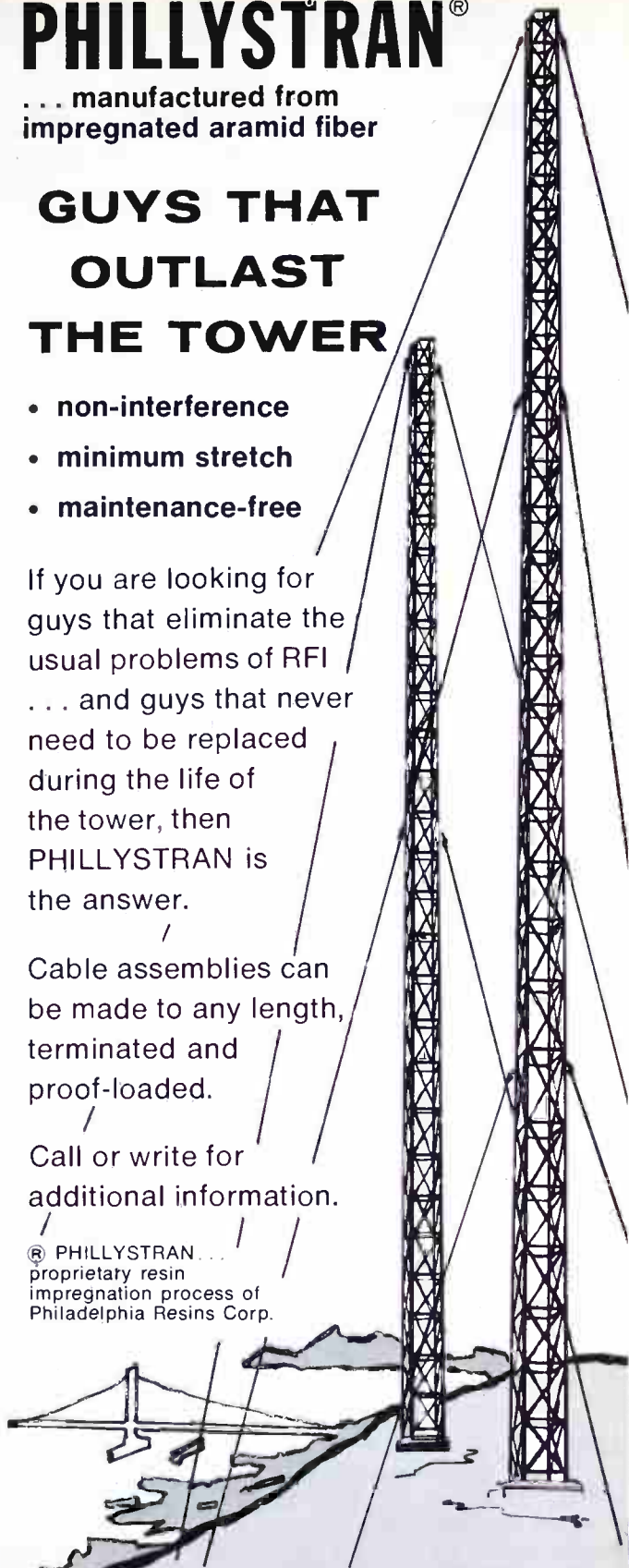
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# GREAT IDEA CONTEST

You asked for it! The 1976 Great Idea Contest is underway. Vote for the idea that impresses you most on the Reader Service Card. Enter your own Great Ideas. (See April, p. 58 for rules.)

## 6. Cable Short And Open Identifier.

Bill Ruck, CE, KUSF Radio, San Francisco, Calif.

**Problem:** To devise a cable checker that will show continuity or shorts between the three pins of a mike connector, and the shell as well.

**Solution:** With the circuit as shown you can tell whether or not the shell is connected to any of the three pins, and if so, which pin is connected to which shell in addition to the usual continuity checks.

You will have to make sure that both connectors are insulated from the chassis, or use cable connectors and four conductor cable. Switchcraft A3F

and A3M connectors provide a terminal lug for connecting the fourth wire to the connector shell independently of the other three pins.

The entire circuit can be contained within a small hand held box, and a standard 9 volt transistor radio battery provides power.

If the cable is wired so that the shells are not connected to any of the pins, the two shell LED's will not light up, but the corresponding LED will. If the cable is not wired properly, the wrong LED will light up, and if any pin is shorted to the shell, the corresponding shell LED will light up, identifying both the pin that is shorted and which end of the cable has the short to the shell.

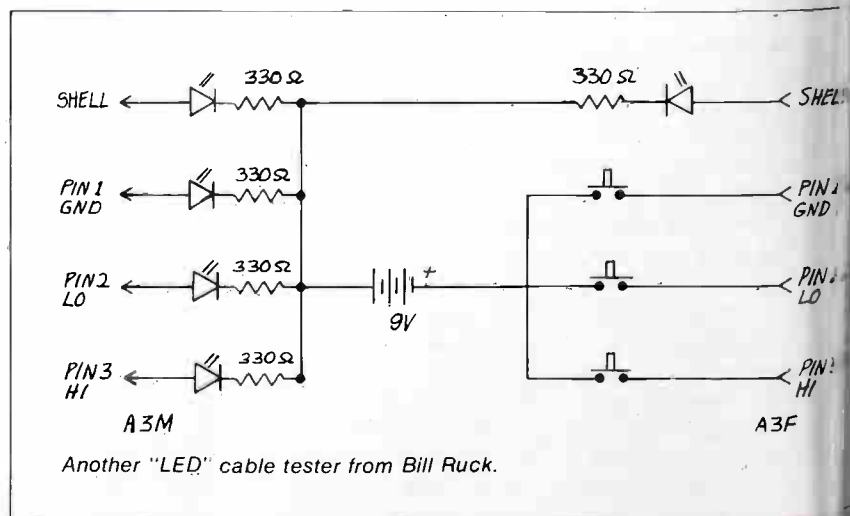
## 7. Reading Antenna Common-point Data.

Frank S. Colligan, A.D. Ring Assocs., Washington, D.C.

**Problem:** To provide ready access to common-point current and phase information.

**Solution:** For the last several years I have been recommending that additional A.M. stations replacing their antenna monitors order their new towers with one extra R.F. input beyond the number of towers in their system with which to sample and monitor the common point. A simple but effective loop, such as a toroid loop, may be located at the common point or a short length of RG-58 cable run from it to the extra monitor input. This provides continuous sampling of common point current that is conveniently and smoothly integrated into a remote control metering system. The remote common point current readout requirement. The common point is simply considered to be an additional "tower". It is also useful as a diagnostic antenna maintenance tool, observing the phase angle of common point current as well as magnitude, troubles with any tower may be located quickly and easily. The common point loop may be used to temporarily replace the reference tower input to the monitor whereupon the ratios and phase angle of all towers may be read with respect to the common point. The "tower" will be the one whose current ratio and/or phase angle shows the greatest departure from normal in respect to the common point. I have used it on several occasions to spot

continued on page



# RCA power tubes of the future have a remarkable past: actual lifespans up to 30,000 hours.

Tube Operating Hours Reported by 20 TV Stations\*

<b>Up to 5 kW</b> Types 8890 & 8806 Aural service	24,142 hrs.	21,329 hrs.
	12,263 hrs.	19,200 hrs.
	16,200 hrs.	14,000 hrs.
<b>Up to 12.5 kW</b> Type 8891 Visual service	10,096 hrs.	10,525 hrs.
	9,402 hrs.	
<b>Up to 17.5 kW</b> Type 8807 Visual service	16,600 hrs.	18,300 hrs.
	29,800 hrs.	21,200 hrs.
	30,100 hrs.	20,400 hrs.
<b>Up to 27.5 kW</b> Type 8916 Visual service	9,778 hrs.	9,776 hrs.
	7,875 hrs.	13,183 hrs.
	10,799 hrs.	

\* Serial numbers and tube type data available on request

RCA power tubes are at work now in new-generation color transmitters. Proving their value with an excellent combination of high gain, high linearity, plus long operating life.

*Documented long life.* In the table, you can see actual operat-

ing hours reported by 20 TV stations. That reliability comes from RCA's sturdy, coaxial CERMALOX® construction and thoriated-tungsten mesh filament, which minimize inductances and feed-thru capacitances. So you can use simple, economical broadband circuitry.

In fact, RCA can supply you with the right circuit and cavity to go with the tube you select.

For high performance and proven long life in a wide range of power tubes, there's one thing to do. Contact your RCA Representative. Or, RCA Power Tube Marketing, Lancaster, PA 17604. Telephone 717/397-7661.



# RCA

Circle 175 on Reader Service Card

## GREAT IDEAS

"sour tower" on arrays with mysteriously drifting parameters, one case being that of an electrically broken Johnny ball insulator at the tower and another where the FM coax isolation hardware had broken loose to an unstable condition due to weather's wear and tear over a period of time.

Specifying an extra input on a newly ordered antenna monitor is well worth the investment.

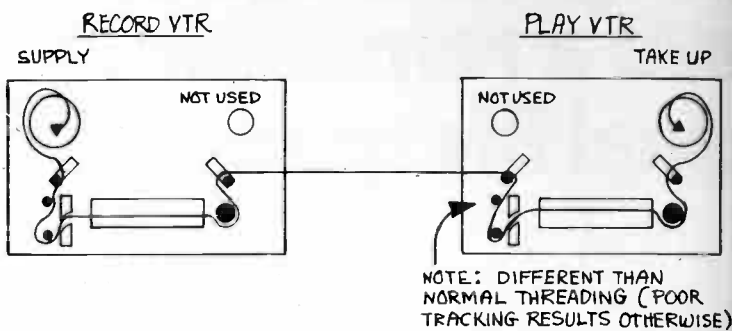
### 8. Videotape Delay.

*Al Szablak, Technician, WKTV, Utica, N.Y.*

**Problem:** To provide a videotape delay for live programming.

**Solution:** The AVR-2 provided the solution with its excellent tape tension throughout a 64-minute reel with the set-up shown in the drawing. If any tracking problems occur, the TBC maintains perfect sync. The Ampex 1200 was also tried but often caused tracking errors due to uneven tape path tension.

The first playback roller should be bypassed. A common start such as that used in dubbing should also be used.



*Szablak's videotape delay system.*

The play VTR should be stopped first. Push stop and manually reduce the take up tension until the arms activate the stop circuit.

In addition to the delay, many unusual effects can be created by mixing the playback machine with the record input.

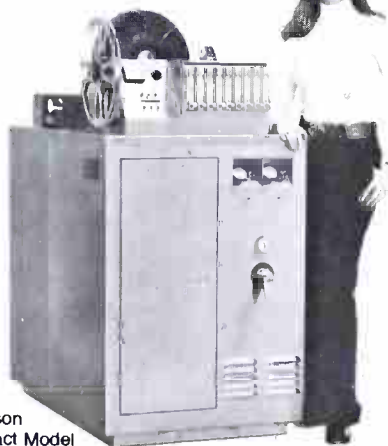
### 9. Public Info Added to

*George Grubbs, Production Manager, KNOE-TV, Monroe, Louisiana*

**Problem:** To utilize the TV station identification segment as a service to the public, as well as to satisfy FCC requirements.

**Solution:** The TV station usually consists of from two to three programming segments, one of which is the identification of the station. After pondering what might be done

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Circle 176 on Reader Service Card

the ID more effective and functional, I came up with the idea of providing a public service to the viewing audience by incorporating the correct temperature, and a special event for the station identification. KNOE-TV began this practice in January 1971, and as far as can be determined, we were the first station to use of this technique.

The set-up includes a digital readout, a digital readout temperature gauge, and hot press supers of special messages, days, weeks, and months. The units are fitted into a plywood enclosure, with appropriate openings for the readout clock and temperature gauge, and a slot for sliding in the message. The entire unit is faced with a black mask for keying. The message is lighted by an external fixture. A single black and white camera is used to key the set-up over the ID slide.

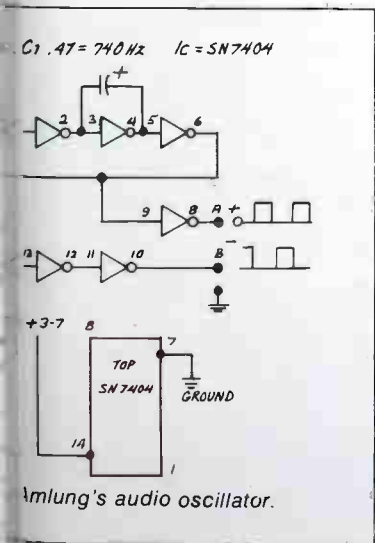
Specialty edited and produced three, five, and 10 second, and one minute cartridge tapes supply the audio portion of the ID instead of the usual announcement. Several sets of tapes were produced and are re-used monthly.

This station ID concept has had tremendous audience response over the five years. We have also been flattered by stations from various states contacting us about our station ID. Several local and regional stations have adopted a similar ID. In the last two years, we have noticed that electronic companies have developed a similar, similar to ours, which can be used by TV stations.

## Very Inexpensive Audio Oscillator.

by Amlung, Nutley, N.J.

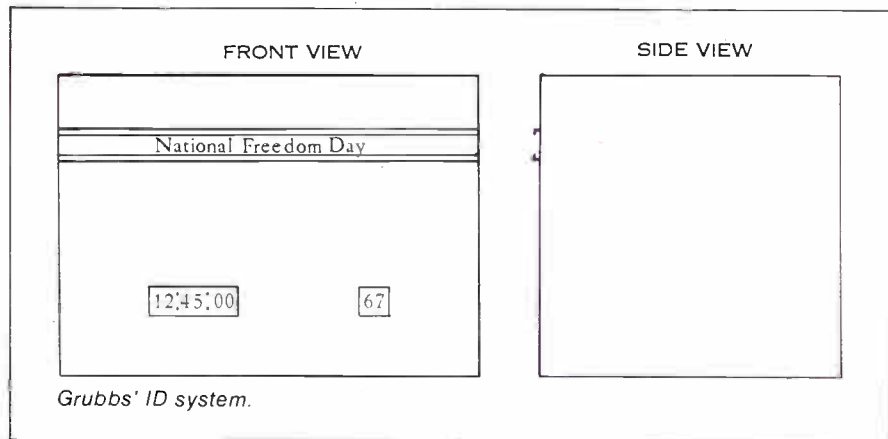
**Problem:** To design an extremely inexpensive audio oscillator.



American History Month



Example of KNOE-TV public service ID.



**Solution:** Here is my answer. It has a wide range, about 1 Hz—15 MHz—15MHz. It's the ideal super-compact oscillator with only three parts in-

cluding the battery. Output is between A and ground (positive) or B and ground (negative). Voltage for power is 3—7 volts dc at 10 Ma.

Mail to: Editors, BM/E  
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New York, New York 10017

1976  
Entry Form

Name \_\_\_\_\_ Title \_\_\_\_\_

Station Call Letters \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

Telephone No. \_\_\_\_\_

Licensee \_\_\_\_\_

Class of Station at which idea is used (check one) TV \_\_\_\_\_ FM \_\_\_\_\_

AM \_\_\_\_\_

Category: Audio \_\_\_\_\_ RF \_\_\_\_\_ Video \_\_\_\_\_ Control \_\_\_\_\_

Objective or Problem: (in few words; use separate sheet for details) \_\_\_\_\_

**Solution:** (Use separate sheet—500 words max)

I assert that, to the best of my knowledge, the idea submitted is original with this station; and I hereby give BM/E permission to publish the material.

Signed \_\_\_\_\_ Date \_\_\_\_\_

# BROADCAST EQUIPMENT

For more information  
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**Professional audio series** includes a quartz-controlled turntable, stereo control center, amplifier, and universal frequency equalizer. The high torque (6 kg-cm) Model SP-10Mk2 turntable (\$699.95 without arm) needs only 1/4 second or 25° of revolution to reach rated 33.3 rpm. The platter can be braked to a halt in 0.3 second via remote control. The control center (SU-9600P, \$629.95) features 4-stage direct coupling, two phono inputs, calibrated volume control and rack-mounting design. The power amplifier (SE-9600P, \$799.95) is rated at 220 watts at 8 ohms. The frequency equalizer (SH-9090P) uses 12 active filters. Filter Q is variable from 0.7 to 7.0.

TECHNICS/PANASONIC

**300**

**Diversity wireless microphone**



**system** uses Models 54 or 55 transmitters, Model 58 receiver, and Model 62 diversity combiner. System reduces the effects of fades and dead spots caused by interference between direct and reflected radiation that cancel. The two receivers are placed three feet or further apart. The combiner selects the receiver with the greater signal strength. VEGA

**301**

**Mixer Series 422**, forms a tailored multi-channel, multi-track system. Quadriphonic pan faders are used in each source channel to form an 8/4 system. The submixer (type 426) pro-

vides six input channels. Each has an adjustable sensitivity over range of 100 dB, with a maximum gain of 90 dB. Input noise figure is 10 dB. The 4-channel in/out jacks allow for four channel or quadriphonic or for the addition of submix. Built-in limiters provide a compression ratio of 20:1. LAMB LABORATORIES

**Portable stereo mixing systems**, Models M82 II/S42 II, feature



age-controlled gain stage in each channel allowing direct interface. continued on page

# Optimod FM

Optimod-FM is a revolutionary signal processing system for FM which replaces conventional compressors, limiters, and stereo generators with a single package. Optimod achieves up to 3 dB more effective modulation than conventional systems by eliminating stereo generator lowpass filter overshoot. Yet the unique Optimod lowpass filter fully protects the stereo signal from the distortion characteristic of stereo generators without filters.

The Optimod filter is complemented by broadband and high frequency limiters matched with unique psycho-acoustical accuracy to the characteristics of the ear. The result is unprecedented naturalness: bass is tight, midrange is detailed, and highs are open and transparent.

Installation is easy, and Optimod is fully FCC-authorized. For a reprint of our technical paper, and further information, we invite you to contact us directly at the address below. Price: \$2950.00

## orban / broadcast

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Marketing and Sales Agent  
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San Francisco, Ca. 94109

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Kurt Orban Company, Inc.

# here's News Out There...



## Farinon's Portable, Frequency-Agile Microwave Works It On The Air!

The new FV Portable Microwave system is available for all bands from 1.99 to 13.25 GHz. You dial-tune to your operating frequency in a spot. There's no need for bench-work when you set up a remote pick-up. No filter selection. You don't even need a screw-

You can plug in video monitors, or clampers, or up to three sub-carrier channels.

You can run 500 feet of cable between the RF head and the FMT or FMR remote unit without roll-off or equalization.

And you get 1-watt output level from 6.875 to 13.25 GHz, 5-watt output (optional 20-watt) from 1.99 to 2.11 GHz,  $\pm 0.002\%$  frequency stability; 60-dB signal-hum ratio from dc to 10 kHz, and 70-dB signal-noise ratio from 10 kHz to 5 MHz.

Farinon Electric, 1691 Bayport Ave., San Carlos, CA 94070, U.S.A. Tel. (415) 592-4120. Telex 34-8491.  
... in Canada: Farinon Electric of Canada, Ltd., 657 Orly Ave., Dorval, P.Q. H9P 1G1, Canada.  
Tel. (514) 636-0974. Telex 05-82-1893.



Circle 178 on Reader Service Card

## PRODUCTS

with automated mixdown equipment and electronic music synthesizers. Available in 8, 12, 16, 20, and 24 input channel formats, expandable as desired. RICHMOND SOUND DESIGN, LTD. **303**

**10-Meter Polar-Mounted video earth terminal** is designed to receive video transmissions from any domestic satellite. The terminal features 50 dB gain, all-aluminum construction, plus the ability to change rapidly from one satellite to another. The antenna is available either alone or as part of a complete system. RF SYSTEMS, INC. **304**

**Modular broadcast color television camera**, the BCC-1, was introduced last May at Montreux, Switzerland and was shown for the first time in the U.S. at this year's NAB convention. The head housing of the BCC-1 provides assembly, disassembly, and transport of the camera for use on location. The optical assembly is suspended on a single front casting, uses a hook-on lens mount with one-point suspension to permit quick lens change. A five-position filter wheel is sealed in the light-proof assembly. The tiltable viewfinder can be detached or rotated to either side during mainte-

nance. A return viewfinder feed enables the operator to view the same picture as that of the director. Prices for the BCC-1 range from \$70,000 to \$107,000 depending on accessories. AMPEX CORP. **305**

**VTR editing module**, the Model SM-2, is designed for use with VTR's such as the Sony VO-2850, VO-2800, BVU-200 and the JVC 8300. Search



capability is up to five times normal speed. The SM-2 also provides cue capability programmable from 1 to 10 seconds, and full transport controls, including fast forward, rewind, stop and play. \$1,600. CONVERGENCE CORP. **306**

**Tone encoder**, Model 501-A, measures 1½-in. × 1-in. wide × ½-in. high. The frequency range is 20 Hz to 3,000 Hz; stability is ±0.5% over a temperature range of -40°C to 100°C. Output is adjustable to 2.5 V rms.

ALPHA ELECTRONIC SERVICES, INC.

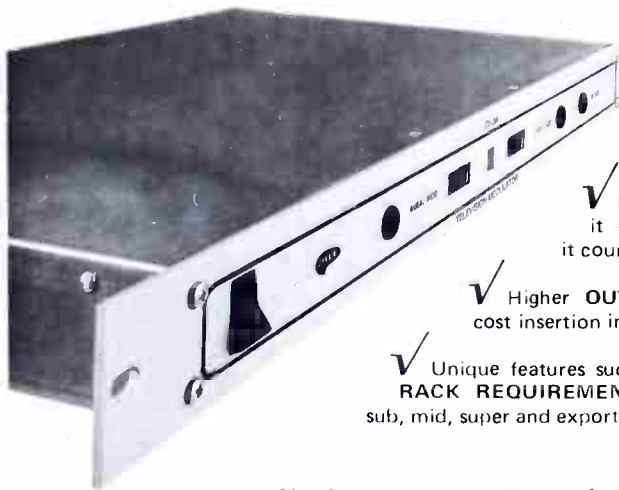
**Oil vapor removal filter** for the raffiltration of compressed air removing smoke, oil aerosol, particles (as small as 0.01 μ, nominal) and condensate moisture. Free air flow is 45 cfm at 100 psi and working pressure is 100 psi. Designed for a remote mount on tubing or hose, and it has a ¼-in. NPT inlet and outlet. Overall size is 5 (dia.) × 6-in. high. MOTOR GUARD CORP.

**Film processors**, one for the M process and the other for the VN process, are designated the Model (ME-4/VNF process) and model VNF (VNF process only). Each requires less than 20 sq. ft. of floor space. Film speed is 17 ft./min. HOUSTON PHOTO PRODUCTS, INC.

**Zoom lens** for 1-in. and ¾-in. C-mount vidicon cameras, Model V6x18-f1.6, has a speed of f/1.6 throughout the zoom range, a focal length of 18 mm at wide angle, 108 mm at telephoto. The lens has proper exit pupil for use with the S-Trinicon series models DXC-110, DXC-1200 and SXC-1600. manual version is \$775; a cable version is \$1,375. CANON, U.S.A., INC.

**Shoulder pod** for cine and

# What makes the DYNNAIR TX-3A the OUTSTANDING MATV modulator?



✓ It's video modulator is a **QUADRANT MULTIPLIER** which makes for better stability — better unit to unit consistency — better linearity at high modulation levels for superior color performance.

✓ Real **AUDIO STABILITY** keeps the sound where you want it — undistorted — all day — all night at the TV receiver when it counts — not just on the specification sheet.

✓ Higher **OUTPUT LEVELS** — +48 dBmV — enough to permit minimum cost insertion in many broadband systems.

✓ Unique features such as **TWO LEVEL METERS** — **REMOTE KEYING** — **MINIMUM RACK REQUIREMENTS** (1¼ inches) — **ALL CHANNEL AVAILABILITY** including sub, mid, super and export channels — plus **DYNNAIR RELIABILITY**.

Need any more reasons for specifying the DYNNAIR TX-3A for your next MATV application? Write for Bulletin No. 97.



**DYNNAIR ELECTRONICS, INC.** 6380 FEDERAL BLVD., SAN DIEGO, CA. 92114 PHONE: 714, 582-9211, TWX: 910-335-5



## BROADCASTING NOV. SECTION RETURNS?

Use costly, cumbersome displays, or quickchange 4" x 6" cards in the pensive tabletop **VersaTitle™** can all.

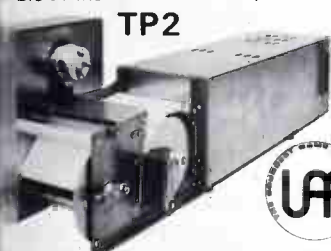
**VERSATILE** — feeds any video monitor • standalone, self-contained operation, illumination built-in.

**CLARITY REVERSAL** — flip of a switch converts black-on-white to white-on-black for greater legibility, and vice-versa.

**VTITLER** — your sync generator's drives let you title your tele-productions from typewritten or other inexpensive visual material, synchronized with program video.

**ROLLING TITLES** — accepts typed, written or drawn "visuals" on standard 4X6 cards or adding-machine paper for continuous "crawl".

**REMOTE CONTROL** — Forward, reverse and crawl Speed are controllable at the TP2 or remotely.



TP2



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## Heart Transplant



### Tape Recording Electronics

Modern recording capability for new or old recorders. 2-speed EQ, separate EQ for optional SYNC amp. "Linearized" record amp and phase-corrected reproduce circuitry. Fully remotable. Pin-compatible with most mixers, adaptable to many others.

Model 375, \$690.

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INCORPORATED

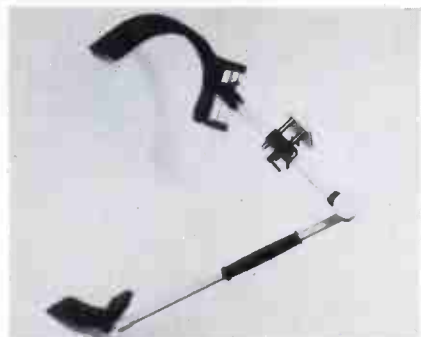
1630 DELL AVENUE, CAMPBELL, CALIF. 95008 (408) 374-8300

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1976—BM/E

## PRODUCTS

cameras, the Model MSP-75, weighs three pounds. Three adjustments suit it



to the cameraman's body, plus two other adjustments align it to his eye. \$180. VIDEO COMPONENTS, INC. 312

**Conductive heat-shrinkable polyolefin tubing** and molded shapes are alternatives to metal braid and connector backshell braid adapters. They provide lightweight, flexible EMI/RFI shielding and strain relief for cables,



connector terminations and coax splices. Called Cho-Shrink, the materials are coated with a silver-based resin which contacts the polyolefin without cracking. Typical shielding: 50 dB @ 100 MHz. Tubing is available in diameters of ¼-in. to 4-in. It shrinks to half its original diameter. CHOMERICS 311

**Digital time base corrector**, the CVS 520, is designed to handle segmented VTR's and signals from non-



segmented machines. Specifications include: signal-to-noise greater than 60 dB; differential phase less than 2°; differential gain less than 2%. The active video portion of the last 8 lines of vertical blanking may be individually selected to pass vit, vir, and other test signals. CONSOLIDATED VIDEO

continued on page 116



Recorder/Reproducer \$775  
(Reproducer \$550)

## So Much For So Little

### PD-II SERIES

A machine that records and plays mono tapes in the "A" size cartridge, stops automatically on the 1 kHz cue tone and offers you longer life, less maintenance and better performance than any other cartridge machine at an economy price.

### Compare For Yourself

- Quiet air-damped solenoid
- Flat, stable ½ inch solid aluminum deck
- Micro-adjustable head assembly
- Direct-drive capstan motor
- Trim design - 3 units fit side-by-side in a 19 inch equipment rack
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## PRODUCTS

SYSTEMS, INC.

313

**Automatic lifeline safety system,** Model 6006, consists of a safety lifeline and 1/2-in. dia. three-strand nylon



rope having a minimum breaking strength of 6,000 lbs. Lifeline is threaded onto the rope and, once attached to the worker's safety belt, allows free vertical movement during normal working conditions. It travels up and down freely without manual adjustment and meets OSHA require-

ments. **RESEARCH & TRADING CORP.** 314

**Rain covers** for CP-16 reflex and non-reflex cameras are made of



naugahyde. Available in two versions: Model 1L255 is for CP-16R cameras, Model 1L134 is for CP-16. Both versions permit access to camera controls. \$74 each. **CINEMA PRODUCTS CORP.** 315

**Telephone line equalizer,** the Model 133, uses a 25 dB gain-regulating amplifier to compensate for flat line loss. The basic frequency response is from 10 Hz to 70 kHz. Impedance is 135 ohms. Balance and impulse noise is specified at 20 hits in a 10 minute period with a threshold of 54 dBRN from 40 Hz to 50 kHz bandwidth. **TM SYSTEMS** 316

**Film-sound console,** the AVEX-1, is a self-contained, 4-ft., film/sound production facility. Some of the con-

**ENTER GREAT IDEAS CONTEST, PAGE 111**

sole capabilities are direct tape magnetic film stripe transferring on or 35 mm, work track preparation, fingertip control pick-up record. Standard models are available with 3-, and 4-track master recorder, 1 3/4 35 mm. **MULTI-TRACK MAGNET INC.**

**RF peak wattmeters,** the Model 4314, a directional peak & cw instrument, costs \$395, down from \$475. Frequency and power ranges 0.45 to 2.3 GHz from 1 watt to 101 depending on the plug-in element selected. **BIRD ELECTRONIC CORP.**

**Oscilloscope** with digitally-delayed timebase, the PM3261, features 100 MHz bandwidth, 3 ns-risetime vertical amplifiers, main and delayed-sweep time bases with 5 ns/division minimum sweep speeds, triggering beyond 200 MHz. Additionally, a search mode is provided in which the scope slowly scans a selected part of the stream for checking contents for presence of glitches. The LED display provides indication of the bit being checked. \$2,495. **PHILIPS TEST MEASURING INSTRUMENTS**

## Reduce your replacement costs with Beau audio heads.



Stereo Heads: \$69.50



Mono Heads: \$19.00

From the maker of Beau motors and Beaucart cartridge tape machines comes a broad new line of long-life audio replacement heads. Cost savings techniques and quantity production permit the introduction of moderately priced, quality audio heads to the replacement market. Remember: These tape heads fully meet all applicable NAB cart machine standards.

Beau audio heads are available from stock and may be used in Ampro, ATC, Beaucart, Collins, Garron, Gates, ITC, RCA, Sono-Mag, Sparta, Spotmaster, and other popular machines. Order as follows:

Mono Heads: \$19.00				Stereo Heads: \$69.50	
Nortronics P/N	Beau P/N	Nortronics P/N	Beau P/N	Nortronics P/N	Beau P/N
2003	BH 2001	2051	BH 3002	5701	BH 5001
2053	BH 2002	2057	BH 3003	5703	BH 4001
2002	BH 2003	2052	BH 6001	5751	BH 5002
2001	BH 3001			5753	BH 4002

Prepaid shipment if check accompanies order

Other models available. For further information and electrical specifications, please contact the factory directly at (203) 288-7731.

**UMC** BEAUCART DIVISION  
UMC ELECTRONICS CO.  
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**TV TRANSLATORS**

**TV TRANSMITTERS**

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VS continued from page 20

representatives for certain Setchell on Video products . . . . **Town Associates**, a Massachusetts manufacturer of TV transmitting equipment, has announced a licensing agreement with NERA A/S, a Norwegian company which has been producing V transmission equipment for the international market since 1960.

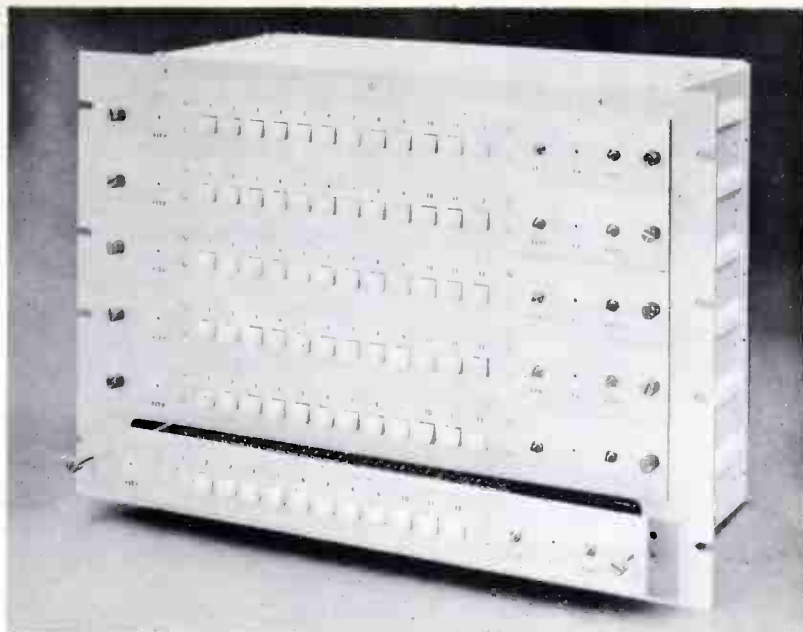
An agreement has been reached between **RCA Corp.** and **GTE Sylvania**, for the sale of machinery, parts, materials, work in process and technical data related to the manufacture of Nuvistors and certain other vacuum tubes that were produced at the RCA plant in Harrison, N.J. As a result of this understanding, the plant closed last April 30 . . . . An agreement to acquire Corotek Corp. of San Grove, Calif. for cash of an undisclosed amount was announced by **Basic Industries** . . . . A firm in Richmond, Va. that produces musical equipment for radio and TV advertising, and film production has been acquired by **R. Lawrence**, founder of **Cambridge Productions** . . . . The company's N.Y. CATV system has been acquired by **Stefran, Inc.**

**Broadcast Electronics, Inc.**, Silver Spring, Md. has announced the appointment of Neff Communications of Washington, Md. as its representative for sales and negotiations with all federal government agencies . . . . **System Concepts**, a national sales office for the Eastern region, has been named to represent nationally **System Concepts**, **Automatic Electronics**, and **SSC** . . . . a group of manufacturers specializing in program automation equipment . . . . **Bird Electronic Corp.** announced the establishment of a regional sales office for the Eastern region at 800 Olde Hickory Road, Lancaster, Pa. 17601; 717-569-0467.

**WIS Radio** announced that on March 1st **WITH Radio**, Baltimore, and **WKHM Radio**, Jackson, Mississippi became Network affiliates . . . . **Video Group, Inc.** of Detroit has changed its name to **videogroup** . . . . **Business Music of Arkansas, Inc.**, a franchisee for Central Arkansas, now offers **MUZAK EMERGENCY WARNING SYSTEM** (VS) as part of its 24-hour service.

President Vincent T. Wasilewski testified to the Radio Board of Directors of the **National Association of Broadcasters** recently a multifaceted program designed to provide additional services for its radio members. One aid to radio is the promotion of Charles T. Jones Jr., to the newly created post of Vice President for Public Affairs . . . . Two **IVC 9000** tape recorders have been donated to **MCA Disco-Vision Inc.**

continued on page 118



# Routing Switcher

- 12-input switcher can be expanded to any desired number of outputs
- Each switch module contains separate power supply
- Available options include solid-state crosspoints, clamping and audio switching with built-in transformerless audio distribution amplifier

**DYNASCIENCES** | video products

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just a few pointers on the Clubman Two disco mixer...

**Bass, Middle & Treble Controls** giving 12dB of cut or boost so a pre-amp is not required.

**Twin Phono Inputs** so both turntables can be played together & professional fade-ins achieved.

Set your voice level with its own **Volume Slider**.

**The Tape Input** allows special effects and tapes to be added.

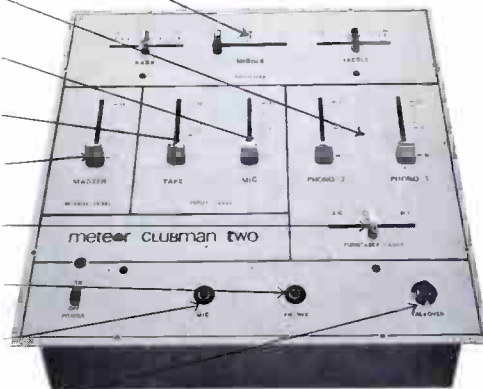
A **Master Volume Slider** to set overall system level.

**Pre-Cue** play one turntable while cueing up the other or the tape.

**Headphone Output** from 400 to 10K impedance.

**Mic Input** accepts any impedance microphone.

**Talkover Button** with its auto fade recovery makes voice talkover easy.



**Clubman Two mixer** -

just 1 of over 320 products in the Meteor disco range.

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light and sound company

Circle 186 on Reader Service Card

## NEWS

Torrance, CA and will be used to transfer videotape copies of movie films to Disco-Vision discs. With the delivery of the MCA recorders, IVC has produced over 100 9000 recorders . . . . Station **KNTV**, San Jose, Calif., has acquired two ACR 25 video cassette recorders . . . . New York State Assemblyman Jose E. Serrano has sponsored Legislative action resulting in the appropriation of \$50,000 to the **New York State Commission on Cable Television** for the development of the South Bronx Media Access Center . . . . Construction has commenced on a new CATV system on **Saipan** in the Mariana Islands, which is soon to become a U.S. Commonwealth.

**Continental Electronics Mfg. Co.** of Dallas has been awarded a \$3,305,551 contract from General Electric Co. for the design and manufacture of radar transmitters and related equipment for use in an Over-The-Horizon Prototype Radar System (PRS) . . . . A \$1.6 million contract has been awarded **CCA Electronics** by the U.S. Army Corps of Engineers for the installation and one year maintenance of a multichannel radio network in Saudi Arabia . . . . **Magnetic Components Ltd.** has received world-wide orders for over \$600,000 for cassette-

and cartridge-player recording-heads.

A new company, **EAGLE Com-Tronics**, has been formed to supply electronic products to the CATV industry. For more information contact A.F. Tresness, EAGLE Com-Tronics, 8016 Chatham Dr., Manlius, NY 13101; 315-682-2650 . . . . **Television Technology Corp.** has moved to 5970 W. 60th Ave., Arvada, CO 80003; 303-423-1652 from Maryland . . . . The definitive agreement to merge Rixson-Firemark, Inc. into a subsidiary of **Conrac Corp.** has been authorized by the boards of directors of both companies and will be submitted to their shareholders . . . . **Dropped digit correction:** 44 Fernseh KCU cameras were used at Winter Olympics, not 4 as stated in caption on pg 38, April BM/E.

## Meetings

The **Canadian CATV Association** has announced that it will hold its 19th Annual Convention June 1-4 at the Four Seasons Sheraton Hotel, Toronto, Canada. For more information call 613-232-2631 . . . . The Fifth Annual **Public-Cable Conference** will be conducted on the campus of Kutztown State College on June 3 and 4. The Conference theme is "Public Service Cable At The Crossroads." Contact Dr. Robert P. Fina, Kutztown State

College, Kutztown, Pa. 19530 details . . . . Imero Fiorentino Associates has announced that its four **Television Lighting & Staging Seminar/Workshop** will be held June 7-9 at the Univ. of Wisconsin's new Tel communication Center, Madison, Wisconsin. For further information contact the Education Div. of the company at 212-787-3050 . . . . An intensive, full-time, five-week **Film Production Workshop** will be offered at New York University's School of Continuing Education starting Monday June 28. All materials, laboratory services and instructions are included in the \$725 tuition. For further information call 212-598-2375 . . . . The 19th Annual **Motion Picture Laboratories Seminar** will be held July 1 and 24 at Memphis State University Memphis Tenn. For further information write MPL Seminar, Box 1758, Memphis, Tenn. 38101 . . . . **IFSA, the International Scientific Film Assoc.**, will hold its 30th annual congress and festival from August through 14 in conjunction with SCOM '76 in Philadelphia. For further information contact SCI/COM University City Science Center, 36 Market St., Philadelphia, Pa. 19101 . . . . The fourth annual **Midwest Seminar on Videotape and Film** will be held October 8 and 9 in Chicago

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## THE NECESSITY ACCESSORY

*Because Your TV Zoom Lens  
Can't Give You . . .*

- **SUPER WIDE ANGLES.** Use lenses up to 180 degrees.
- **MACRO FOCUSING** for extreme closeups.
- **SPECIAL EFFECTS** including Anamorphic squeeze, controlled distortion, multiple, split and rotating images and many other effects.

Now with the new Comquip Adaptor use virtually any motion picture and SLR lenses on studio and portable color TV cameras . . . plus the new electronic TV news-gathering cameras . . . for far greater flexibility in studio and location production. You can even use your favorite Cine or SLR zoom lens on it. And there's no loss of light or vignetting. Adaptor is equipped with built-in iris, focusing mount and choice of camera mount.

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CART MACHINES

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Custom 3000 Series for "A" size  
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- Record/Playback
- Playback Only
- Single Units
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- Stereo

Automatic fast-forward standard

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 ar on Videotape and Film, P.O.  
 1376, Chicago, Ill. 60611 . . . .  
 ites for SMPTE's 118th Techni-  
 onference and Equipment Ex-  
 have been changed to October  
 This is a week earlier than origi-  
 nounced. The Conference and  
 it will be held at the Americana  
 lin New York. For information  
 at SMPTE, 862 Scarsdale Ave.,  
 sale, NY 10583, 914-472-6606.

from \$7,335,000 in 1974.

**Wometco Enterprises** reports that  
 in its fiscal 1975, revenues were  
 \$180,677,000 compared to  
 \$160,871,000 in 1974 an increase of  
 12.4%, and net income was  
 \$11,615,000 compared to \$9,007,000  
 in 1974 an increase of 28.9%.

The **Zenith Radio Corp.** Annual  
 Report 1975 shows net sales of \$901  
 million compared to \$911 in 1974,  
 income before taxes of \$45 million  
 compared to \$15 million in 1974,  
 income taxes of \$19 million compared  
 to \$5 million in 1974, and a net income  
 of \$31 million compared to \$11 million  
 in 1974.

## Financial Briefs

1975 Annual Report, **Cox**  
**roadcasting** reports revenues of  
 \$46,028, a 10% increase over  
 1974. Its income before taxes was  
 \$28,902, a 8% increase over 1974  
 the company's net income was  
 \$4,490, a 12% increase over

**B/CECO Industries** has re-  
 corded both increased revenues and  
 profits for the six month period that  
 ended November 30, 1975 with net  
 earnings up 207% over the same period

**Fairchild Industries** has  
 reported that its financial results for  
 the fourth quarter and the year ended  
 December 31, 1975 showed fourth  
 quarter earnings were \$1,195,000 or  
 \$1.19 per share on sales of \$56,570,000.

**General Electric** compares with earnings of  
 \$2,000 of \$.25 per share on sales  
 of \$142,000 for the fourth quarter of  
 1975. For the full year 1975, earnings  
 were \$3,198,000 or \$.70 per share on  
 sales of \$218,538,000. This compares  
 with earnings of \$6,022,000 or  
 \$1.20 per share on total sales of  
 \$492,000 in 1974.

**General & Western Industries** has re-  
 corded the highest net earnings for any  
 quarter or first half in its history for the  
 first six months ended January 31,  
 1975. Net earnings for the second quar-  
 ter of fiscal 1976 advanced by 43% to  
 \$32.7 million from \$32.7 million in  
 1975. Net earnings for the six months  
 ended January 31 advanced by 45% to  
 \$92.8 million from \$64.2 million recorded last year.

**General Standard** has announced  
 audited financial results of 1975.  
 Sales for the nine months ended  
 December 31 were \$25,923,124 com-  
 pared to \$24,760,250 in 1974, net  
 earnings is \$808,000 compared to  
 \$700,000 the previous year, dividends  
 per share were \$.15 compared to \$.135  
 in 1974.

**General Prompter Corp.** has reported  
 that 1975 revenues increased to  
 \$848,000 from \$86,809,000 in  
 1974 — an improvement of  
 17%; the corporation's net  
 earnings declined to \$4,387,000 in 1975

## People

The Board of Directors of Multronics  
 Inc. has announced the election of  
**John F. Watter** to the office of Presi-  
 dent . . . . **Neal P. Monda** has been  
 elected Vice-President and General  
 Manager of Q.E.I. Inc. . . . . **Nat C.**  
**Myers, Jr.**, has joined Goldmark  
 Communications Corp. as Vice Presi-  
 dent . . . . **Thomas J. Brady** has

been named Vice-President, Finance  
 for RCA Global Communications  
 . . . . **John M. Seavey** has been  
 named Vice-President of Engineering  
 for RF Systems Inc. . . . . **Brian**  
**Matley** has joined Micro Consultants,

Inc. as Vice-President of Engineering  
 and Chief Technical Officer and  
**George Grasso**, formerly Marketing  
 Vice President of CEI, has joined the  
 company as Vice-President of Market-  
 ing . . . . **Louis A. Arpino** has been  
 appointed Vice-President and General  
 Manager of the Rhode Island Div. of  
 Ampere Electronic Corp. . . . . GTE  
 Sylvania has announced that **J.**  
**Clayton Stephens** has been appointed  
 Western Regional Vice President-  
 Marketing and that **James A. Roden**  
 has been appointed Manager-  
 Marketing Information.

Zenith Radio Corp. has promoted  
**James A. Stark** to Executive Direc-  
 tor, Purchasing . . . . **Bill Mansfield**,  
 a Datatron founder, has resigned as a  
 full time employee to join Electro  
 Units, Inc., a San Jose based start-up  
 company. Mansfield will remain a  
 Datatron Director and Consultant

. . . . **David L. "Les" Werschker**  
 has been named to head Image Trans-  
 form's new United Kingdom-Europe  
 operation . . . . Scientific Atlanta has  
 appointed **Joseph O'Connor** as Man-  
 ager of its Optima Division and has  
 appointed **John Edwards** to the  
 newly-created post of Director of Ad-  
 ministration and Operations . . . .

**John H. McGuire** has been promoted  
 to Director of Minicomputer Services

continued on page 120

# Tidy Up Your SWITCHERS

## NEW Video Delay replaces cable



**MATTHEY TYPE No. UN097**  
**FEATURES**

- 75Ω Passive Delay
- Adjustable Delay without Switches
- ±4ns Trim by Screwdriver Adjustment
- BNC Connectors
- Video Performance
- Delay Range 15ns min. to 665ns max.
- Replaces up to 437ft. of coax.

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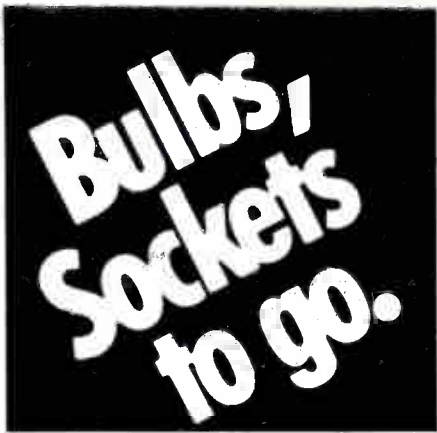
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## NEWS

for Cox Data Services . . . . **John Bridal** has been named Manager of Special Accounts at Ditch Witch, a Division of Charles Machine Works . . . . United Systems Corp. has appointed **Richard Pitner** to the position of Product Manager for digital printers, thermometers and data acquisition systems and components . . . . **Mrs. Bonnie Kraig** has been elected Corporate Secretary for Goldmark Communications Corp.

**William R. Brock** has been appointed Manager, Dealer Sales for Auditronics, Inc. . . . . **E.D. (Don) De Cesare** has joined the Teleprompter Corp. as Director of Marketing . . . . **William Adikes** has been appointed Marketing Manager of the Thomson-CSF Electron Tubes Div. of DuMont . . . . **Fredrick W. Feuerhake** has been appointed Director of Export Sales and Licensing for the Entertainment Products Div. of GTE International . . . . **James M. Hollen** has been appointed Sales Supervisor, professional recording & broadcast markets, Magnetic Audio/Video Products Div., 3M Co. . . . **Donald V. Pascarella** has been appointed Vice President, Sales of the

## NEWS

CATV Div., Oak Industries Inc., and **Joseph W. Spells, Jr.** has been appointed Manager of Engineering . . . . **Gerald J. Sperry** has been named General Sales Manager of "videogroup" in Detroit.

**John J. Schroder** has been appointed Eastern Regional Sales Manager for Nikko Electric Corp. . . . . RCA Broadcast Systems has announced that **Paul Bergquist** has become Manager, Midwestern Area Sales and **Ray Harding** has been appointed Western Area Sales Manager.

**Frank Maynard** has been appointed Chief Engineer of stations WILS and WILS-FM, Lansing, Mich. . . . . KEVN-TV/KIVV-TV has announced that **Don Stafford** has joined its staff as Chief Engineer and **Jim Kozora** has joined its staff as Assistant Chief Engineer . . . . **Robert W. McDermott** has been named General Manager of Radio Station WKKE, Asheville, North Carolina . . . . KYTV, Springfield, Mo. has announced the appointment of **Raymond A. Gilvard** as Program Director . . . . WJCT, Jacksonville, Fla. has announced the appointment of **Richard V. Brown** to the new position of Vice President for Programming and **Eric Sasse** has been promoted to Vice President of Development . . . . WCBS-FM, N.Y., NY has promoted disc jockey **Jack Miller** to the position of Music Director.

The appointment of **Rita Sands** as a CBS Radio News Reporter has been announced . . . . The National Association of Broadcasters has announced the appointment of the following radio station executives to the Small Market Radio Committee: **David Brown**, president and general manager, WTVL AM & FM, Waterville, Me.; **Glodean Kent**, vice president and general manager, KKZZ & KOTE FM, Lancaster, Ca. and **Ernest Sparkman**, owner and manager, WKIC-WSGS, Hazard, Ky. . . . . The National Cable Television Association has announced the following personnel changes; **Thomas E. Wheeler** has been named Executive Vice President, Director of Government Relations; **Don Shuler**, **Carl Gainer** and **Patrick J. Nugent** have been elected to the Board of Directors; and **James H. Doolittle** has been elected District Five Director (North Carolina, South Carolina, Georgia, Alabama, Florida and Mississippi) . . . . **Douglas I. Sheer**, Advertising and Sales Promotion Manager of JVC Industries, has been elected to the Board of Directors of the National Audio Video Assoc. . . . **Eric**

**Hauenstein**, Vice President and General Manager of Radio Station KD Mesa, Ariz., has been named Program Chairman for NRBA's National Radio Broadcasters Conference & position.

Former Senator **Sam J. Ervin**, of North Carolina was the first recipient of the NAB's annual Grover Cobb Memorial Award at this year's convention for his work in improving broadcasting's relationship with the federal government . . . . **Sam Da** for a CBS Radio Mystery Theater script, and **Norman Morris** and **I. Minor**, for "The American Heritage," have been named winners in the 1975 Writers Guild of America Annual Script Awards competition . . . . The NCTA has presented **V. Schneider** with the Robert H. Isswenger Memorial Award for total involvement and commitment to the CATV industry and **Richard Hickman** of Cox Cable Communications, and **Archer S. Taylor**, an engineering consultant, have been named recipients of the Technical Achievement Awards . . . . The American Society of Lighting Directors presented Gold Honor Awards and honorary memberships to GTE Sylvania Inc. and three of its executives: **Melvin H. Moehring**, **Thomas Holland** and **Dr. Robert E. Levi**

**Kenneth V. Jaeggi** has been promoted to the position of Director of Manufacturing/Material Financial Control, at Zenith Radio Corp. . . . **Dr. Wesley H. Weisenberger** has joined Communications Trans Corp. as Manager of Research and Development . . . . Sola Basic Industries has announced that **Glenn E. F** will head the Electronics and Communications Group consisting of Diltic Communications, Sola Electric Warren G-V Communications divisions . . . . **R. Don Webster** has been appointed Manager, Marketing Analysis, for GTE Lenkurt Inc. **Douglas C. Johnson** has been appointed Marketing Manager of Bell Laboratories . . . . **Ronald B. W** has been named Manager of Communications Corp.'s System Programming Dept. . . . **John F** has been appointed Manager of Materials for Theta-Com . . . .

**Frank J. Morris**, West Coast Manager of the NAB's Code Authority died of a heart attack January 26 at the age of 56 . . . . **Ernest E. Free Jr.**, President of General Instrument Corp subsidiaries Chicago Mini Lamp Works and Drake Manufacturing Co., died January 26 at the age . . . . **Richard J. Raiczky**, Sr. Assistant Controller of CCA Electronics died of a heart attack on February the age of 52.

continued on page 2

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radio broadcaster seeking operations executive to serve as administrative assistant to the President. Duties include coordination of station day-to-day operations with office, including the supervision of engineering projects with each station's chief, with good technical background preferred. Salary commensurate with experience and capability. Write in complete confidence detailing experience and general background to: Box NY5-2 c/o BM/E Magazine 295 Madison Ave., N.Y., NY 10017.

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#### West Coast Sales Engineer

Professional audio console manufacturer requires aggressive sales engineer to establish West Coast Office. Solid background in professional audio sales and/or engineering with minimum of 5 years experience. All replies treated in confidence. Send resume and salary requirements to: Box #NY5-3, BM/E Magazine, 295 Madison Ave., N.Y., NY 10017.

**MAINTENANCE TECHNICIAN:** An opening with a Hallmark Cards subsidiary in Crown Center, Kansas City, Missouri. We need a Maintenance Technician for a closed circuit color TV system. Cameras include both studio and ENG type equipment. Emphasis on 4-in. U-MATIC video cassette format. RF or MATV experience helpful, but not necessary. In addition to a good salary commensurate with experience, we offer outstanding benefits including company-paid hospitalization, life insurance and profit sharing. Call Virginia Kirlin, collect, (816) 274-5663. Hallmark Cards, Kansas City, Missouri 64141. An equal opportunity M/F employer.

**ELECTRONIC TECHNICIAN** — operation and maintenance of Norelco, Ampex and CDL equipment preferable. Opening available immediately at full service Midwest quad tape facility. Send resume and date available to: Box NY5-1, c/o BM/E Magazine, 295 Madison Ave., N.Y., NY 10017.

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**CARTS** — All good. 50¢ each in lots of 50. KKZZ, Box 1152, Lancaster, CA 93534.

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SA 141



DA 504



CS 9100



OT 157



- SA 141** Tape input switcher which mounts in a reel to reel overbridge; selects twenty remote sources of variable levels from -20 to +8 dBm and amplifies them to two selectable outputs. Supplied is a three watt monitor output with speaker and headset jack.
- DA 504** Audio Distribution Assembly consisting of six amplifiers, twelve outputs for each amplifier and power supply wired in a 5 1/4 inch rack mounting frame.
- CS 9100** Ten station intercom system consisting of all input amplifiers, output amplifiers, crosspoints, a power supply and packaged in a 5 1/4 inch rack mounting frame.
- OT 157** Multi-frequency Oscillator consisting of 19 frequencies from 20 Hz to 20 kHz, output levels adjustable in 11 pre-steps from -70 to +18 dBm, balanced output impedances of 150 and 600 ohms. Packaged in a case measuring only 1 1/8 in. Wide by 5 1/4 in. High by 6 1/8 in. Deep.

**MCCURDY RADIO INDUSTRIES INCORPORATED**

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