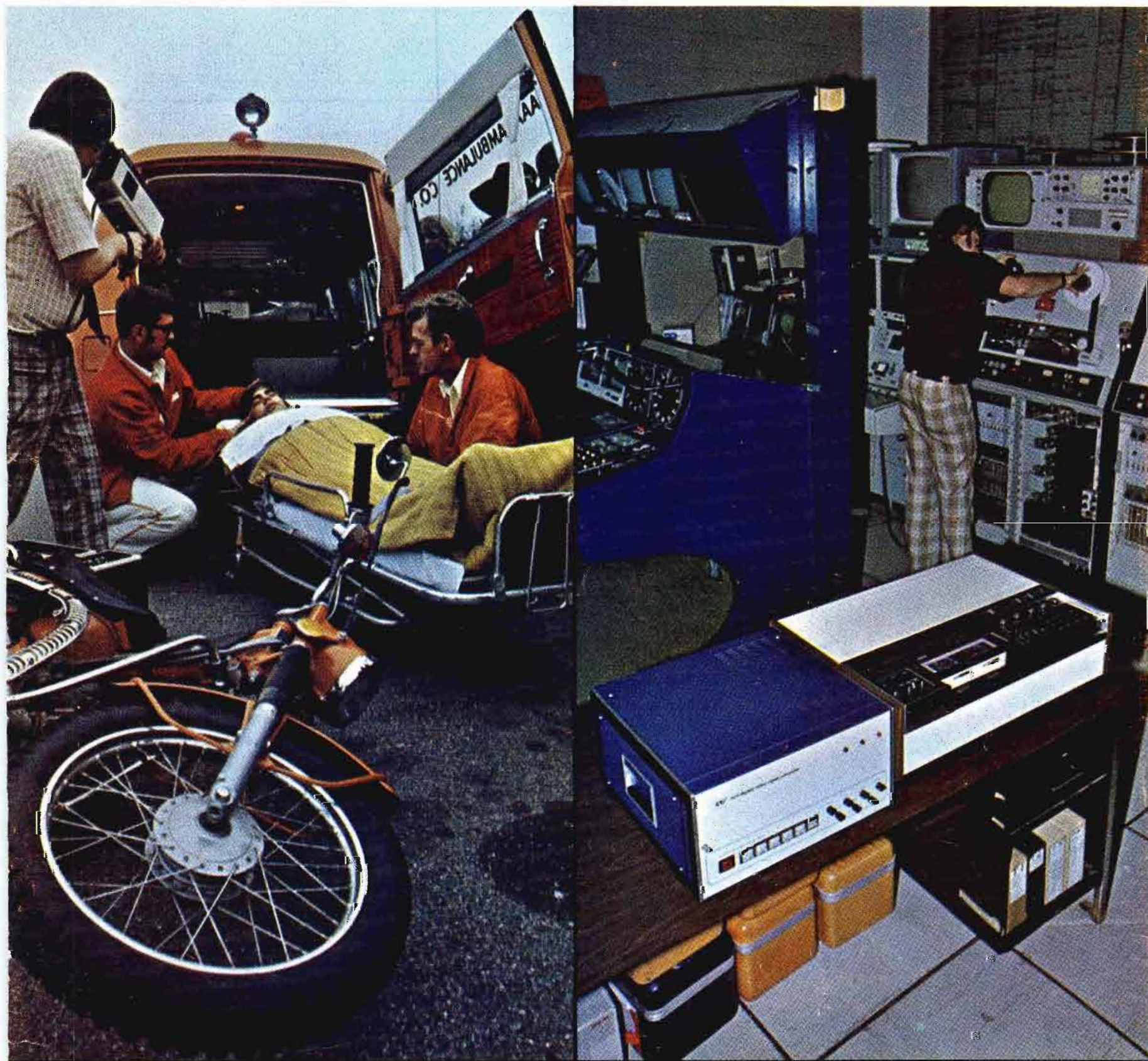


# BROADCAST **engineering**

January, 1975/75 cents



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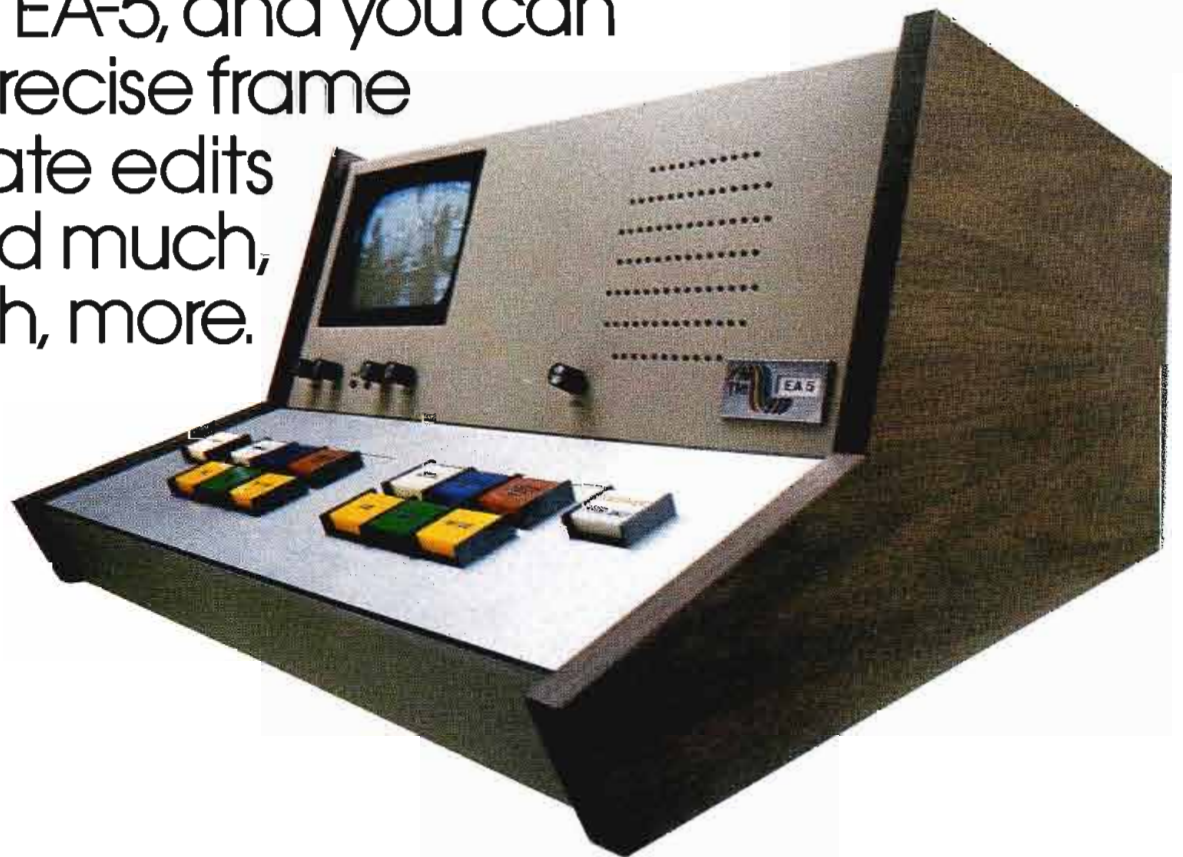
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COMMUNICATIONS AND  
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For More Details Circle (2) on Reply Card

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This electronic journalism cover tags our theme for the month, and was made possible by the ingenuity of Bill McDonough and photographer Donna Roizen.

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Robert A. Jones, *Facilities*  
Walter Jung, *Solid State*  
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Joe Roizen, *Video*  
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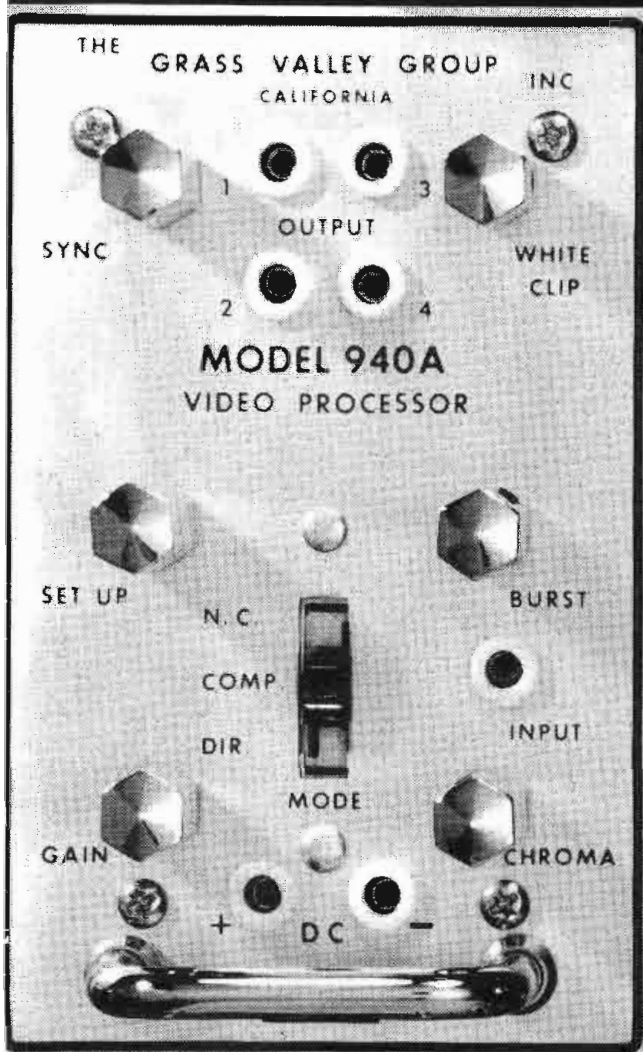
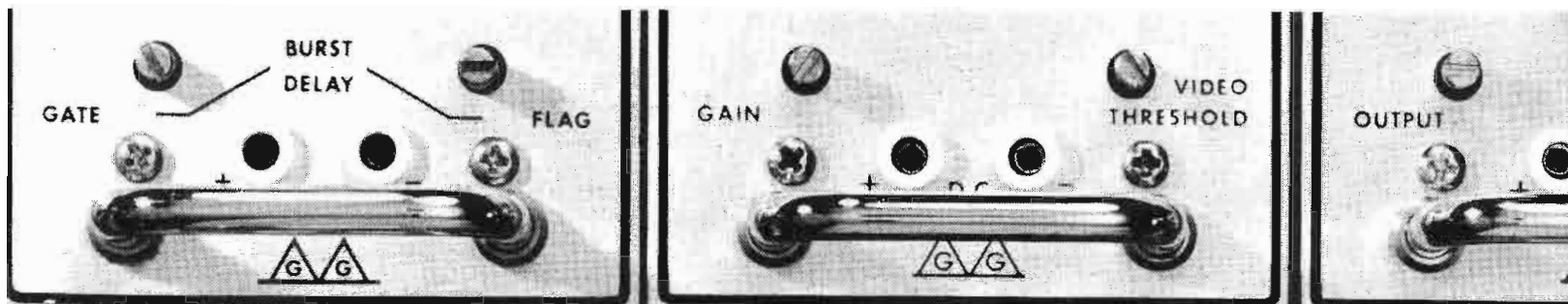
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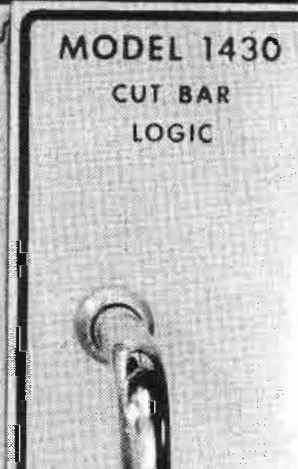
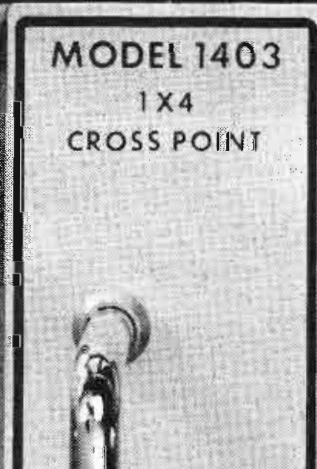
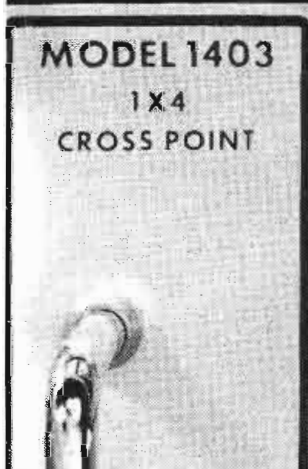
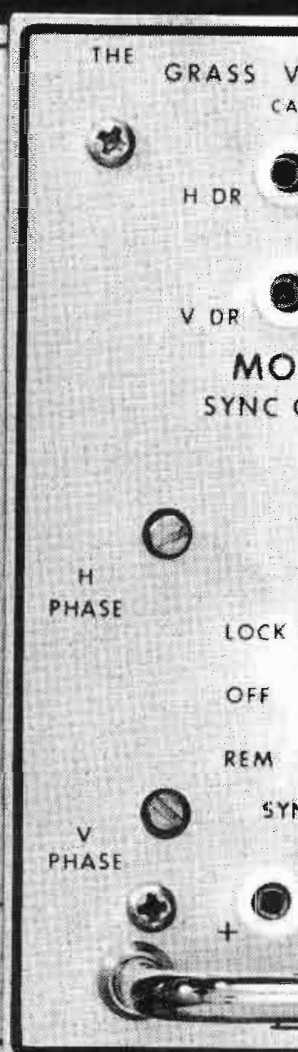
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# DIRECT CURRENT FROM D. C.



January, 1975 / by Howard T. Head

## Commission Proposes Relaxed AM Assignment Rules

The Commission has proposed to relax the AM assignment Rules in cases involving power increases for existing stations. The present Rules permit such increases only where less than 80 percent of the principal city is adequately served and the power increase would improve the principal city coverage. Under the new proposal, the 80 percent requirement would be done away with. Existing interference standards would continue to be observed, and no increase is proposed in the maximum power permitted for a given class of station.

The Commission's Notice points out the increasing difficulty of providing adequate coverage to rapidly expanding metropolitan areas. The problem is compounded in frequent instances by the difficulty of obtaining suitable transmitter sites, and the restrictions imposed on coverage by directional antenna patterns.

The existing requirement for a special showing when the 5 mV/m contour of a suburban station invades the central city would continue to be invoked. The new proposal would not apply to applications for new AM stations, and the more than 1000 Class IV stations on the six local channels are specifically exempted from the proposed power increase.

## VIR Signal Standardized

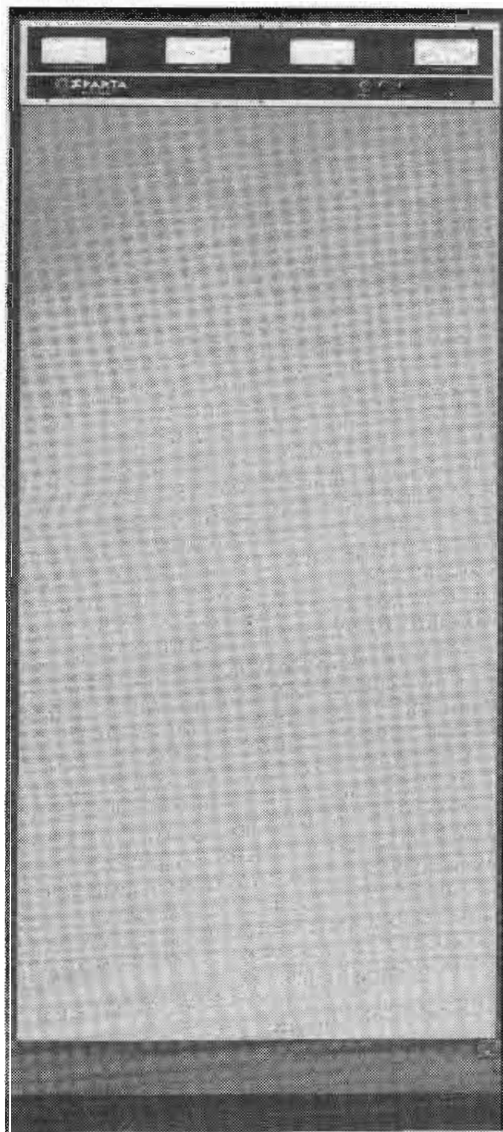
The Commission has amended the television rules to permit the transmission of a Vertical Interval Reference (VIR) Signal as a means for improving the quality of color transmissions. The signal standardized is essentially the same as that described in the article on Page 32 of January, 1971 Broadcast Engineering, the only exception being that the signal is to be inserted on line 19 of the TV raster rather than line 20 as originally contemplated.

The use of line 19 for the VIR signal will require that the VIT signals now transmitted on lines 18 and 19 for remote control operation be moved to lines 17 and 18. This change must be accomplished by November 15, 1975.

(Continued on page 6)

# “Nothing astonishes men...

so much as common sense and plain dealing”, wrote Ralph Waldo Emerson. We’ll settle for impressing our common sense on you with a few features of the Sparta Model 701B. Plain facts, more than anything astonishing, always explain better why Sparta broadcast equipment should be compared to that of other makers before you arrive at a buying decision.



Sparta 701B 1 kw AM XMTR	Other Maker #1	Other Maker #2	Other Maker #3	
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Plainly, after you’ve checked which other makes of 1 kw AM transmitters have some of these INDIVIDUAL features, you’ll see that the 701B has the ASSEMBLY of standard features which make it your best choice. And this is just ONE example of why you should always consider Sparta in your equipment selection.

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### FCC Modifies Procedures in Adding FM and TV Channel Assignments

The Commission has revised the procedures to be followed in requests for changes in the tables of FM and TV channel assignments. The changes are procedural only and the required mileage separations for both FM and TV remain unchanged.

Under the new procedures, requests for new channel assignments must continue to be accompanied by a showing of channel availability, and in the case of FM, by the usual "preclusion" study. In addition, copies of proposals must be sent to all licensees and permittees affected by the change and a draft of a Notice of Proposed Rule Making (to be issued by the FCC) must also be supplied.

### Environmental Policy Procedures Adopted

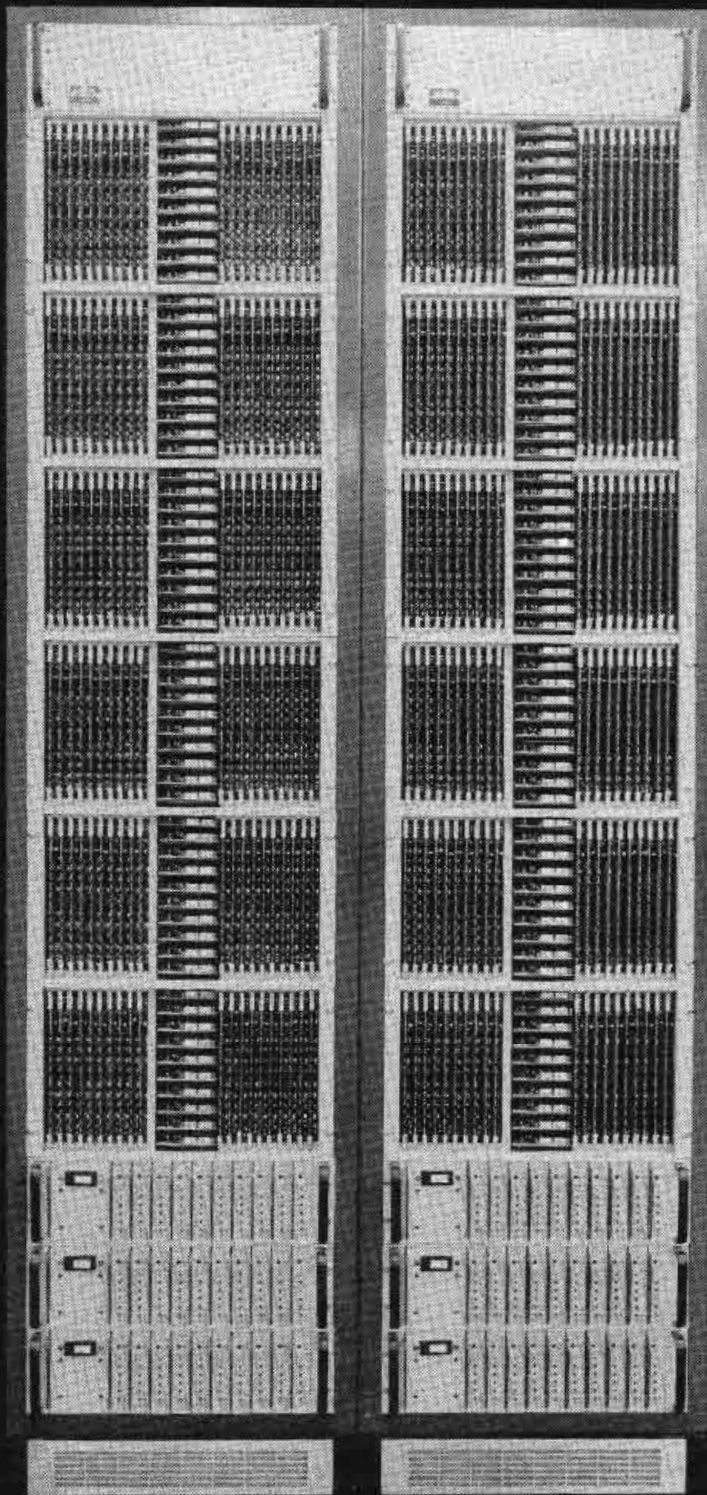
The Commission has adopted new rules identifying types of facilities requiring environmental study. Information relating to affected proposals must be submitted to the Commission with applications for construction permits.

Of particular interest to broadcast applicants are requirements including all AM, FM, and TV towers or supporting structures over 100 feet high. Also included are any structures more than 300 feet in height and all AM directional arrays regardless of height, and microwave supporting structures over 100 feet high in a wide variety of recreational and wilderness areas, including those recognized either national or locally for their scenic or recreational value.

### Short Circuits

A land mobile trade association has asked for the re-allocation of a portion of the 450 MHz broadcast auxiliary band to various land mobile services...A two-tone signalling system has been adopted to replace the existing EBS attention signal...The Commission has eliminated its requirement that cable systems with 3500 or more subscribers engage in local origination, and has substituted a requirement simply that these systems have equipment available for local production and cablecasting...The U.S. has reached an agreement with the Commonwealth of the Bahamas for pre-sunrise operation on 1540 kHz, a Bahamian clear channel...Broadcasters have strongly supported a Commission proposal to outlaw power amplifiers capable of being used illegally in the 27 MHz Citizens Band...The inspection of TV transmitters operated by remote control is now required only once a week instead of five days a week as previously required.





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The 900 is the ONLY system to feature a "developed for television" Integrated Circuit Crosspoint to *discretely* switch video-audio-tally, all with superb specifications.

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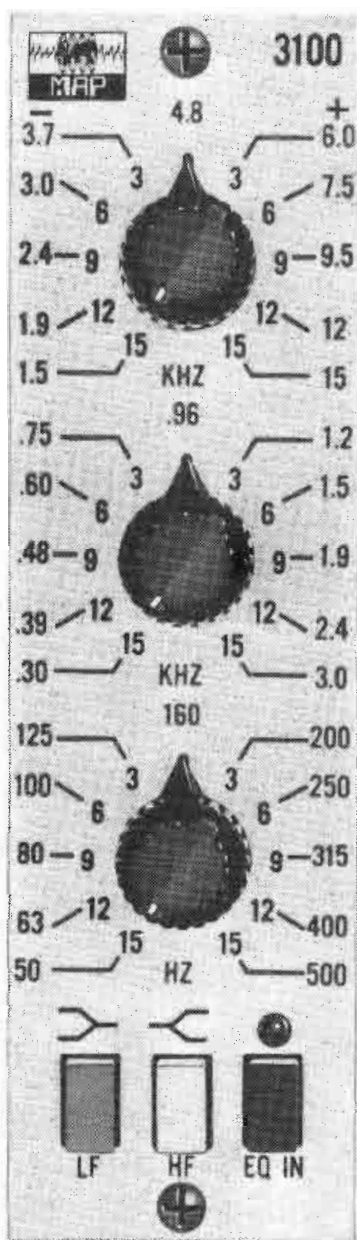
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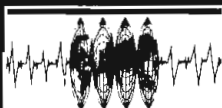
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## FCC amends TV rules

The Commission has amended its rules to reduce required inspection, calibration and testing of television remote control equipment and transmitters from five days a week to once each week. It also deleted the requirement for transmitter backup facilities for the stations.

Section 73.676(g) of the rules requires each television broadcast station operated by remote control to conduct a transmitter inspection, and to calibrate and test remote control equipment at least five days each week, with not less than 12 hours elapsing between successive inspections. That rule also provides that inspection, test and calibration may be conducted at weekly intervals if the station maintains transmitter backup facilities capable of providing service with at least 20 percent of authorized power, should the main transmitter malfunction.

The requirements of Section 73.676(g) were adopted March 17, 1971, by the First Report and Order in Docket 18425, which extensively amended the rules governing the remote control of television broadcast stations, and for the first time, permitted VHF stations to be remotely operated.

Previously, UHF stations operating by remote control had been required to make only weekly transmitter inspections.

The Commission said it had imposed the more stringent inspection schedule to insure the maximum reliability of television service to the general public, pointing out that the specified five-day-a-week transmitter inspection was no more severe than that being observed by AM and FM stations.

This action became effective December 30.

## NAFMB ready for '75

The site and date for NAFMB's 1975 National Radio Broadcasters Conference & Exposition was announced by NAFMB President, James Gabbert.

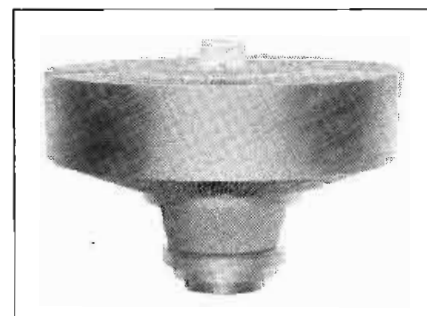
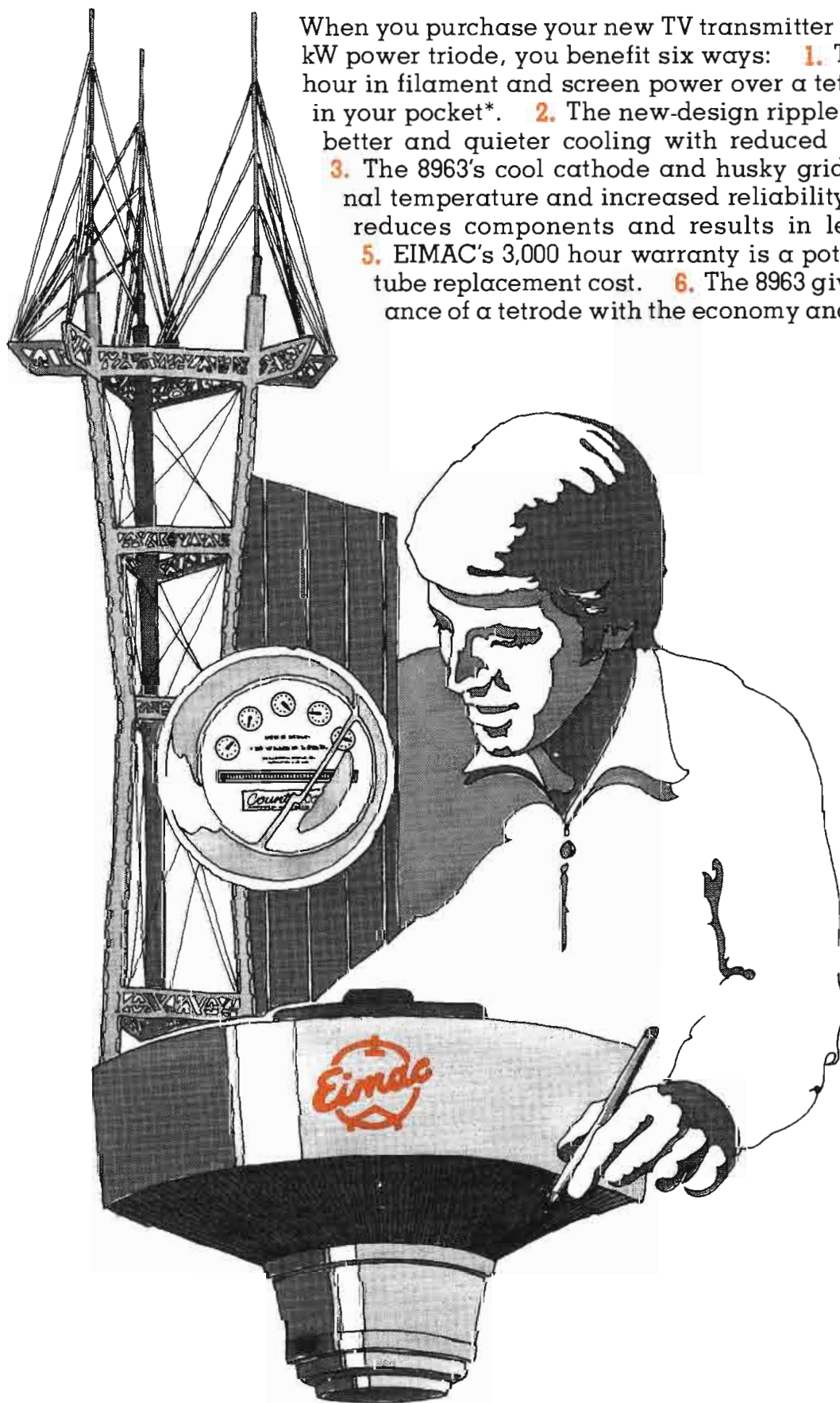
"Following through on a decision of our Board of Directors to meet in Atlanta in 1975, the NAFMB Convention Committee has selected the Marriott Hotel in Atlanta as the headquarters hotel for our 1975 National Radio Broadcasters Conference & Exposition," stated Gabbert. "We have picked the dates of September 17th through 20th as most convenient for radio broadcasters," he said, "and the excellent facilities at the Atlanta Marriott will certainly help to make our 1975 meeting even more successful than our meeting this year."

For further information, contact: Elena S. Saldan, Administrative Director, National Association of FM Broadcasters, 420 Madison Avenue, Suite 803, New York, New York 10017—(212) 755-9330.

*TV Station Executives...*

# EIMAC's 1975-model 8963 TV triode saves you money six ways.

When you purchase your new TV transmitter with EIMAC's 8963 the new 25 kW power triode, you benefit six ways: **1.** The 8963 saves 1200 watts per hour in filament and screen power over a tetrode. That's over \$250 a year in your pocket\*. **2.** The new-design ripple fin radiator of the 8963 gives better and quieter cooling with reduced blower power requirements. **3.** The 8963's cool cathode and husky grid structure mean lower internal temperature and increased reliability. **4.** Simple triode circuitry reduces components and results in less downtime and failures. **5.** EIMAC's 3,000 hour warranty is a potential savings on tomorrow's tube replacement cost. **6.** The 8963 gives you the gain and performance of a tetrode with the economy and circuit stability of a triode.



Put dollars in your pocket and enjoy improved transmitter reliability with the EIMAC 8963. For complete details, ask your TV equipment distributor or write EIMAC, Division of Varian, 301 Industrial Way, San Carlos, California 94070. Or contact any of the more than 30 Varian/EIMAC Electron Device Group Sales Offices throughout the world.



\*Based on an 18 hour transmitting day at 3¢ per kWh—and rates are going up (Business Week, Oct. 5, 1974).

For More Details Circle (6) on Reply Card

## EIA announces new standards for monitors

The Electronic Industries Association announces the availability of two new standards for television monitors. They are RS-375-A, "Electrical Performance Standards for Direct View Monochrome Closed Circuit Television Monitors

525/60 Interlaced 2:1" and RS-412-A, "Electrical Performance Standards for Direct View High Resolution Monochrome Closed Circuit Television Monitors."

Both of these standards are the product of the EIA Engineering Department's Committee on Closed Circuit Television (TR-17) under the chairmanship of Carlos Kennedy of the Ampex Corporation.

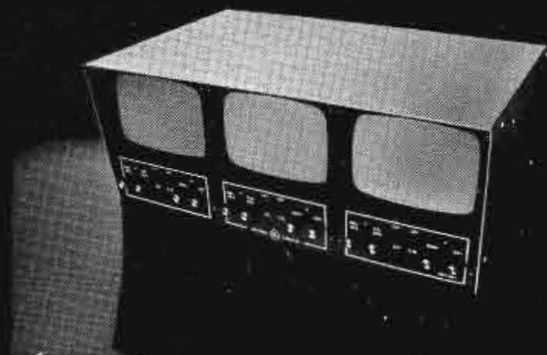
These new standards replace the earlier versions, RS-375 and RS-412, which were the first standards

developed by any standards organization relating to monochrome closed circuit television monitors. They outline significant parameters descriptive of the operation of closed circuit monitors and also the minimum levels of performance deemed desirable to develop an acceptable display.

Because of their uniqueness in the field of standardization, the development of these publications took over four years and required many laboratory sessions and meetings. Some of the industry men who contributed greatly to the development of these standards are George M. Bates of Dynair Electronics; Alan Bedford of Ball Brothers Research Corporation; Barry S. Brown from General Telephone & Electronic Services; John H. Harshbarger from Visual Information Institution; Herbert P. Lavin of General Electric; Jude Schmidt from Motorola and Arthur D. Sterling of Visual Educom Company.

Copies of RS-375-A and RS-412-A may be obtained at a cost of \$4.00 each from the Standards Sales Office, Electronic Industries Association, 2001 Eye Street, N.W., Washington, D.C. 20006. A free **Index of EIA & JEDEC Standards and Engineering Publications** containing abstracts of other standards distributed by EIA is also available from the Standards Sales Office.

## If you haven't seriously considered the new Setchell Carlson triple-six monitors, brace yourself...



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Setchell Carlson Triple-six monochrome monitors offer outstanding performance and quality, maximum number of monitoring points in a minimum area, and an exceptionally low price. Most people are noticeably surprised when they get the full picture.

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## Video seminar set for Indy

Communications Systems will hold its Winter Seminar Video Show February 3-5 at the College Park Pyramids in Indianapolis, Indiana. The theme for this year's show is "Video: A New Dimension".

Topics for the seminar include: "Vertical Interval Reference Signal"; utilization of "Control Instruments in Black and White and Color Studios"; "Color Correction"; "Time-Base Compensators" and "Quality Video Production".

For further information, contact Jon Powell, 3500 De Pauw Blvd., Suite 3000, Indianapolis, Indiana 46268.

For More Details Circle (7) on Reply Card

## NAB opposes latest FCC fee schedule

The National Association of Broadcasters has opposed the latest fee schedule proposed by the Federal Communications Commission.

It protested in comments filed with the FCC, that while the revised schedule reduces various broadcast fees to approximately 30 percent below their current rates, the fees still are "at variance with the dictates" of the Supreme Court.

The Court recently invalidated Commission efforts to recoup 100 percent of the agency's operating costs through fees stating that the agency's costs for "protective services rendered the public" were not chargeable to the industry.

NAB said in its comments that the revised fees still contemplate the costs for those protective services despite Commission pronouncements that the fees are being "based principally upon only the costs attributable to application processing." NAB admonished the FCC for failing to adhere to its own stated policy saying, "It is abundantly clear that the Commission is not setting charges to recoup identifiable costs."

Concerning the imposition of annual license fees, NAB contended the Commission erred in interpreting the Supreme Court's decision as permitting such fees. Even assuming the legality of annual fees, NAB said that "like the assessment for assignments and transfers, the proposed annual fee is premised upon an estranged construction of the 'value to the recipient' standard," one of the criteria which the Commission may consider in assessing fees.

"NAB respectfully submits," its comments said, "that there is no legal basis for employing a 'deep pocket' theory in the recovery of annual fees such as those contemplated."

NAB said "the proper trust for a fee recovery scheme should envision recoupment, through essentially flat or graduated fee charges, of the direct and indirect costs attributable to the processing of specific applications."

"Fees would not be recoverable where there is no identifiable Commission activity," NAB said. "Fees should contemplate the current public interest being served even when costs are otherwise attributable to the licensee."

"Inasmuch as the existing fee schedule, with its massive recovery plan, has been declared illegal, refunds from past broadcast charges are appropriate. NAB intends to file a separate petition at a later date directed towards the refund of excess fees."

NAB said it would be "unconscionable" to require broadcasters to share in FCC hearing costs since only a small number of cases go to hearings and the Commission itself has said hearings focus most clearly on "the public interest factor."

# yes it's TRUE... the PRICE of Cross-Pulse & Color monitors HAS DROPPED

Now you can convert any monitor to a cross-pulse monitor with VACC's new \$345\* model CPG-1 Cross Pulse Generator. Your monitor requires no modification. Fill out the coupon below for more information. At the same time, ask for a free copy of VACC'S Troubleshooting Chart. This handy wall chart has actual photos showing typical video conditions such as normal sync with and without burst, time-base errors, overshoot, clipped sync, and many more. VACC's chart is a valuable aid when adjusting and troubleshooting video problems using a cross-pulse monitor.

If a video monitor is needed, install a VACC Electro-optical Isolator in a Sony receiver for only \$129. An electronic technician can install a model A-1 in a 12", 15" and 17" Sony receiver in less than an hour. Model A1-A should be installed in a KV1722 and all 19 inch Sony receivers. You add only one-half pound to your receiver and your Sony can be used as a high quality monitor or retained as a receiver by merely flipping a switch. Isolation is far superior to heavy transformer isolated monitors and you can connect up to 20 monitors without troublesome ground loops if all monitors have VACC isolators.

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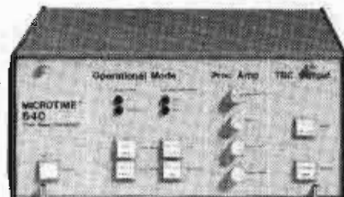
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**The new MICROTIME 640 TBC** is now in production. This state-of-the-art TBC overcomes all the VTR and signal format restrictions of earlier digital units. With its wide window, it easily handles wild and wiggly signals from low-cost VTRs with large tension errors. It offers an outstanding signal-to-noise ratio and optimized differential phase and differential gain.

The 640 also offers direct/heterodyne processing, a built-in Proc Amp, and is the only digital with Signal Status Indicators.

**Our MICROTIME 610 HETEROCOLOR analog TBC** is an outstandingly versatile and cost-effective performer where VTR signals are more stable. As the most advanced analog TBC in the industry, it replaces all the separate stand-alone units that preceded it and handles the output of any VTR from quarter-inch to quad, NTSC direct or heterodyne color, EIA broadcast

or industrial sync.

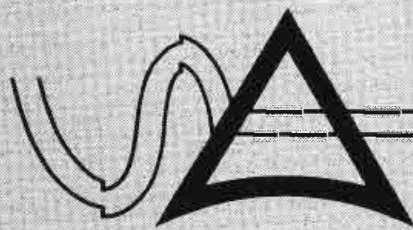
**Experience.** We introduced the first stand-alone TBC three years ago and have been known for reliability ever since. You'll find our equipment designed with such unique features as front-panel Proc Amp controls to control and optimize the signal quality. Rear-lighted operating mode selectors. Input Signal Status indicators. And hot new features like DCS (Derived Coherent Subcarrier) mode, to let you dub up from a battery-pack to quad. A combination of features available in MICROTIME TBCs and nowhere else.

**Our approach.** We never try to sell you any TBC until we understand your system's requirements. Then, if a TBC will help, we'll recommend the MICROTIME model that's your best price/performance buy — we're not locked into pushing one system or the other at you. We meet your needs — not vice versa.

Send for our free new illustrated applications brochure that discusses time base error correction in non-technical language. Or call us for the name of the nearest distributor and a no-obligations demo at your facility.

## Ask us. We're the only people who offer both.

**Television Microtime Inc.**



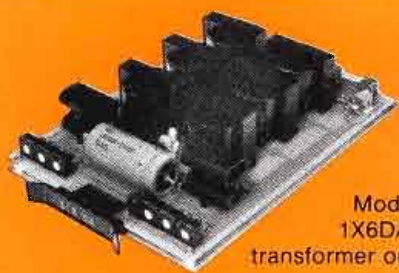
1280 Blue Hills Ave., Bloomfield, Conn. 06002  
Call us for immediate attention to your needs. (203) 242-4242

# best for you?

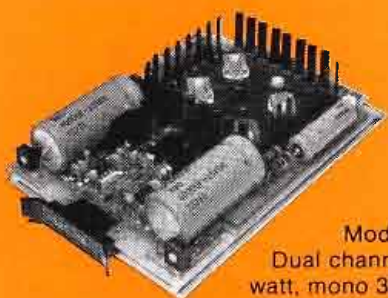


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# system construction made easier with ROH



Model 212  
1X6DA with  
transformer outputs



Model 220  
Dual channel 10-  
watt, mono 30-watt



Model 224  
Dual channel  
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Model 225  
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+30 DBM



Enclosures  
Rack mount, powered  
and unpowered. Models 201, 202



Power Supplies  
High reliability system.  
Models 207, 208, 209

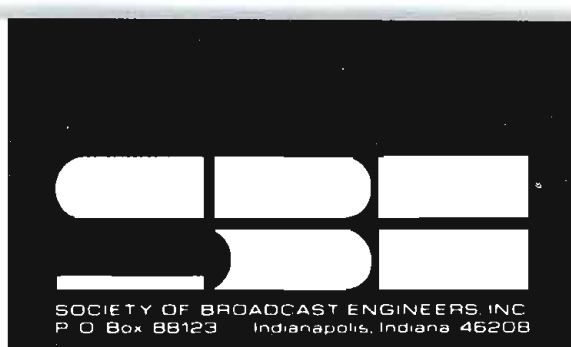
21 modules, 4 enclosures and the necessary accessories from a single source for your next audio project.

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SOCIETY OF BROADCAST ENGINEERS INC  
P O Box 88123 Indianapolis, Indiana 46208

## SBE Fellow

In the short, 10-year history of the Society of Broadcast Engineers Inc., a number of members have been advanced to the grade of Fellow. The Fellow grade is conferred on those who have rendered conspicuous service or who have rendered signal service to the Society. A member cannot apply for the Fellow grade but must be nominated by other members and be approved by the SBE Board of Directors.

In each of the previous six issues of **Broadcast Engineering**, thanks to the publisher of **BE**, we featured a recipient of the SBE Fellow award. So far, we have honored Robert Flanders, Charles Hallinan, Harold E. Ennes, Albert H. Chismark, Benjamin Wolfe, and Leo Reetz. In this issue we have selected Orville J. Sather.

Orville J. Sather, Chief Engineer for Radio Station WOR in New York City was made a Fellow in the Society of Broadcast Engineers at its annual meeting on March 17, 1974.

Sather has been in broadcasting for 44 years, having begun his career at the University of Minnesota Radio Station WLB in 1930 while a student in electrical engineering. He remembers that the science of broadcasting was in its infancy in those days. No one had ever heard of tape machines or oscilloscopes or solid state - to say nothing of television or FM or UHF or microwave. Carbon microphones were used. Remote equipment was battery operated and cumbersome. Nevertheless broadcast quality was fairly good, even by today's standards. The weakest link was in home receivers and loud speakers.

Following his graduation from the University in 1935, Sather was employed as a transmitter engineer at WCCO in Minneapolis, a CBS owned station. He transferred to CBS in New York in 1938 where he was employed successively at the AM and shortwave transmitters, in

the radio field department, and at the new television transmitter in the Chrysler Building. In 1940 he became the youngest supervisor at CBS, and was responsible for converting the visual transmitter from double to single sideband modulation, for a 6 MHz change in frequency, and for changing the aural transmitter from AM to FM modulation - all in conformance to the new FCC regulations.

Following the war Sather became Engineer in Charge of the CBS television transmitters and later the TV Studio and Field Departments, then as Assistant Manager of CBS-TV Technical Operations, and finally Manager - a post he held from 1951 to 1960. He relates that when he started in CBS television in New York there was a total staff of 6 in the engineering operations department, and when he left there were 650, most of whom he had hired. Those were the days of greatest expansion - from nothing, to the live network extravaganzas.

In 1961 he was employed by RKO-General as Director of Engineering for WOR, WOR-TV and WOR-FM in New York City, a post he held until 1972 when it was decided each station should operate independently. During this period he was responsible for the engineering operation of the three stations and the planning and supervision of major construction projects, including new television and FM transmitters; new radio studios and technical facilities; new television studios and technical facilities; new television studios at Shea Stadium; a new TV mobile unit, and the move of the WOR 50 KW transmitter with its new directional antenna system from Carteret, New Jersey to Lyndhurst, New Jersey in the Jersey meadows five miles from Times Square. Since 1972 Orville Sather has been Chief Engineer for WOR, in his words "the most listened to station in the United States."



## Chapter reports

**Chapter 1: Binghamton, N.Y.**  
**Chairman: Bill Sitzman, Jr.**  
**Tyrone, N.Y. 14887**

"TV Sideband Analyzer and Envelop Delay Test Set and Application" was the program presented by Bob Griffiths, Regional Manager, Telemet, Amityville, following 6:30 PM dinner on November 12th at the Owego, N.Y. Treadway Inn, the usual meeting place for Chapter 1. Bill Sitzman, Chairman, served notice that the mailing list was being updated, for the benefit of persons wanting their names added. The chapter normally meets the 2nd Tuesday of each month. Further information? Phone (607) 273-2970.

**Chapter 2: Northeastern Pa.**  
**(Scranton/Wilkes-Barre)**  
**Acting Chairman: John Kowalchik**  
**Mountaintop, Pa.**

The annual informal combined business session and Christmas festival was held December 6th at the studios of WVIA-FM-TV, Northeastern Pennsylvania's Educational stations. Chapter elections and future meetings were covered during the business portion of the program.

**Chapter 9: Phoenix, Ariz.**  
**Chairman: Leon Anglin**  
**Phoenix, Ariz. 85001**

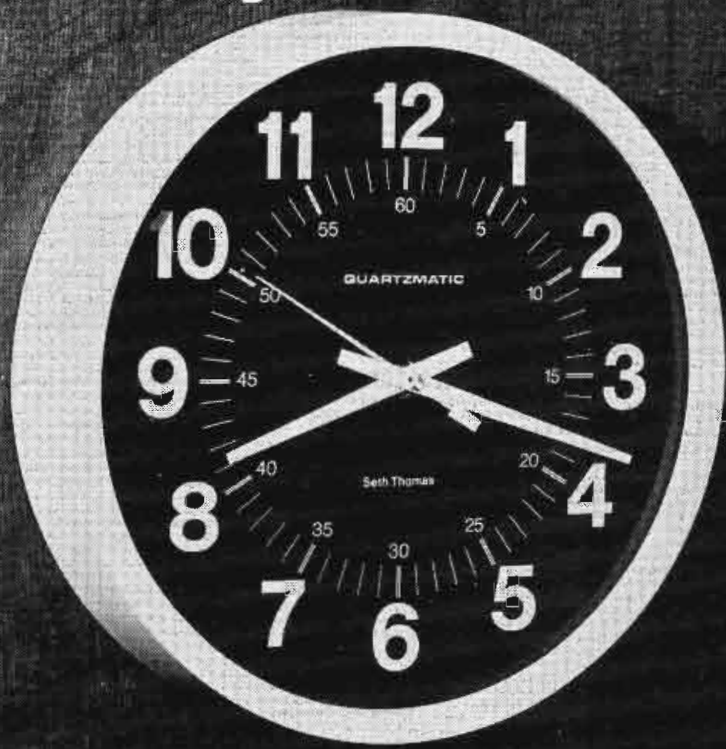
The October 29th meeting was held at KPHO-TV studios; Parts Electronic arranged for Amperex Electronic representatives Bob Manahan and Raleigh Utterback to present "Recommended Method for Installation and Setup of Plumbicon Tubes". The program included a 20-minute videotape.

Chairman Anglin appointed Al Hillstrom, KOOL-TV, to head a committee to gather information on a mini-convention. The chairman also thanked Telemation for the interesting September meeting presented by their Chuck Mendenhall, Vern Pearson, and Hank Maynard.

Members of Chapter 9 include representation from the following stations and organizations: KPHO, KTVK, KOY, KTAR, KAET, KOOL, KHEP, KRFM, KBUZ, KRIZ, KBLU, KUAT, KZAZ, 3M Co., Dalis Electronics, Thatcher, ZONAR, Telemation, Circuit Research, Courtright Engineering, Crosstown Communications, Dyna Tronics, DeVry, and the University of Arizona.

(Continued on page 53)

# A face you can trust when every second counts.



**Quartzmatic**  
**accuracy in battery  
 operated cordless  
 wall clocks from  
 Seth Thomas.**  
 only **\$65**

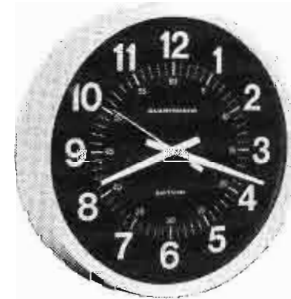
The incredible time measuring precision of the quartz crystal is now available in an easy-to-read cordless wall clock. The Seth Thomas Quartzmatic. Amazingly accurate to plus or minus one minute per year—less than 2/10 seconds a day.

Two ordinary "C" batteries (not included) make every second count even during power failures or where no outlet is available.

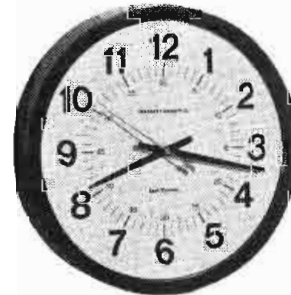
Easy to read even from a distance. Ideal for the broadcast industry where seconds count.

One year Factory Guarantee from Seth Thomas, division of General Time.

Trust Seth Thomas Quartzmatic accuracy and cordless convenience. Now offered to you directly by General Time Service for only \$65. Mail coupon below or your own purchase order today to the General Time Service Center nearest you. Be sure to specify your style choice.



**Model A.**  
 Bold white numerals against black face. Sweep seconds track. White case. Dia. 13 1/4", D. 2 5/8", Dial 12".



**Model B.**  
 Large legible black numerals, white face. Sweep seconds track. Brown case. Dia. 13 1/4", D. 2 5/8", Dial 12".



**Model C.**  
 Ebony finished case. Wood grained dial, black center. White numerals. 10 3/8" x 10 3/8" x 2".

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For More Details Circle (11) on Reply Card

**AMPEX HAS A ONE-WORD ANSWER TO  
FOUR QUESTIONS ABOUT COMMERCIAL  
RECORDING EQUIPMENT:**

# AG-440C

**Q:** Our program material is *monaural*. Our budget is small. What's the best all-around recorder/reproducer for our station?

**A:** Get an AG-440C. You'll appreciate the way it handles 10½" reels of tape. With capstan servo, end-to-end timing for 30- and 60-minute

programs is always reliable enough to bring you up to the network hour marker, and years after you've amortized the investment, your AG-440C will still be delivering top professional performance. Features and options are the same for all one-, two-, and four-channel machines. It's the best value on the market.



**Q:** We're *mixing down* for stereo releases, and we can't afford to lose the sounds we worked so hard to get. What's the answer?

**A:** Get an AG-440C. It'll handle everything on the master tape, from the lowest frequencies right up through the top. At

15 ips, response is virtually flat to 25 kHz. And the capstan servo will deliver flutter and wow performance that is as close to the original as can be achieved on any commercially available mixdown recorder. Low noise figures, too, assure optimum mixdown/dubbing.



**Q:** Our work involves original production for *quadraphonic* material. We need a recorder that can get us started without making any compromises at all in sound quality. How can we get rolling?

**A:** Get an AG-440C. The four-channel version is a fully professional half-inch multitrack mastering machine with the latest solid-

state electronics for extended high-frequency response. You'll appreciate motion sensing, the easy-to-read VU meters, the large level-setting controls, and the high-visibility record and ready indicators. Your tape will be protected, perform better, too, because the heavy-duty transport has an improved tape guidance system for reduced skew.



**Q:** We've got to squeeze a *multichannel* production recorder out of this year's tight budget, and those 2-inch recorders are just too rich for our blood. How can we expand?

**A:** Get an AG-440C. The 8-channel version with Sel-Sync™, automatic monitor switching, automatic tension adjustment, cap-

stan control options, transport remote control, and tenth-of-a-second start/stop will make you a big-leaguer in the one-inch circuit. And, of course, when you go all the way with an AG-440C-8, you'll be ready for all of the previously listed studio operations. Just drop in the right head assembly and get on with the profitable activity.



Information about all the Ampex AG-440C models is available from your local Ampex distributor. Many configurations are now available from

**AMPEX**

Ampex Corporation  
Audio-Video Systems Division  
401 Broadway, Redwood City, CA 94063, (415) 367-2641

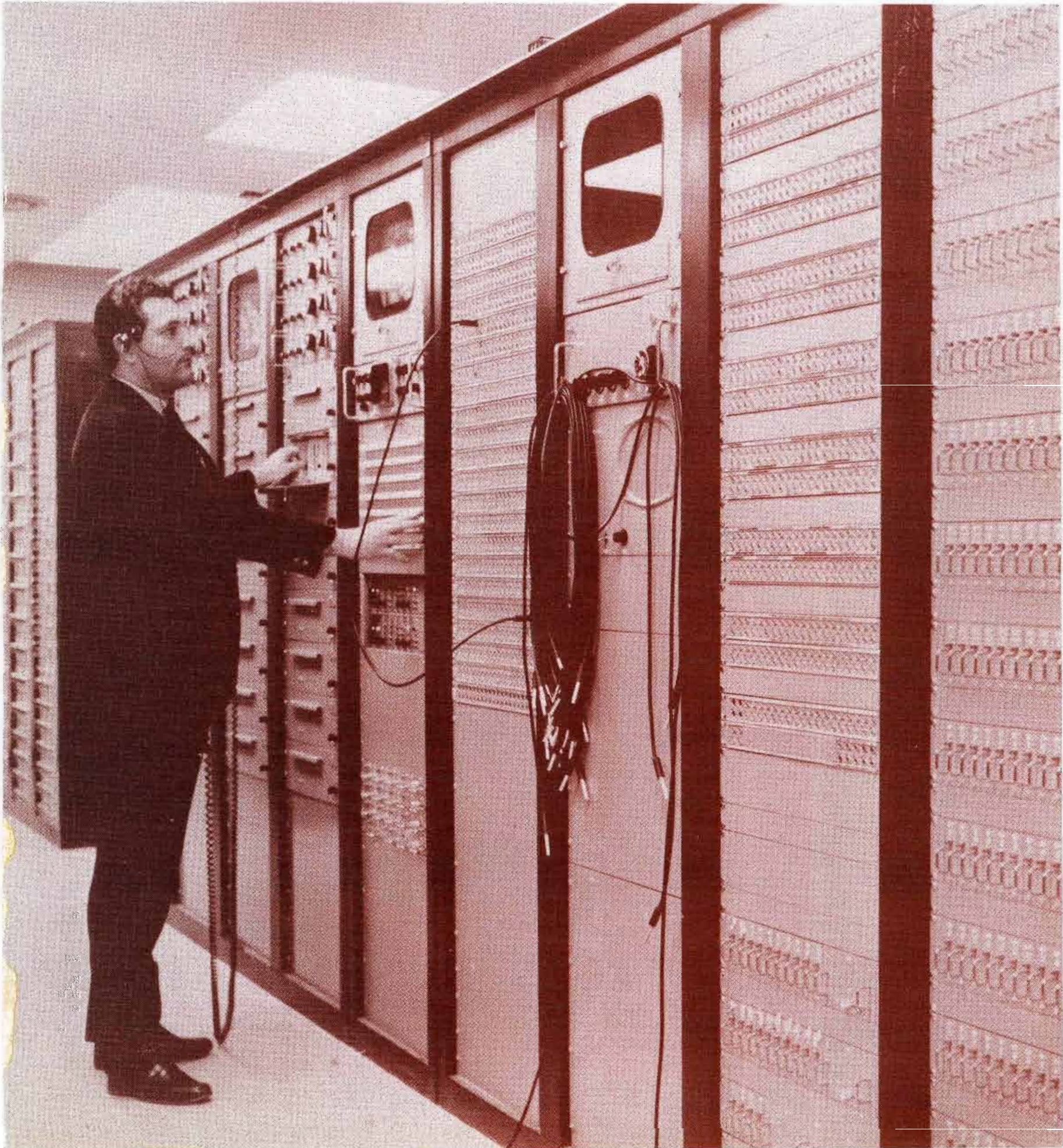
stock. Ask for a demonstration today or send for our literature. Ampex has the answer to every sound recording question, and the answer is AG-440C.

# CABLE engineering

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*In this issue....* New Origination Rules .....CE-2  
Refunding Cable Fees .....CE-3  
New Products .....CE-4

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# FCC takes new stance on cable TV rules

The Commission has deleted its mandatory origination rule and adopted new rules requiring any cable system with 3,500 or more subscribers to have equipment available for local production and presentation of cablecast programs, and to permit local nonoperator production and presentation of such programs.

Also subject to the rule are conglomerates of systems that are commonly owned and technically integrated with 3,500 or more subscribers.

The mandatory origination rule (Section 76.201), prohibited systems with 3,500 or more subscribers from carrying the signal of any television station unless the system also operated to a significant extent as a local outlet by cablecasting and had facilities available for local production and presentation of programs other than automated services.

On March 28, the Commission instituted a rulemaking and inquiry proceeding inviting comments on a series of questions concerning the possible deletion or modification of the mandatory program origination rule.

## **Comments And Replies**

It sought discussion on whether the costs for origination equipment and program production operation, which had substantially increased above the figures estimated in 1969, have constituted a substantial change in circumstances warranting changes in the rule; to discover whether access cablecasting might best reach the goal of localism which origination cablecasting was designed to achieve; and the propriety of demanding programing origination from cable operators who either showed little interest in local origination and created a product reflecting such reluctance, or operated in communities where voluntary origination or programing

is needed to attract and retain a satisfactory number of subscribers.

More than 50 comments and replies, many with appended comments and observations from other sources, have been filed. Commenting parties included cable television interests, broadcast interests, public interest and public access organizations, individual members of the public, state and municipal cable regulators and educational authorities. The majority of those commenting requested deletion of the mandatory origination rule.

The Commission said the equipment availability rule (Section 76.253) was designed to better fulfill the statutory mandate of affording outlets for local expression to as many communities as possible.

**The Commission said systems already subject to the designated access channel rules of Section 76.251, would not be subject to any changes. (Section 76.251 requires that cable systems in major television markets must provide designated access channels, cablecasting equipment, and a studio.)**

**Systems where Section 76.251 does not yet, or may never, apply need not provide a dedicated channel but must make a reasonable effort to provide channel time whenever available, including unused time on the origination channel, if any, or black-out time, for local nonoperator cablecasting.**

It said that nonoperator cablecast programing should be identified as such with appropriate access rules being applicable. Charges may be made for use of equipment where there are no franchise requirements to the contrary, the Commission said, but it stated that such charges must be reasonable and consistent with the goal of affording the public a low cost means of television access.

## **Ad Rule Out**

The Commission also deleted Section 76.217, which provided that cable systems engaged in origination cablecast programing could present advertising material only at the beginning and conclusion of each program and at natural intermission breaks within a cablecast. Since it was placing origination on a voluntary basis retention of the rule would tend to discourage origination activity. Many parties requested deletion of Section 76.217.

In adopting the mandatory origination rule in 1969, the Commission said the rule would stimulate origination by cable systems and create more local programing, and would help insure that technical equipment and facilities would be available for use by others wishing to originate on leased channels. Cable operators were required to have some kind of video cablecasting system for the production of local, live and delayed programing.

The Commission said it was now convinced that imposing mandatory origination rules was unlikely to best serve its cablecasting goals. It said quality, effective local programing demanded creativity and interest, and that these factors could not be mandated by law or contract.

It said the net result of attempting to require origination had often been the expenditure of large amounts of money for programing that, in some instances, was neither wanted by subscribers nor beneficial to the system's total operation.

## **Equipment Availability**

The Commission said that while it was ending the requirement that larger systems originate programing, it was retaining the provision that insures the availability of cablecasting equipment. It said it was its desire to foster local

programming in as many communities as possible and to require equipment availability by those systems which can best sustain the monetary costs.

The Commission said it was encouraging operators to make their communities aware of existing video opportunities. Should it find that operators seek to evade their obligations by suppressing information of those opportunities, the Commission said it would promptly promulgate appropriate regulations.

Cable operators may still originate programming, but on a voluntary basis, the Commission said. It noted that a substantial number of the larger systems and larger conglomerates are now, in fact, in essential compliance with the equipment rules, and that any system that provides at least public access cablecasting has likely fulfilled the equipment requirements.

**Any system having the available equipment shall not enter into any contract, arrangement or lease for use of its cablecasting equipment that would prevent or inhibit the use of the equipment for a substantial portion of time for local programming designed to inform the public on controversial issues of public importance, the FCC said.**

Each system must not exercise control over the content of nonoperator cablecast programs; must establish rules requiring first-come, nondiscriminatory availability of such equipment; prohibit the presentation of lottery information and obscene or indecent matter; require sponsorship identification; specify an appropriate rate schedule; and permit public inspection of a complete record of the names and addresses of all persons or groups requesting use of such equipment.

Established operating rules are to be filed with the Commission within 90 days after a cable system first makes equipment available and such rules are to be made available for public inspection.

While the equipment availability regulation does not take effect until January 1, 1976, the other rule changes adopted by the Commission will be effective on January 6, 1975.

## Commission elects to refund \$4 million in fees

The Commission has granted a number of petitions for refunds of cable television annual fees paid under the current fee schedule, and will refund approximately \$4 million to owners of cable television systems in the near future.

The petitions were filed by Combined Communications, National Cable Television Association, Inc., American Cable Television Inc., Cannon Beach TV Co. and TelePrompTer Corp.

In 1970, the Commission adopted its fee schedule (Subpart G of Part I of the rules) under the authority of Title V of the Independent Offices Appropriation Act of 1952, which authorizes Federal agencies to collect fees for their services. Section 1.1116(b) of the rules provided for an annual fee of 13 cents per subscriber to be paid by cable systems by April 1 of each year.

On March 4, 1974, the Supreme Court reversed a decision of the U.S. Court of Appeals for the Fifth Circuit (New Orleans) which had sustained the validity of the cable television annual fees. The Supreme Court said it could not determine that the fee schedule had been formulated in a manner consistent with proper interpretation of Title V, and remanded the case to the Commission.

The Commission said that it had no doubt that it could legally recompute the appropriate cable fees after conclusion of a pending proceeding to revise the entire fee schedule (Docket 19658).

However, in view of the Court's decision, the amount which would be recoverable, and the expense involved in recomputing and collecting the fees from the large number of parties involved, the Commission said the best course

was to refund the total fees collected to the parties that originally paid them.

The Commission said it would initiate refunds without requiring any further action on the part of cable operators, and would proceed as expeditiously as possible to make the appropriate refunds.

## NCTA seeking contest entries

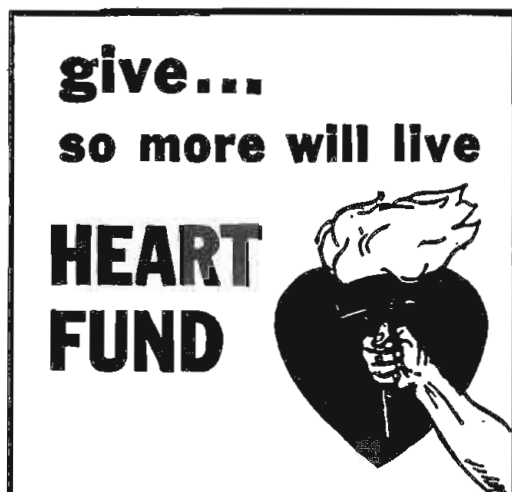
NCTA is seeking entries in its 1975 Cablecasting Contest and has issued rules and entrance requirements for the annual competition.

The association's Community Services Committee, which sponsors the contest, has attempted this year to recognize new industry trends and thus has included a special category for "Series" programs in six areas: news and public affairs, election '74, sports, children's, education and a miscellaneous section for programs which do not fall in the five specified areas. The second category is for "One Time Only" programs.

Systems must enter the contest under one of three classes, based on subscriber count: systems with fewer than 5,000 subscribers, systems having 5,000-15,000 subscribers and those serving more than 15,000 subscribers. A limit of three entries per system has been set.

This year, entries must be made in the 3/4" cassette format and be no longer than five minutes in length.

Only those programs produced since Feb. 15, 1974 by the local system staff using the system facilities will qualify. Entries must be posted by Jan. 31, 1975.



# NEW PRODUCTS

## CATV Test System

A new CATV test system from **Peca, Inc.**, features a sweep receiver with an output bandwidth up to 25 times greater than conventional detectors operating at the same RF input. The system uses high-level sweep signals, to eliminate the masking that can occur with low-level techniques; yet its 1.5 millisecond total sweep time (1-400 MHz) keeps subscriber interference minimal.

The complete system consists of Peca's SSG-400 simultaneous sweep generator, installed at the system head-end; and one or more Peca SRS-350 sweep recovery receivers, located at remote amplifiers or in mobile vans.

The SRS-350 receiver incorporates a unique biased detector that provides an output bandwidth that is exceptionally broad (260 KHz) and highly stable with respect to temperature and RF input level. It is this broadband detector that permits the use of high-level sweep signals (typically 17dB above carrier) for high resolution, with short sweep times for minimum interference. A monitor point on the receiver, with separate gain and slope controls, permits direct connection of a signal-level meter.

For More Details Circle (66) on Reply Card

## Circular Switch

**Trompeter Electronics** has developed a new proprietary circular switch. This 50 Ohm circular switch is designed for operation in the frequency range DC to 700 MHz. The unique design provides equal signal line lengths thus maintaining constant phase delay transmission paths.

The CSAZ 1X8B uses long life dry reeds, and is equipped with transient protection diodes. They are available with either BNC or TNC 50 Ohm connectors. The standard switch is a one pole eight throw. However, one pole four throw, and one pole six throw versions are available on special order.

For More Details Circle (67) on Reply Card

## Demodulator

A new television demodulator has been introduced by **Comark Industries, Inc.**

The Model CI-2400B Demodulator

spans the gap between the use of a low-priced simple diode with its inherent limitations and an expensive off-air receiver.

The CI-2400B Demodulator provides a flat response by means of video correction, eliminating mixing and IF filtering. A bypassable sound notch working with a high-Q trap at the aural carrier frequency provides 70 dB (typical) inter-carrier attenuation. Front-panel controls provide a means of varying chop-pulse width and position when the integral chopper is triggered from vertical sync ("Int" mode.).

As an added feature an "Ext" mode is also provided allowing the CI-2400B to be used in closed-loop video correction utilizing a VIR signal. In the latter mode, the CI-2400B accepts a zero-carrier reference drive pulse from a VIR-corrector (such as the Tek 1440) to control the chop-pulse width and position and the front-panel pulse controls are automatically disabled.

For More Details Circle (68) on Reply Card

## Outdoor CATV Power Supply

**Sola Electric's** 30/60 VAC, 12-14 Amp regulating power supply for outdoor installation with CATV cable amplifiers has won UL listing.

The unit, Model 22-1275-11, provides AC power using a Sola Electric constant voltage transformer, which stabilizes output voltage with  $\pm 2$  percent in order to maintain the integrity of cable transmission and help protect the amplifier from malfunction and damage.

Operated at 12 Amps, the unit will accept line fluctuations ranging from 85 to 130 VAC. Operated at 14 Amps, line input may vary from 95 to 130 VAC while still maintaining  $\pm 2$  percent voltage regulation on the output. Response time for all line voltage changes within input limitations is 25 milliseconds.

Short circuit and overload protection is provided by the combination of a ferroresonant transformer and circuit breaker. The unit also features a fault indicator light, built-in lightning and surge protection, an auxiliary AC convenience outlet, and an external grounding plug. A coaxial cable connector is pre-installed on the case.

For More Details Circle (69) on Reply Card

## Push-Pull Amplifier

Model A-4145 and A-4150 are high gain, high output 50-300 MHz, push-pull amplifiers specifically designed by **AVA Electronics** for large CATV multiple dwelling installations. A-4145 offers 45dB gain, 54dBmV output, and A-4150 has 50dB gain, 56dBmV output. Both amplifiers are equipped with AVA exclusive "third port" feature which provides extra signal strength to feed other locations or directly power a remote amplifier such as A-4230 or A-4245.

A-4145 and A-4150 have two gain controls with total range of 24dB and slope control capable of compensating 22dB of cable. Both amplifiers can be used with either 117 VAC or 30-60 VAC power sources.

For More Details Circle (70) on Reply Card

## Viewfinder-Monitor

A viewfinder-monitor that can convert surveillance closed-circuit TV cameras to studio view cameras has just been introduced by **GBC Closed Circuit TV Corp.**

The GBC VFM-50 viewfinder-monitor is a 5-inch plug-in type unit designed to be mounted on GBC CTC-5000, 6000, and 8000 closed circuit TV cameras.

Circuitry of the VFM-50 is fully silicon-transistorized with the exception of the picture tube. Video signal, horizontal drive pulse, AC voltage, inter-com and tally lights are supplied by the TV camera through a single plug-in connector.

For More Details Circle (71) on Reply Card

## Test Connectors

**LRC Electronics Inc.** of Horseheads, New York, a manufacturer of cable connectors for the CATV industry, has announced the availability of a full line of test connectors. Through the acquisition of Boltz Communications and their specialized connector knowhow, LRC is able to meet the industries needs for this product.

These precision test connectors are designed for use by cable manufacturers and users and are suited for repeated production sweeping of cable reels.

For More Details Circle (72) on Reply Card

# EXPANDABLE AUDIO/VIDEO SWITCHER ELIMINATES PATCH CABLES

**DYNAIR'S SERIES-X SWITCHERS ARE TOTALLY  
MODULAR WITH FIELD EXPANSION CAPABILITY**

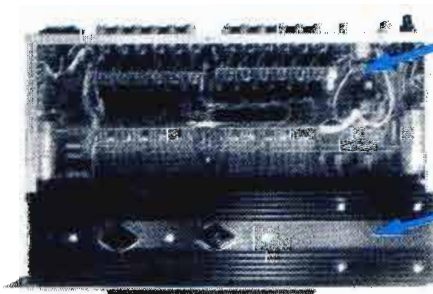
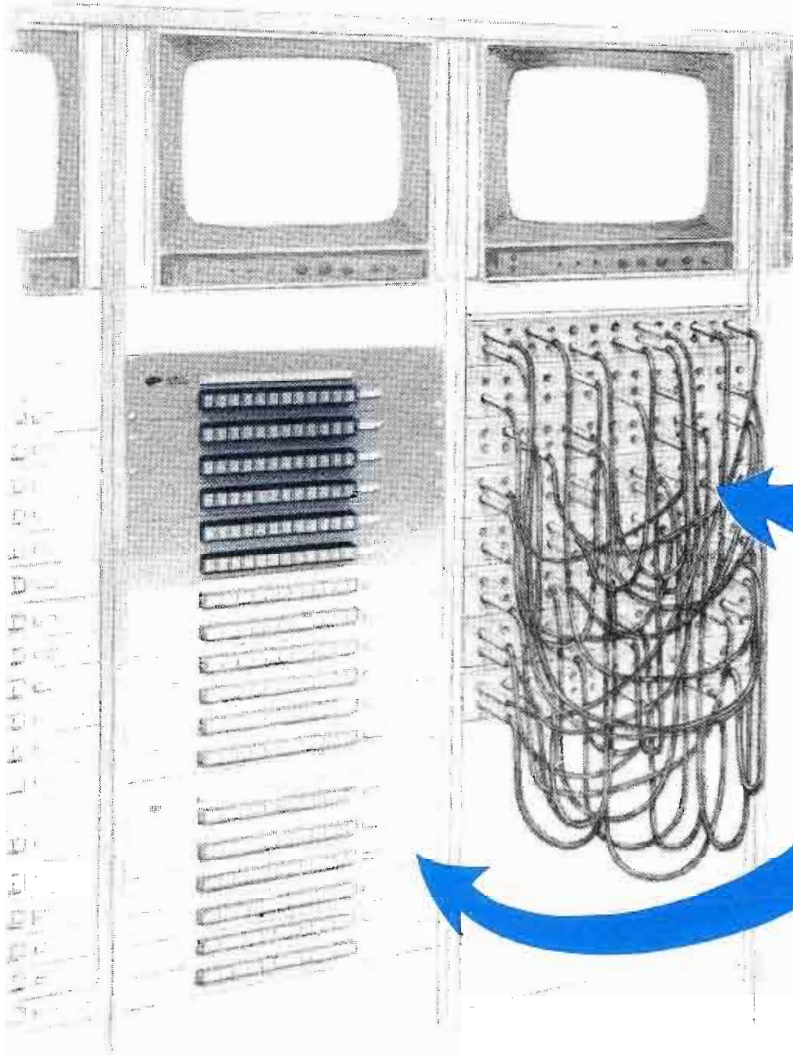
That's right. Now you can replace your video/audio patch panel with a routing switcher made up of off-the-shelf modules. You get the versatility of a custom system with the price and reliability of volume-produced electronics. It makes your signal routing easier and your system looks better too.

Messy, tangled patch cables are a thing of the past. The confusion of patching is being replaced with the simplicity and professionalism of pushbutton selection . . . a more reliable, more compact and – in many cases – less expensive approach.

You receive a lot of other extras when you go the Series-X route. Like illuminating pushbuttons, which give you an instantaneous indication of signal routing. And . . . each pushbutton can be easily labeled in the field to indicate the signal it controls.

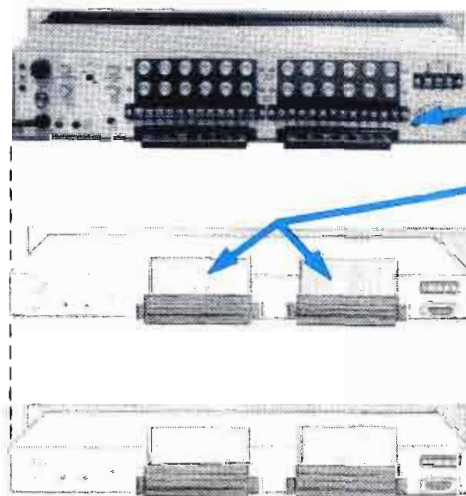
Expansion is easy too . . . you simply add input or output expansion modules as required. Up to 36 inputs and 120 outputs without adding external DA's. Inputs are added in increments of six or twelve, and outputs are added in increments of one.

Unlike many other switchers of this type, the Series-X is a broadcast quality unit. Worst case crosstalk isolation: 50 dB at 3.58 MHz. Frequency response: 12 MHz,  $\pm 0.5$  dB. Differential gain: less than 0.5%. Differential phase: less than  $0.5^\circ$ . State-of-the-art integrated circuit design.



Plug-in modular construction simplifies servicing and allows various options to be added in field. Liberal use of integrated circuitry.

Precisely regulated power supply designed for continuous-duty applications.



Master 12 x 1 switcher supplies power for up to eleven output expansion units. Unique 3-way connector for signal and power bridging.

Etched circuit interconnect.

Output expansion units provide one additional output each. Receive power and signals automatically when plugged into switcher. Switchers of almost any input-output configuration can be easily assembled from off-the-shelf modules; inputs or outputs can be added in the field.

The new Series-X provides exceptional performance at prices which are, in most cases, much less than competitive versions. For reference, a 12-input, 12-output audio-follow-video Series-X occupies only 22 3/4 inches of standard rack space and costs only \$4495. Wouldn't a Series-X switcher solve some of your distribution problems?

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For More Details Circle (13) on Reply Card

# *Where has EJ been all these years?*

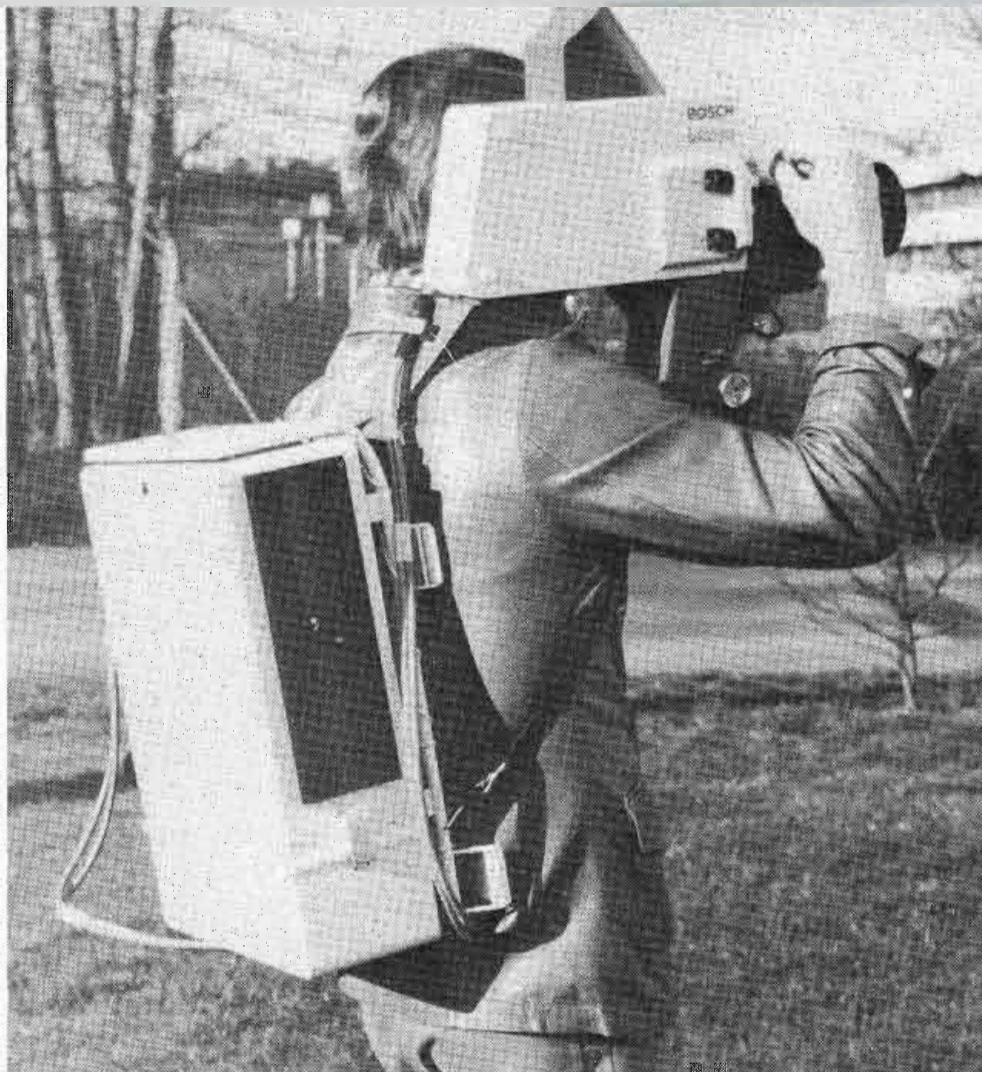
*Is electronic journalism really new? Or is what we're seeing an extension of local news reporting that allows events to be covered more conveniently in real time?*

*By Ron Merrell*



**Remember the bond drives** during World War II? Here you see an AM remote done under the wing of a bomber. Of course you'd have to go back more than two decades before this to get the beginnings of electronic journalism in sight.





Some of the new backpack cameras were designed for live commercial TV use, others were originally conceived for closed circuit applications but are meeting with acceptance.

January is a good month to talk about electronic journalism. After all, it'll be a little more than two months before we see the innovations that are now being hurried from the boards, through the black boxes, on their way to becoming "the hit of the show" at the 1975 NAB.

We saw the electronic journalism horn of plenty at the last NAB, and there ought to be time now to reflect upon the subject before it inundates us in April.

Just so we can stay on track and keep our perspective, let's first back up. How far? As far as you want. That's right, go back to the history of broadcasting, and you'll find that the first broadcasts were basic to the meaning of what we've now - finally - decided to call electronic journalism.

### **Radio Remembered**

When the prognosticators thought they foresaw the end of radio, it was because they didn't understand radio people and they couldn't begin to guess that something called a

pocket transistor radio could sell for five dollars. With the exception of sports coverage, radio did gradually lose ground to TV news. But about the time that network TV news had stationed its anchormen in the early corners of our evening news, radio introduced the all-news concept.

All-news, probably the most difficult of formats, had its share of success, but there was no great rush to join that movement. Most radio stations gave way to competitive music formats and spot news reports.

Radio, of course, has always been a leader in local sports coverage. Even in a time when music is king, sports remotes still hold their own. In fact, if it weren't for radio and TV rights, many teams—both pro and college—would be hard pressed to find anything stay afloat financially.

Regardless of which format a station may have chosen, it is radio people's news sense and public service that has given them a permanent seat in electronic journalism for their local disaster coverage. The

courage of those stations involved have given the industry some of its proudest moments through electronic journalism.

Meanwhile, network TV news shows went back to the basics and what had been the ground floor of radio: reporting the news as it happens. Of course the advent of satellites added to the prospects. And they brought the Vietnam war right into your station.

### **It's About Time**

While electronic journalism was taking giant steps on the network level, little was done on the local scene. While it's true that the local news team did venture out to cover some news happenings, they were hampered by the most basic of news elements: time.

Film had to be rushed back to the station for processing. And if that took too long, (or if the event happened immediately before or during the news show), it had to be reported without film or bypassed.

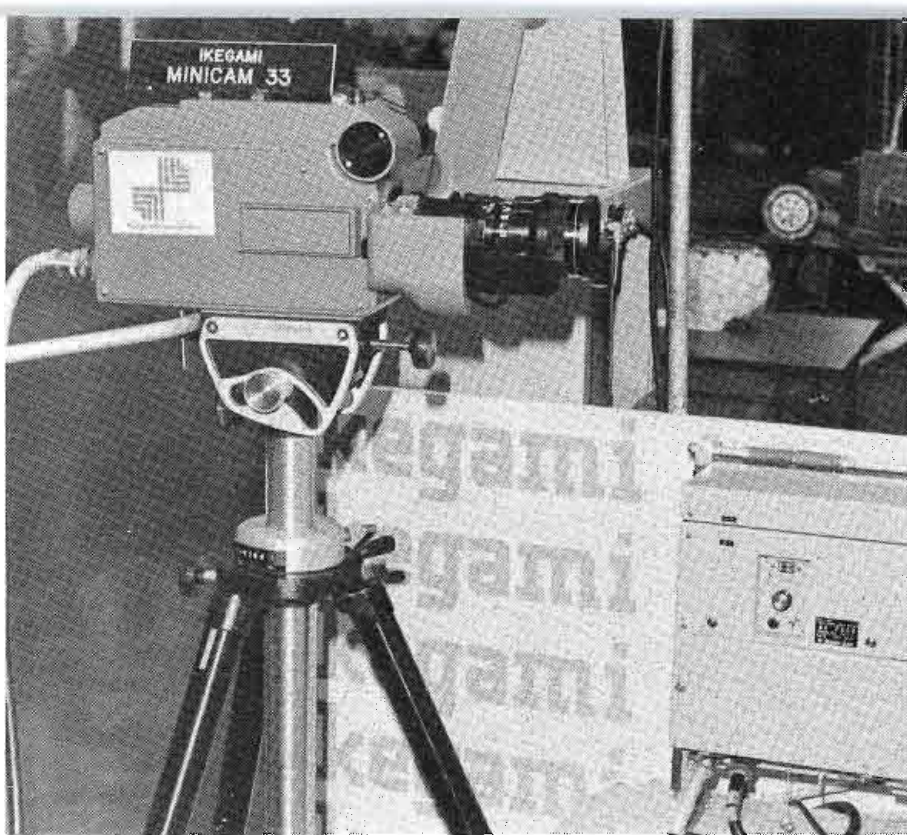
As a means of overcoming this problem, many news-oriented stations either built or purchased video vans. It seemed like the ultimate in electronic journalism. But in many cases, it wasn't. Even with live coverage via microwave, something still was missing.

Certainly vans will not be replaced by lightweight cameras, portable videotape recorders, and timebase correctors. Neither were they intended to eliminate film. But there's no denying their promise of getting **into** the news scene immediately and returning with something that can be aired **now**. What's more, with news teams, a station could cover simultaneous news events that break around or during the news show and never miss a beat.

What we see happening today is a widening news time window, through which could accelerate local news coverage. And what made this news opening possible? An unlikely twist of fate.

### **Supply And Demand**

It wasn't so long ago that local origination was pushed as the great



Shown here on a tripod mount, this camera was one of the first used for EJ by the networks. The choice now is dependent upon how much you want to spend and how deeply you want to be committed.



Radio journalism did not end when television became viable. Here you see a golf event being covered. And for that matter, radio will probably always have its share of live electronic journalism.

hope of cable television. It could be accomplished by using low cost B&W cameras and recorders and with film. And shortly thereafter, the list of camera exhibitors at the national cable conventions grew.

As it turned out, there just wasn't an easy way to profit from local origination. Some systems have done quite well, but the lack of sponsors and the slow return on investment have put the brakes on equipment sales. Then too, there was so much hope that public access channels would add sales, but that too has been slow.

And now, the FCC has relented on its origination requirements, leaving only access channels as a market potential of any size.

Then Television Microtime and Consolidated Video introduced their TBC's and it wasn't long until a whole new interest was kindled in electronic journalism. Trouble is, it was bantered about as if there never had been such a thing. Even those who knew better got caught up in the deluge of EJ products that were unveiled at the 1974 NAB convention in Houston.

The major propulsion came from the TBC's, yet they were not exactly new. However, CVS and TV Microtime made a major issue of their offerings. And undoubtedly, we'll be seeing some interesting changes in these products in Las Vegas.

Now the questions come down to whether or not the local news competition will force even greater acceptance of this approach to the news coverage and how the decision making team will select their EJ equipment.

At a time when so many stations have opted for steep coverage of news in prime time, more complete local news coverage could rate nothing less than exciting. After all, the critics have said for so long that the big stations (and newspapers, for that matter) could never do a thorough job of covering the **local** news. With well equipped news teams, a great deal more could be presented.

Not only can a lot more be presented, but some impossible shots become probable. If the one-man-band approach is taken, the



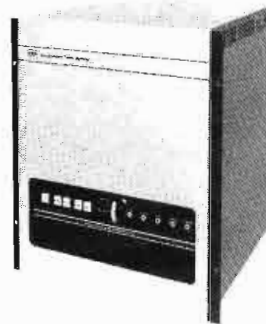
Unretouched monitor photograph of an off-the-air ABC network program, November 26, 1974, at 2:20 P.M.

# Electronic Video Compression is no Big Thing!

It's just another little first from CVS. It lets you shrink a video picture and place it where you want it.

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The CVS 600 and the Video Compressor are now in production. If you would like some literature on the products or would like to see a video tape of what it's all about, just let us know.



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For More Details Circle (14) on Reply Card

Does the EJ trend signal the end of news film? Or on-location commercials? Probably not. But as the trend gathers steam, it will have its effect on news film and camera sales.



This WWJ-TV van shows another version of electronic journalism's live potential. Now, however, you may see more backpack units being used in conjunction with the van...especially if you want live coverage. Of course, backpack crews can rush their tape back to the station for immediate airing.

cameraman can get into close-in shots that before were not possible.

#### **How Far... How Soon?**

But then comes the question of what you will settle for in equipment. How far up and down the spec line will you go in cameras? Recorders? And time base correctors? Will the team operate in conjunction with or as an extension of the news van? Or will they operate as two-man teams on individual assignments, strapping on the equipment after they arrive at the scene?

So it really isn't as if we never had electronic journalism before. It's always been a basic ingredient of broadcasting. It does, however, parallel the advent of communications satellites. With their introduction, we had instant worldwide news. Instead of waiting days for news reports, we had live coverage. You could be fired upon in Vietnam or watch Americans competing at the Olympics in real time.

Tonight you could be covering a downtown fire live via microwave. Or you could be showing a local event moments after it happened. It's a further extension of local news into a new dimension of time elements - either immediate or real time.

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One of the news teams at KSD-TV, St. Louis, is shown here with an Akai unit covering a local news situation that could be aired within minutes after the tape was returned to the station.

# Electronic journalism hits the street

In the November issue of **Broadcast Engineering**, we covered the story of how KREM-TV covered Expo '74 with their electronic journalism "LEM". And long be-

fore that, we showed how WCVB-TV microwaves their on-the-scene news back to the station.

In this article, we'll include a number of reports from around the country to see how and where the new approach to local electronic journalism is being used.

There is no way of telling just how electronic journalism reporting can affect state association awards. But it did happen that in the "show-me" state of Missouri, KSD-TV, St. Louis was selected for the top news award of the year. We're not even certain of the criteria used, but TV-Radio Age Magazine did name KSD-TV the number one television news station in the U.S. in the area of evening news. It would be difficult to imagine that local electronic journalism coverage did not play an important role.

## Fast Breaking News

Confessing to some start-up difficulties, KSD's Ray Karpowicz says they are now using a time-base corrector. "We are using this

system sometimes three or four times a day," he explains. "For spot news and fast developing news, it's ideal."

Neither Karpowicz nor his staff feel that the system will replace the bigger video cameras, or film cameras, for that matter. However, Director of Engineering Ed Risk would like to see improved picture quality.

His associate, Monte Walpole, agrees. But both men see the advantages of a portable, light-weight system.

Meanwhile, KSD-TV has five newsreel crews and one video tape crew. Karpowicz says the entire staff realizes that such a low cost system cannot compare with a studio video camera, yet the portable system is standing up well in the field.

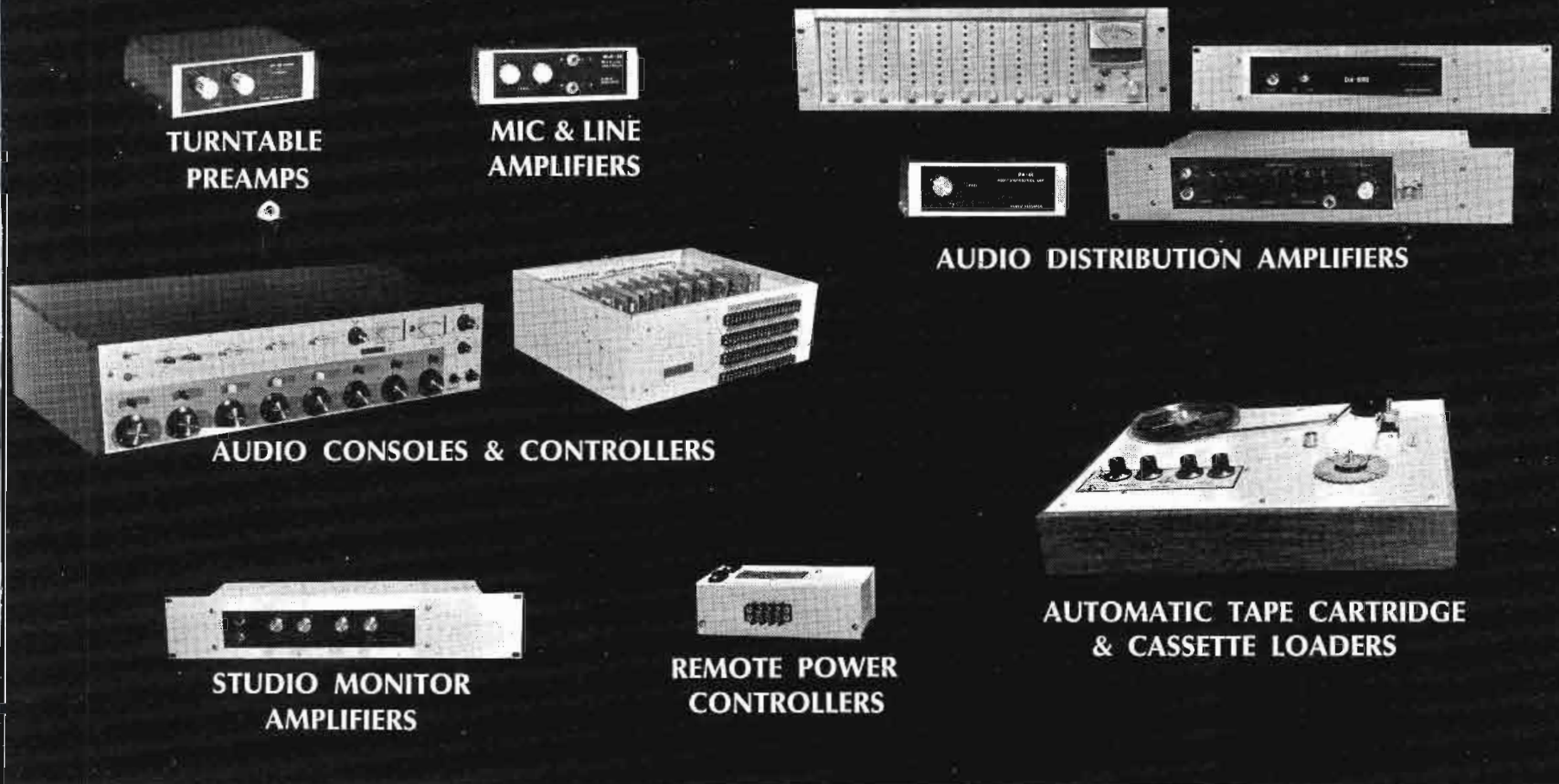
Coupled with KSD-TV's mini-van, the portable system gives the station the ability to cover news live, to beam it back to the station via the van, and the flexibility to videotape in those instances where

## Management highlights

*Since the last NAB convention, Electronic Journalism has been a hot topic in the industry. In this article, we show how some stations have been able to take advantage of the equipment and the concept.*

*As we've already shown, the EJ approach to your news can add a new dimension. But the key question is how you see news in your local area. We don't advise blindly rushing into it. But surely the decision-making team at your station will see the potential.*

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DA-6/E	Table top. 1 in/6 out.	\$131
DA-6R/E	Rack mount. 1 in/6 out.	\$149
DA-6BR/E	Rack mount. 1 in/6 out. Individual level controls for each output.	\$165
DA-6RS/E	Rack mount. 1 in/6 out stereo or 2 in/12 out mono.	\$229
DA-16BR/E	Rack mount. 1 in/8 out stereo or 2 in/16 out mono. Individual output level controls, selectable metering & headphone monitoring.	\$287
DA-2080/E	Rack mount main frame with protected	

power supply, metering & headphone monitor. Will accept up to 10 slide in modules. Each module has 2 inputs & 8 outputs. Individual output level controls & selectable meter switch. Up to 20 in/80 out.

DA-2080/E	Main Frame	\$150
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Winders also come in higher speed models (ACL-60 series). Same operation as above but winds at 60 IPS. Accepts 14" pancakes.

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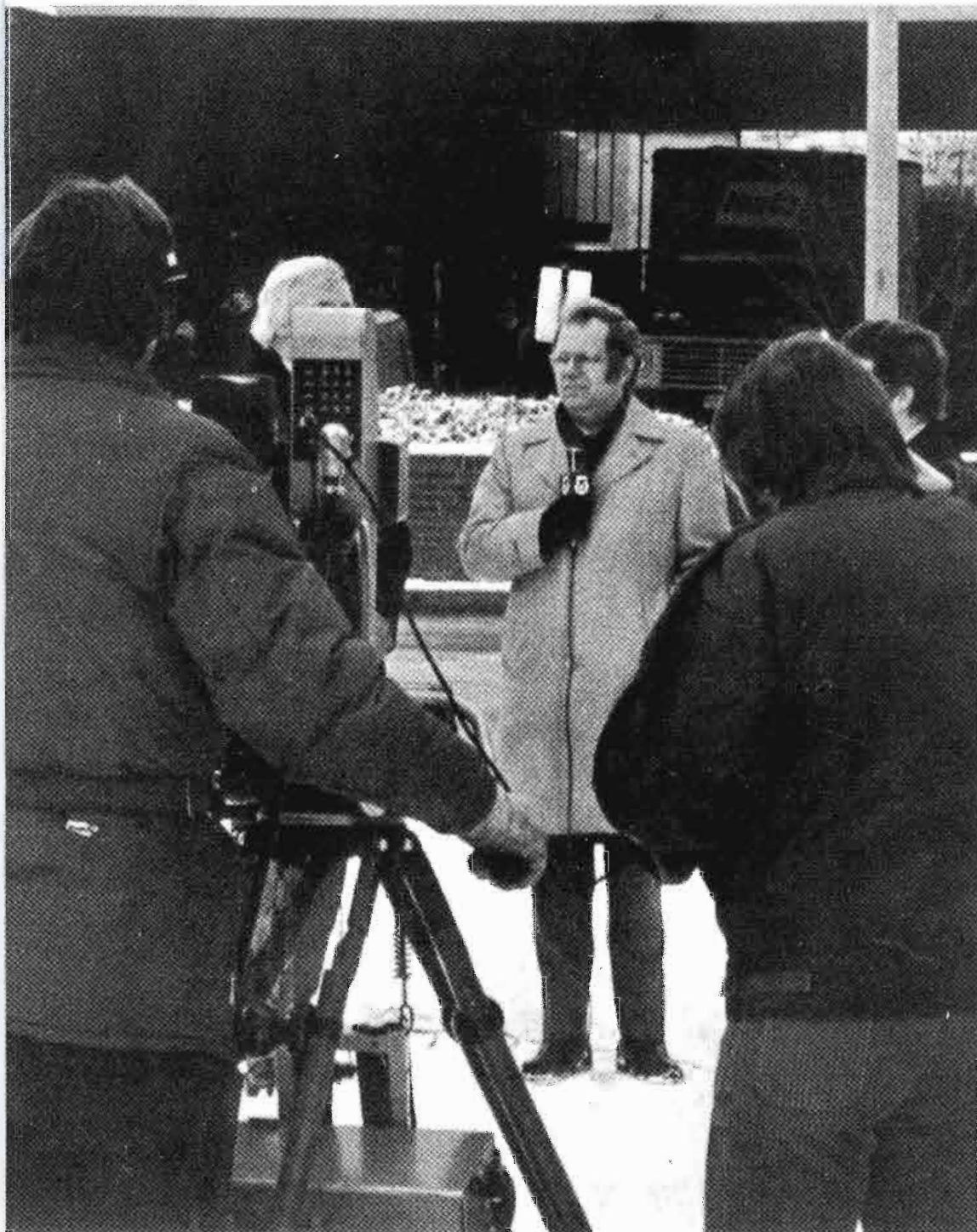
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## RAMKO RESEARCH

For More Details Circle (16) on Reply Card

Here's the KREM-TV unit that was used to send EXPO '74 coverage to the station via microwave. (See article in the November, 1974 issue of Broadcast Engineering.)



WCVB, Boston, on the street for live coverage. In this case, the signal was sent to a nearby van and microwaved back to the station.

for geographic or other reasons the van cannot beam from the site itself. Obviously, the camera crew has the option of returning the tape to the station for instant or later use.

As an example of the portable system's flexibility, the station covered a race track fire from a helicopter. Once at the scene, the pilot carefully moved in for a close shot. The cameraman held the camera hard against his chest (to dampen vibrations). The results were excellent, with the station scoring a major live scoop.

### ***Pushing The Time Element***

Perhaps the system's total value was best emphasized the night Karpowicz attended a dinner at the University of Missouri's School of Journalism to receive the state broadcasters's award. A two-man crew flew in from St. Louis, video-taped the presentation, and flew back to St. Louis in time for the 10 o'clock news...while Karpowicz was still receiving congratulations from those attending the banquet!

### ***Politics, Of Course***

One of the more interesting uses of the portable systems is coming out of the political scene. At KRIS-TV, Corpus Christi, Texas, News Director Tony de Haro makes this point with their recent election fill-ins.

"There were no major issues and no hotly-contested races in our



area," de Haro recalls, "yet we still had to fill seven minutes out of every half hour which the network gave to the local stations. If we had stayed in the studio, it would have been deadly dull. But we took the Akai out and did man-on-the-street reaction interviews and taped events at local campaign headquarters. We had those pieces on the air 10 minutes after we shot them, and they really did liven up our seven-minute segments."

In Houston, KPRC had an even more difficult situation to meet. They had to cover a story that would take place several hundred miles away....and it would break only an hour before it was due to be aired.

Ray Miller, News Director, explains: "There was going to be an important vote on a proposed new state constitution at the capital in Austin. We have a bureau there, but it has only film cameras.

Normally, we air freight back to our studio, but that takes time."

Knowing that, he sent his portable video system to Austin and taped the actual vote in the legislature. "We semi-edited the story there, and then rented time on a common carrier microwave. We transmitted it at 5 PM, copied it on two-inch tape here, did some more editing on it here, and then led the show with it at 6 PM."

How fast can it be? KUTV, Salt Lake, found out when Ralph Nader arrived at the local airport at 6:15 PM, 15 minutes into their hour's news show. By 6:45, the Nader tape was on the air.

Not fast enough? WCBD, Charleston, S.C., went in even tighter. Director of Broadcasting Steve Currie tells how it worked on election night.

"We used two of the cameras as live studio cameras - one as a rover for studio cut-aways, the other on a

separate set for in-studio interviews.

"In one case," Currie recalled, "we declared Mendel Davis the winner in his race for a congressional seat at 7:20 PM. By 7:35 we were able to air a tape showing him at home watching us declare him a winner plus an interview with him."

### The News Trend

At this writing, local electronic journalism is a growing trend. In many cases, its acceptance will be either bumped or pushed by union interests. Of course some manufacturers and stations see this trend as an invasion of the film territory. Doubtless, it will have that kind of effect in the beginning. In the long haul, it's a lot more likely that the trend will gather in people who, in the past, have not paid all that much attention to actively recording local news events. The trend, eventually, will lead to an increased interest in local news coverage.

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# Time base correctors arrive just in time

By Hal Blakeslee  
CVS, Santa Clara, Calif.



The time base corrector arrived in time to make possible an expansion of local news into a new time and coverage dimension. They're a necessary part of systems that use cameras like the one shown here.

The latest frontier in broadcast television is the growing use of portable cameras and VTR's for Electronic Journalism, or as CBS prefers to call it, Electronic News Gathering (ENG). Large and small TV studios are presently selecting and evaluating among the wide range of small color cameras and back pack recorders that meet their performance, packaging and price requirements.

It is worth observing that these considerations would not even have

come up if a device called a digital Time Base Corrector (TBC) with an exceptionally wide window of VTR error correction had not surfaced. The advent of digital correction techniques was the key factor that established a new technological base from which various equipment combinations have evolved to serve the Electronic Journalism requirement in TV news.

Today's TBC is a subtle and complex piece of equipment, carrying with it a profound effect on the

broadcasting industry at many levels. For the first time a practical alternative to news acquisition via film is not only possible but is in actual daily use across the country. The digital TBC is the electronic catalyst that made it happen, but its impact on broadcasting will undoubtedly reach far beyond Electronic News Gathering.

### **TBC History**

To look at the subject technically, time base correction is hardly

We've all heard about "the problems with tape." "The problem with tape is... chroma noise... head wear... breakage... print-through... S/N... consistency... sensitivity... slitting... spooling... packaging..." It's been said so many times, it's easy to forget that the problem might not be "tape" ... just the tape that's been available.

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# YOU'RE ABOUT TO CHANGE YOUR TAPE PERFORMANCE STANDARDS.



For More Details Circle (19) on Reply Card

new. The invention and introduction of a practical quadruplex video tape recorder in 1956 brought with it a wide variety of time base displacements that distorted the geometric or signal parameters of the reproduced video image. In order to make any kind of color from the early VTR's, a variety of electronic time base correction schemes for the chroma signal alone were devised during the late 1950's. These included heterodyne and start/stop oscillator systems that maintained NTSC phase within then acceptable limits, even on nonsynchronous VTR's.

About 1960, a new electromechanical servo that could hold the video head assembly rotation to within  $\pm 1$  usec of reference sync was developed and permitted the operation of quad VTR's in a synchronous mode. Nevertheless, residual jitter, geometric displacements and color phase error were still visible problems. At this point in time, an engineer working for CBS at WBBM-TV in Chicago came up with a voltage variable analogue delay line that was the most important development in the short history of quadruplex VTR's because it opened the way for direct color recovery. It was significant enough in its day to be nominated for a technical Emmy.

This analogue variable delay line had a window of only  $\pm 0.6$  usec, but because of the excellent mechanical configuration of quad tape transports and their high precision servos, it was sufficient to eliminate geometric and cyclic head drum errors. A companion vernier unit working on the same principle, but correcting color phase errors, only came along shortly after. Eventually a velocity compensation system that further manipulated the variable delay line over a single line period, reduced color phase errors even further. None of these sophisticated improvements, however, added to the correction window range, as they only served to refine the residual time base perturbations in the nanosecond region.

Helical recorders were considered to be too unstable, too limited in performance and too inexpensive to

warrant developing a special time base corrector for them, consequently little was done from the mid-sixties to the early seventies to widen the capture range or window of correction of existent time base correctors.

At the 1973 NAB in Washington, D.C., Consolidated Video Systems of Santa Clara, California introduced a digital time base corrector with a window of correction of  $\pm 1.5$  horizontal lines, approximately two magnitudes better than the previously available window size. Since then, several other companies have either announced plans for digital TBC's or actually offered them for sale now.

### **Theory Of Operation**

In general, the operation of digital TBC's is as follows: an 8-bit analogue-to-digital converter usually clocked at 10.7 MHz is used to break the video signal into 256 discrete levels of information. That information is then stored in a memory bank comprised of either shift registers or Random Access Memories (RAM's) and then clocked out of the memory at a corrected rate with timing signals supplied from a sync generator. Advanced vertical timing pulses are available as an output from the TBC to the VTR to compensate for the delay involved while the signal is stored in the TBC.

As the first of these digital TBC's became available, a number of questions were raised as to whether a digital TBC could meet broadcasting requirements in signal-to-noise and differential phase and gain specifications. It now is obvious that nearly all the digital TBC's do indeed exceed 50 dB signal-to-noise ratio measurements with differential phase and gain specifications of 1.5 to 3° and 1.5 to 3% respectively. An examination of typical specs show a bandwidth of 4.2 MHz with color correction of the NTSC subcarrier within  $\pm 2.5$  nanoseconds.

Processing amplifier controls are standard with nearly all digital time base correctors. New sync and burst information is reinserted as the

time base correction takes place. Additional features such as velocity compensation and dropout compensation are optionally available on several units. Depending on the recorder involved, velocity compensation can be meaningful, but it is interesting to note that when a digital TBC is used in conjunction with a heterodyne color VTR, velocity compensation is of considerably less value than when used with direct color recovery VTR's.

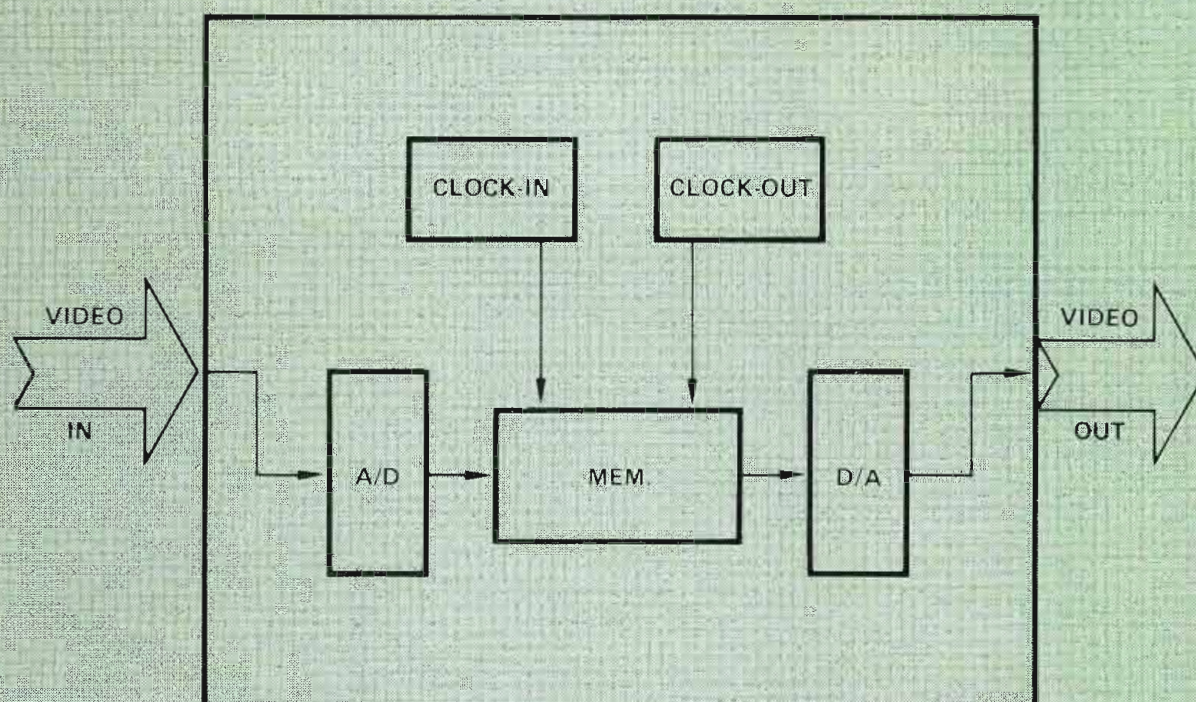
The biggest single difference among the available digital time base correctors is their universality - or their ability to interface with various types of helical scan video tape recorders. Some units only interface with wide-band (direct color recording) type recorders which have a capstan servo. At the other end of the spectrum there is one unit which will interface with every non-segmented helical scan recorder in existence.

Through increased familiarity with digital time base correctors, it is easy today to accept them as useful "black boxes" without too much thought to their complexity. Not long ago a CBS Network engineer remarked, after studying the circuitry in one particular digital time base corrector, that it actually exceeded in volume all the circuits involved in a typical 1949 U.S. television station. Solid-state technology compresses a lot of functions into a relatively small space.

### **Bumping Film?**

Looking at the overall impact of digital time base correctors in broadcasting there appear to be three significant and likely results. The first is that 16 mm film (and for that matter 8 mm and super 8 mm) as a news acquisition medium is being supplanted - not only because of the benefits of video tape processing time versus film, but equally important because of the economics of the medium itself.

For purposes of comparison, the cost of shooting and processing film for a ten minute television recording would be about \$104.00, if a color work print is used. TV news often use original film and the cost



is then reduced to approximately \$60.00. A Sony U-Matic cassette for a ten minute recording cost of \$25.00, can be instantly previewed, and can be erased and reused if the program material is transitory.

Smaller broadcast stations that cannot budget for full direct color quad VTR's can save in both capital equipment investment and in operational complexity by using high performance helical machines with a digital TBC to achieve on-air playback of signals that meet FCC stability requirements. And that includes viewer satisfaction needs with the reproduced hue of the home receiver image.

### ***Where Its Been, Where Its Going***

The application of digital time base correctors to Electronic Journalism is today a reality in broadcasting. ABC, CBS and NBC are all incorporating news excerpts gathered via portable helical recorders in their news programs. The Patty Hearst incident, the Nixon visit to Moscow, and the Pioneer Eleven Jupiter Fly-By all benefitted from digital TBC's that made broadcastable signals from helical acquisition machines.

At the local news level the conversion to Electronic News Gathering is spreading rapidly. For

example, in St. Louis, Chicago and Washington, D.C., three stations in each market are now equipped to shoot news without using film cameras.

The second major impact of digital time base correctors can be found in a family of future products, which handle the television signal digitally. The so called "Super Time Base Correctors" or Synchronizers are already available. These devices with a television field or a frame of memory are used to genlock incoming asynchronous signals automatically. Another capability recently introduced is the Video Compressor ( an option to the synchronizer) which takes a full video picture and compresses it or shrinks it both horizontally and vertically to one-fourth its original size.

Ultimately, there is no reason why broadcasters cannot look forward to a product which gives them access to any individual bit of information in a television frame (using an 8-bit A to D clocking at 10.7 MHz, there are approximately 2.8 million bits in a television frame). Such things as literally painting a picture already recorded on tape by changing hue, contrast, or anything else, is well within the scope of today's television digital technology.

The third major impact resulting from the birth of the digital Time Base Corrector will undoubtedly be its design relationship to the video tape recorders used in broadcasting. The Ampex AVR-2, for example, does not have to meet the precise mechanical tolerances of its predecessors precisely because its signal is processed through a digital TBC. The result is a less costly VTR.

Recently a new helical VTR was introduced specifically to compete with other production VTR's. The recorder itself does not H-lock because it was designed to incorporate a digital TBC and therefore did not have to. The resultant output from the digital TBC is, of course, H-locked and color locked, but the cost savings are genuinely significant.

In summary, the impact of the digital TBC in broadcasting is both immediate and long term. The rapidly accelerating growth of Electronic News Gathering is more than adequate testimony to the digital TBC's immediate effect. Long term, the digital technology it employs will find its way in broadcast products long needed beyond the reach of analogue technology. The digital TBC is the first product to reduce this technology to practical use.

One way to get the most out of what we're now calling electronic journalism is to microwave the signal back from the news site. As the trend to EJ catches on, you'll see changes in the equipment, as in this article.



# New designs for EJ microwave

By Harry Rutstein and J. Gordon Neuberth\*  
Nurad, Baltimore, Md.

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## Management highlights

One of the very real prospects for electronic journalism is its use in live coverage of news events. To do this, the station must microwave the signal from the scene back to the station.

There are times when this is no big problem, because the path from the scene back to the station may be relatively clear of obstructions. However, and more often than not, there have been problems of getting a quality signal back to the receiver site.

In the November issue of **Broadcast Engineering**, we covered the KREM-TV live remote arrangement at EXPO '74. Earlier, we showed the WCVB-TV van remoting live from downtown Boston. While microwaving remote signals has met with some very real

success, it still has been held back by problems inherent in microwave transmissions bounding through a maze of tall buildings.

Aside from the pickup problems, an electronic journalism microwave system would be a lot more attractive if it required a set-up time of about five minutes. Of course, it would be another plus if it had omni-directional receive capability from remote sites located within a 50-mile radius. And if the receive site were unattended and operated remotely from the TV studio, so much the better.

We're going to describe here an antenna system that has recently found success in network station use. It has these features incorporated in a challenging approach to live microwave remotes.

The Nurad antenna system has two salient features which differentiate it from conventional systems. First, circular polarization is the basic mode of transmission. Second, the omni-receive coverage is divided into four quadrants, each covered by a high gain antenna element. This allows the receive gain of 14 dB to be realized which is 10 dB above a basic monopole antenna performance. In addition, limiting the instantaneous coverage to one quadrant eliminates unwanted signals from the other three quadrants.

### **Circularly Polarized Transmit Antenna**

The transmit antenna used at the remote location is a four-foot parabolic dish antenna having a circularly polarized feed with a clockwise sense of polarization. One of the key factors in the effectiveness of the system is the utilization of circularly polarized energy instead of a linear horizontal or vertical polarized radiation. In the direct transmission of a circularly polarized signal to a receive antenna, only the same sense of polarization will be received. The opposite sense will be rejected.

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**Microwaving** will keep the vans working hard. In fact, their very existence is a built-in benefit to the full exposure to EJ. Without them, the full idea of immediacy of the news would be missing.

When a circularly polarized signal is radiated on a reflecting surface, the polarization of the reflected signal will reverse its sense of polarization. (i.e., A clockwise polarized signal will radiate counter-clockwise after being reflected from an object in the transmission path.) Therefore, a receive antenna of the same sense of polarization will reject the reflected signal and only accept the direct transmitted signal.

The degree of rejection of the reflected signal is dependent upon the quality of circularity of the transmission. This is measured as Axial Ratio in dB.

#### **Quad-Polarized Multi-Directional Receive Antenna**

The receive antenna is capable of being switched to any of four polarizations: clockwise circular, counter-clockwise circular, linear horizontal or linear vertical. The receive site has four separate antenna elements, each covering a horizontal quadrant. The selection of the antenna covering the direction of the remote site and the best polarization for the transmission is effected remotely from the studio. If the remote location is in direct

line of sight of the receive antenna, the studio will select the antenna pointing in that direction and choose the same sense of polarization as the transmitter (clockwise circular).

If there is an obstruction in the transmission path, then either of two other techniques can be implemented. These are the reflection or defraction methods. If a nearby structure is used as a reflecting surface, the studio selects the opposite sense of polarization. The receive antenna will accept the signal from this first reflection and again reject any secondary reflections.

The defraction method is accomplished by directing the transmit antenna towards the upper edge of an obstruction in direct line with the receive site and thereby defracting the energy over this edge. This is sometimes referred to as the "knife edge effect". Since the circularly polarized energy is usually distorted and becomes elliptical in character, the studio will select the horizontal polarization as being the most effective for this type of transmission.

In practice, the field crew at the remote location will be in radio contact with the studio and they

will rotate the dish antenna until a maximum signal is monitored at the studio. The studio will then switch through the four polarizations to further optimize the quality of the transmission. This procedure usually takes less than five minutes.

#### **The Quad Polarized Antenna System**

A quad polarized receive antenna system consisting of four high gain antennas was required. The parameters for the antennas were determined to meet the overall desired system performance.

Although the designers of these antenna elements have been involved for many years in building low loss, high gain antennas, the task of creating an antenna which encompassed the needed specifications was both challenging and intriguing. Not the least part of this challenge was that associated with the unique polarization and antenna radiation pattern characteristics, i.e., beamwidth asymmetry and polarization agility.

Initially, several antenna types which naturally radiate circular polarization such as spirals or helices were considered for use in this system. However, such antennas operate in one sense of circular polarization only and would have to be arrayed in order to obtain the required gain and beamwidth characteristics.

Small multiple horn arrays were also discarded as a choice for this antenna system requirement for a number of reasons. They are inherently complex which will effect their reliability. Horn arrays would require many precision phase matched circuits and an intricate switching arrangement to facilitate the choice of polarization. They are also more susceptible to high energy environments and are considerably less efficient than a single horn antenna.

Cross-polarized linear dipoles, another class of antennas, radiate both vertical and horizontal linear polarization providing they are oriented properly. Generally, circular polarization can be produced in these antennas by the co-existence of a vertical and a horizontal polarized electric field of equal



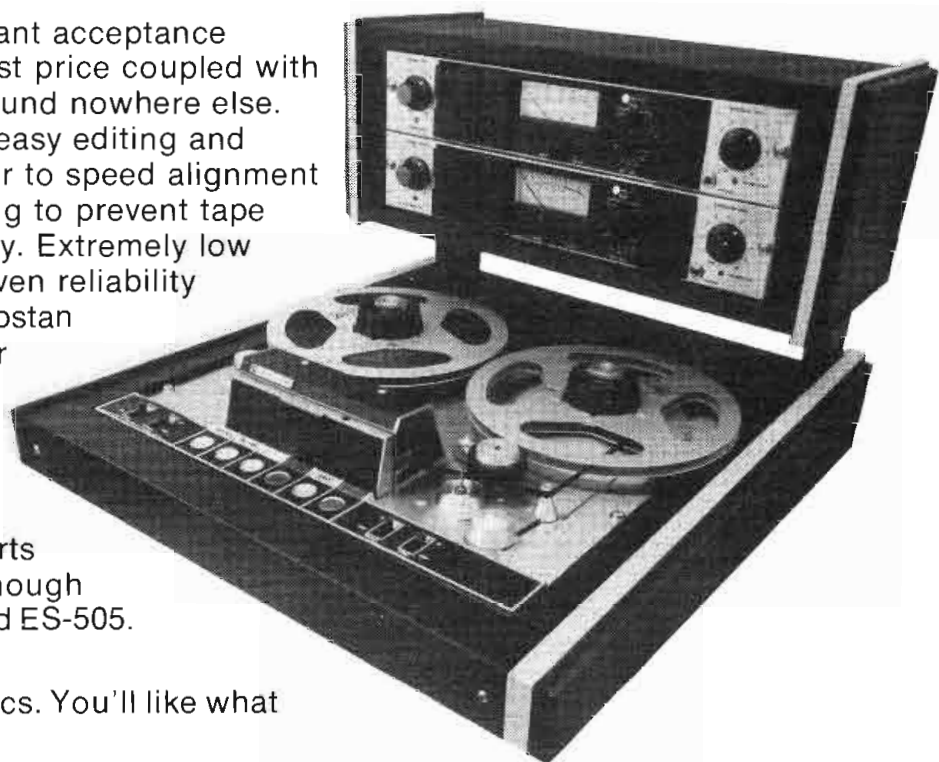
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amplitude and of quadrature phase. In practice, the crossed dipoles are fed simultaneously by signals of equal strength and a  $90^\circ$  phase lag imparted to either dipole, in order to produce a circularly polarized signal. The sense of rotation of this signal will depend on whether the vertical or horizontal component lags. A microwave device commonly used to obtain this quadrature antenna feed is a 3 dB hybrid.

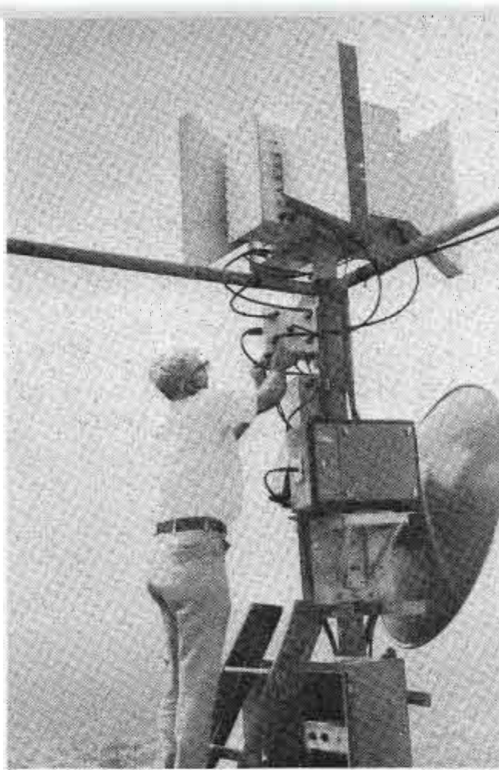
It should be noted that for such a system the transmission line lengths connecting the hybrid and the antenna, and the dipoles themselves, must be accurately controlled so that the proper phase is maintained. If not, or if the amplitudes in each antenna are unequal, an elliptically polarized wave will result.

The best solution Nurad found was a horn antenna. The horn type aperture was to be fed by a special orthomode generator. This microwave device consists of square waveguide transmission line with capacitively coupled coaxial probes arranged to set up two independent waves in a waveguide.

Techniques previously developed at Nurad allow this waveguide-to-horn junction to be matched to a VSWR of 1.1 to 1 over the required frequency band. Isolation obtained between the two co-axial ports is usually better than 25 dB.

In order to obtain an antenna of reasonable physical dimensions, three major design problems had to be solved. First, a way of compensating for the fact that the gain and beamwidth characteristics of horn antennas are different for different polarizations. This asymmetry translates directly into loss of circularity. Unless this is solved, unacceptable ellipticities will occur on the nose of the beam and could deteriorate even further because of resultant different radiation pattern shapes.

Second, in a horn length limited to 30", the phase deviation across the aperture was found to be  $250^\circ$ . Since this would result in some of the energy at the center of the horn being completely out of phase with energy at its edge, a maximum gain deterioration of 8 dB below theoretical could result.



**Hope heights** don't bother you. Here you see an installer putting the final touches on the quad polarized antenna system. You can also see the radio transmitter for relay to the studio.

The third major cause for concern was that the path length for a horizontally polarized wave through the proposed horn was  $450^\circ$  longer than that for a vertically polarized wave. This is due to a peculiar characteristic of waveguide transmission lines in that the wavelength in the guide is larger than that in air, and is a variable

that is dependent on the waveguide dimensions.

A complex of dielectric lenses was designed and installed in the horn to solve the first two problems. The antennas were fed through the network of switches and hybrids shown in Figure 1. The cable lengths were designed to compensate for the third problem, unequal path lengths for horizontal and vertical signals. It can be seen from Figure 1 that proper control of the switches will provide the four polarizations required:

1. Vertical; 2. Horizontal; 3. Clockwise circular; and 4. Counter clockwise circular.

These efforts resulted in a production antenna system that met all of the original design goals. In addition, the horn aperture provides a high pass filter circuit with the additional advantage of allowing the antenna to operate in high power RF environments.

Numerous pattern and polarization arrangements are possible utilizing the techniques described here. This inherent flexibility is extended to other frequency bands and over wider frequency bandwidths.

### DETAIL OF HORN ANTENNA ELEMENT AND CONNECTIONS FOR VARIABLE POLARIZATION

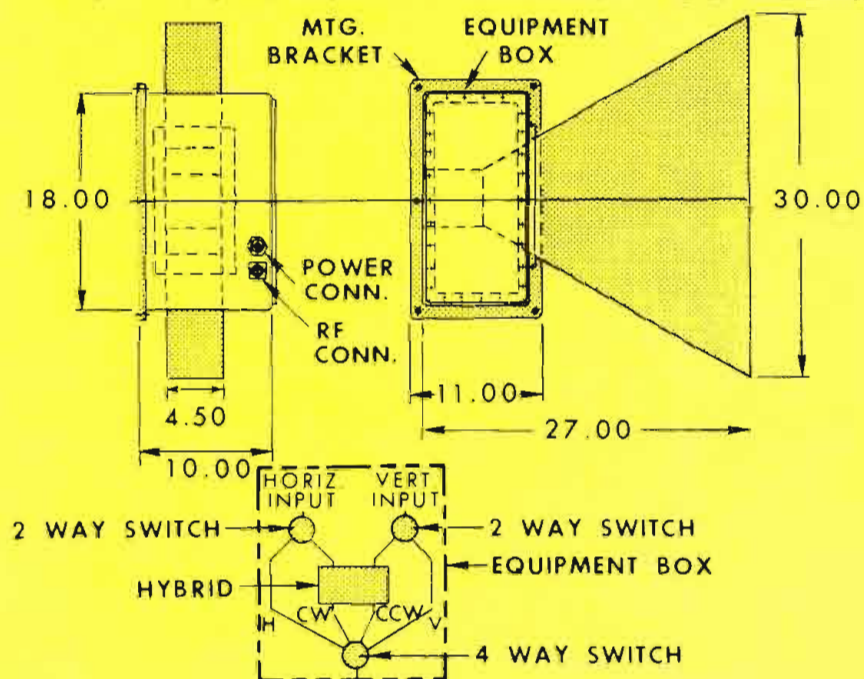


Figure 1

# BE surveys the industry on AM and FM proofs

By Dennis Ciapura

When we published the results of the preliminary survey in the September issue, we announced that the results would be used to evolve a final direct mail survey which would reflect the suggestions that were submitted to us along with the original survey forms.

In October the forms were sent out to a random sample of stations located in all parts of the country. To insure that the sampling would be completely random, so that every station would be a potential recipient of the form, it was first necessary to pick a starting point. A random number representing a zip code was chosen and from that point every third AM station and every fourth FM station on the master mailing list of all stations was sent a survey form. This method is a more or less standard technique for generating an opinion poll and we feel that the results very accurately describe the engineering community's feelings on each of the major questions concerning possible re-regulation of the part 73 rules that govern the equipment performance measurements.

The forms that were returned were divided into three categories; mostly AM, mostly FM, and AM & FM engineers. Percentage type results were then calculated for the total group of all type engineers, with individual breakouts for primarily AM and primarily FM engineers. The reader may decide for himself whether the answers submitted by the AM engineers to questions that apply only to AM stations should be counted as more meaningful and conversely, if FM engineers' opinions should bear more weight where FM questions are concerned.

The results will be submitted to

the FCC as raw data so that the Commission may analyze the material in any way that it feels is the most meaningful. The important point is that the engineers who actually work with the broadcast equipment day-in and day-out have had their opportunity to express their opinion on the very rules that govern the execution of their responsibilities. We are sure that the FCC will take the results of the survey very, very seriously and hope that some productive action will be taken as soon as funds and staff allow.

The first question asked if the respondent would favor a change in the rules that would require the **test signals to be applied to the system input that carries the majority of the station's programming** rather than to the microphone input as is now the case. **Seventy-nine point two percent of the replies favored this change in the rules.**

When the replies from the AM and FM engineers were calculated individually, we found that 79.8 percent of the AM people favored the change, while 89.4 percent of the FM people support the proposal. The difference between these figures and the 79.2 percent for the total group is due to a third group of respondents comprised of engineers working in both AM and FM and some whose specialty could not be determined from the form as it was submitted.

In most cases this "combo" group generated percentages very close to the total figure, falling somewhere between the AM and FM values. In this case however, it appears that the "combo" group did not respond as positively as the groups specializing in AM or FM only, thus bringing the percentage of positive replies for the total group down slightly. At any rate, **the opinion of all groups was**

**overwhelmingly in favor of the proposed rule change.** Some engineers stated in additional notes that they are already making additional tests through the program inputs as a part of their own internal routine. Other respondents said that they thought that the tests should include both microphone and high level inputs.

In the second question, we asked if the proof rules for AM & FM stations should be modified so that the rules clearly state that **the AGC amplifiers and limiters used during normal broadcast operations be left in the circuit during the proof measurements**, their gain control functions being defeated by switching off the control voltage. It is common knowledge that some stations defeat the AGC by completely patching out the limiters etc., and as Harold Kassens pointed out in a B.E. interview, (June 1973) nothing in the present rules specifically prohibits the practice. Most engineers do leave everything in the circuit at proof time, however, and feel that is the only valid way to do the tests.

Our survey shows that there is strong support for the clarification that we proposed. Eighty-eight point four percent of the total group thought that the change should be implemented. Eighty-nine point two percent of the AM engineers and 86.8 percent of the FM engineers favored the changes. Some engineers said that they are already interpreting the rules as prohibiting patching out segments of the program chain, but most people would like to see more specific language in the rules than now exists.

## **A Standard Test Record**

The most controversial question on our survey asked if the Commission should specify a stan-

dard test record, tape or cart to be used as the signal source for the proof. Some of the respondents felt that the tape and record equipment should not come under any official regulation but that the FCC should publish some standards for the industry to voluntarily follow. Other engineers opposed any federal intervention at all in this area.

As it now stands, the weakest link in most broadcast chains is probably the program source: the only part of the system that now comes under no regulation at all. Some engineers suggested both signal generator and test record/tape tests, and perhaps this would be the most technically valid way to gain truly meaningful data. Only 33.7 percent of the total group would favor a rule change to make these tests a part of the proof, however.

It is interesting to note that while only 32.6 percent of the AM engineers favored the test record and tape method, 41.3 percent of the FM engineers supported the proposition. This is a surprising result because the FM proof distortion and response requirements are more stringent than the AM standards. It may be that the FM engineers have more concern and experience in this area because their transmission medium is more transparent, requiring more routine testing in this field.

Although the majority did not respond favorably to this proposal, we feel that the results are significant because very little work has been done in this area and many broadcast engineers simply do not have a feel for how much distortion a tape deck or phono pickup does or does not have.

B.E. has completed an investigation of test tape and record techniques, including distortion characteristics, which will be published in the near future.

The fourth question asked if the rules should be changed so that **frequency response measurements on AM stations should be required only at full modulation** only, rather than at 25, 50, 85 percent and full modulation, as the rules now read. Fifty-eight point four percent of the engineers who responded said that they would favor the rule change. Fifty-three point six percent of the engineers who work primarily in AM responded positively and 61.9

percent of the FM engineers supported the proposal.

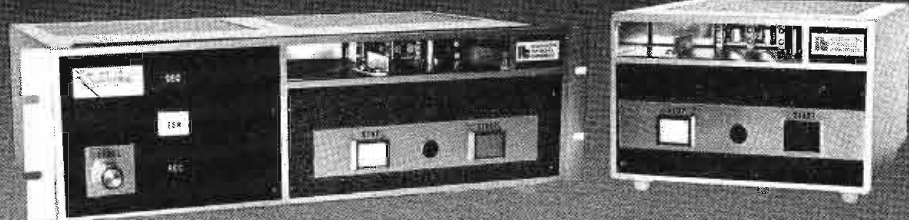
Since AM transmitters usually exhibit the worst response errors at the higher modulation levels, this seemed like a logical step toward eliminating redundant tests, and the majority of broadcast engineers agreed.

When asked if frequency response for FM stations should be measured at full modulation only, 53.7 percent of the engineers who responded favored the change. Although only 48.1 percent of the

AM engineers thought that full modulation response runs would be adequate for FM stations, 57.3 percent of the FM engineers supported the proposal.

Since most FM transmitters yield audio response that does not change with modulation level, this proposal, like the similar AM proposal, was intended to eliminate test redundancy. The standard broadcast audio proof for a stereo FM station now requires a total of 42 frequency response measurements where only 14 would be

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**Figure 1. A summary of the results of the direct mail Proof Change Questionnaire.**

QUESTION	Survey % positive response		
	ALL ENGINEERS	PRIMARYLY AM	PRIMARYLY FM
Test through main program input	79.2	79.8	89.4
Prohibit "patching out" a.g.c. amps, limiters etc.	88.4	89.2	86.8
Use test record/tape/cart for test signal source	33.7	32.6	41.3
AM response tests at full modulation only	58.4	53.6	61.9
FM response tests at full modulation only	53.7	48.1	57.3
AM distortion tests at full modulation only	56.2	54.6	56.7
FM distortion tests at full modulation only	54.9	52.8	58.9
FM distortion tests only up to 7500 Hz	34.1	30.6	35.1
Clarify FM stereo proof rules	87.9	88.7	84.0
Eliminate AM carrier shift tests at low levels	78.1	79.4	74.5
Add AM I.M. test	55.8	52.2	58.3
Add FM I.M. test	63.5	61.2	63.8

required if only 100 percent modulation data was called for.

#### **Harmonic Distortion**

Question 5 first asked if the harmonic distortion measurements for AM stations should be made at full modulation only. Fifty-six point two percent of the engineers who responded said that they would favor the change. Fifty-four point six percent of the AM engineers and 56.7 percent of the FM engineers answered "yes" to this one. Although the majority who responded felt that the lower modulation level tests were not necessary, some engineers felt that the possibility of cross-over distortion at the lower levels in AM transmitters should warrant some low level testing.

Since the full modulation and very low modulation levels seem to be the most critical, perhaps the best compromise would be distortion tests at 20 percent and full modulation while eliminating the tests at 25, 50 and 85 percent.

#### **Distortion At Full Modulation**

Next we asked if the reader would favor FM distortion tests at full modulation only. Fifty-four point nine percent of the total group answered "yes" to this question. Fifty-two point eight percent of the AM engineers and 58.9 percent of the FM people supported this proposition. Since

most broadcast stations employ "null" type distortion test gear, the noise level begins to cloud the validity of distortion measurements at low modulation levels, particularly at the higher audio frequencies because the 75 usec. preemphasis requires an increasingly lower input signal as the frequency is raised, to maintain a given modulation level. This was the primary reasoning behind the FM proposal, and while a small majority of the engineers who responded agreed, this is still a pretty controversial area.

The last part of question 5 proposed that FM distortion tests be made only up to 7500 Hz, since the second harmonic of any fundamental above that frequency would fall outside of the FM bandpass of 15 kHz. This question really yielded some surprising results, as only 34.1 percent of the engineers who responded would support this rule change. Thirty point six percent engineers working primarily in AM said "yes" and 35.1 percent of the engineers working primarily in FM said "yes". There was not a great deal of comment relative to the questions accompanying the replies, so, we cannot speculate on the cause of the generally negative reaction to this proposal.

#### **Stereo Proof**

Question 6 asked if the proof rules should be clarified so that they clearly state that the stereo

proof shall consist of a normal mono proof of each channel with the station in the stereo mode, except that the minimum S/N ratio would be 55dB. Eighty-seven point nine percent of the total group responded positively to this one. Eighty-eight point seven percent of the AM people said "yes" and 84 percent of the FM engineers favored the change. This was one of the areas that received a very striking vote of approval.

Although most stations have been doing a stereo proof by running a standard broadcast audio proof on each of the stereo channels, there is nothing in the rules that specifically says that this is the way to do it and the 60 dB S/N requirement for the mono FM proof standards is extremely difficult to attain in the stereo mode because part of the modulation capability is used to transmit the stereo subcarrier and pilot. It is also necessary to attenuate this 19 kHz pilot in the modulation monitor to better than -60dB so that it does not enter the noise measurements.

For these reasons, some stations enter a mono FM noise reading for the proof, which does not really represent the station's performance in the normal stereo mode of operation. A better situation would be to measure the noise in the stereo mode, but with a more realistic standard of 55 dB. Obviously, most broadcast engineers agree with this line of thinking.

## Carrier Shift Tests

In the next question, we asked if the AM proof rules should be changed so that carrier shift tests would be required only at full modulation. Seventy-eight point one percent of the engineers who replied said "yes". Seventy-nine point four percent of the AM engineers and 74.5 percent of the FM engineers think that the carrier shift measurements at the lower modulation levels are not necessary. This was another proposal aimed at eliminating test redundancy in the proof requirements.

Question 8 was one of the more controversial ones, dealing with the addition of I.M. distortion measurements to the proof. In the first part of the question, we asked if a 60 and 7000 Hz, 4:1 I.M. test should be added to the AM proof, and 55.8 percent of the people who responded said "yes". Fifty-two point two percent of the AM engineers favored the addition of an AM I.M. test, while 58.3 percent of the FM engineers favored the AM I.M. test.

The second part of the question asked if an FM I.M. test should be added and 63.3 percent of the respondents favored the proposition. Sixty-one point two percent of the AM engineers said yes to the FM I.M. test and 63.8 percent of the FM engineers supported the proposal.

Although it seems as though broadcast engineers feel that an I.M. test would be more important to FM performance, a majority favor adding the tests to AM and FM standards. In view of the fact that very few broadcast engineers have experimented with I.M. testing, we feel that a 55 to 60 percent positive response to this question is significant, showing a great deal of interest in a new (to broadcast) technique.

## Look Ahead

To summarize, it looks as though there is very strong support among broadcast engineers to change the existing rules for equipment performance measurements so that the tests are made through the system

input that carries the majority of the station's programming, and with nothing "patched out" of the program chain. There is also a call to clarify the stereo FM test procedures, eliminating the low level carrier shift tests for AM stations and adding I.M. tests, at least to the FM proof.

The changes in the rules that we propose involve more clarification, in many cases, than change. More than anything else, broadcast engineers are perplexed by the lack of specific information on what to do, as the rules are now written. There are those who will point out that the present rules leave some room for flexibility, which sounds nice at first thought, but if the station engineer flexes his interpretation one way and the FCC field engineer flexes another, who's interpretation is official? For this reason, most engineers would rather that the rules be more specific so that their interpretation could be more uniform. So, if we are to start out to clarify the rules, why not fine tune them so that they better relate to today's broadcast station?

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# Globecasting

## BBC TV "Magazine of the Air"

The British Broadcasting Corporation has a string of firsts to its credit, including public television in 1936 and the digital standards converter more recently.

Their latest innovation, which is paralleled by a similar Independent Broadcast Authority (the commercial network in the U.K.) development, is a TV "Magazine of the Air" that is now on line in Great Britain and provides English viewers with a wide variety of information through their home television receivers that are equipped with the proper accessory.

With Parliamentary approval, for a two year public trial, both the BBC and IBA have started transmitting the "Magazine of the Air" over their regular TV channels. The BBC system is called CEEFAX and the IBA's ORACLE. Both use the

same technical standards for full compatibility although each sends out their own selection of information they think the viewers want to see. Digital information at a 6.9 MHz rate is inserted into the vertical blanking interval of a normal television transmission. The receiver is equipped with a decoder, page store and alphanumeric generator that produces the selected page on the screen in 24 rows of up to 40 characters per row.

Index pages tell the viewer what is available in the Magazine and by numerically dialing the specific page on a push button selector that is either built in or connected to the receiver, he or she can see anything from late headlines, local weather, recipe of the day, one's horoscope, or what's on at the local theatres.

Presently up to 60 pages are

available with a 15 second cycle time for a full readout. More pages are possible if the waiting time is increased.

## Experimental Digital Recorder

The potential importance of digital television techniques as applied to video tape recording is evident in the effort put forward by the BBC research department in building an all digital VTR. While the project manager, Peter Rainger admits that this recorder is about eight times less efficient than a present day analogue VTR, he feels that it only awaits some new technology in solid-state memory devices and IC's to make it competitive. This view is shared by many VTR experts, including Charles Ginsburg, Ampex' Vice President and father of the quadruplex VTR.

Ginsburg's prediction is that an operational digital VTR is still 5 years away. Rainger thinks it could be sooner.

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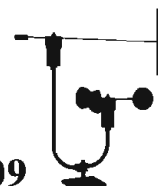


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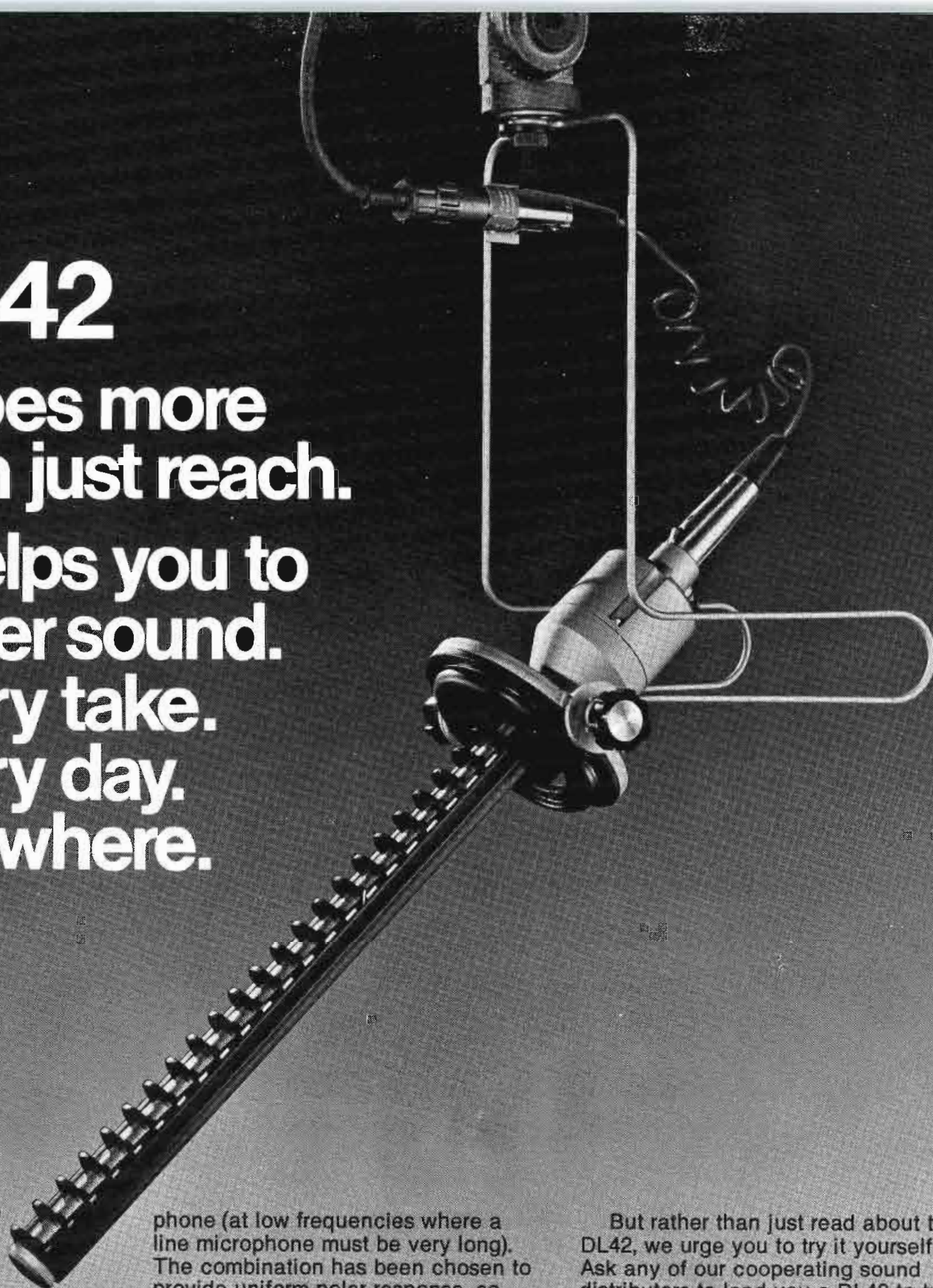
BROADCAST ENGINEERING



# DL42

It does more  
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It helps you to  
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Every take.  
Every day.  
Anywhere.



Since 1962 when the E-V Model 642 earned an Academy Award certificate for contributions to motion picture sound, there have been a lot of attempts to better this pioneering design.

Admittedly, some similar-appearing microphones were lighter and a bit smaller. But often it was at the expense of uniform polar response and wide range. Now there's a long reach microphone that's both smaller and lighter, yet maintains wide range response even off mike.

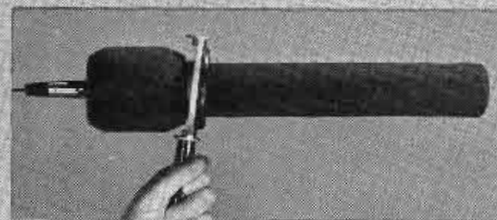
It's the E-V DL42.

Weight has been reduced to 1/4 of the 642... even less than most highly-directional condenser microphones. And size has been shaved wherever possible. The DL42 is a unique combination of line microphone (at the high frequencies) and cardioid micro-

phone (at low frequencies where a line microphone must be very long). The combination has been chosen to provide uniform polar response, so important to consistent sound quality. Off-mike pickups even sound good (although lower in level), a particular advantage to documentary units and free-wheeling shows where the unexpected is always happening.

The good pickup quality off axis has another practical benefit in the studio. Because maximum rejection is at the sides (where most of the noise comes from) you can work at a remarkable distance when necessary. So when a long shot is called for, the DL42 can be moved upward and cover the entire area with good quality and level. In fact the DL42 is more like a *super-super-cardioid*. And it covers with less racking and panning of the microphone than you ever needed before.

But rather than just read about the DL42, we urge you to try it yourself. Ask any of our cooperating sound distributors to lend you a DL42 to try on your next production. No cost or obligation to serious professional users. Write today for a DL42 technical data sheet. Good reach with good sound. We think you'll like what you hear.



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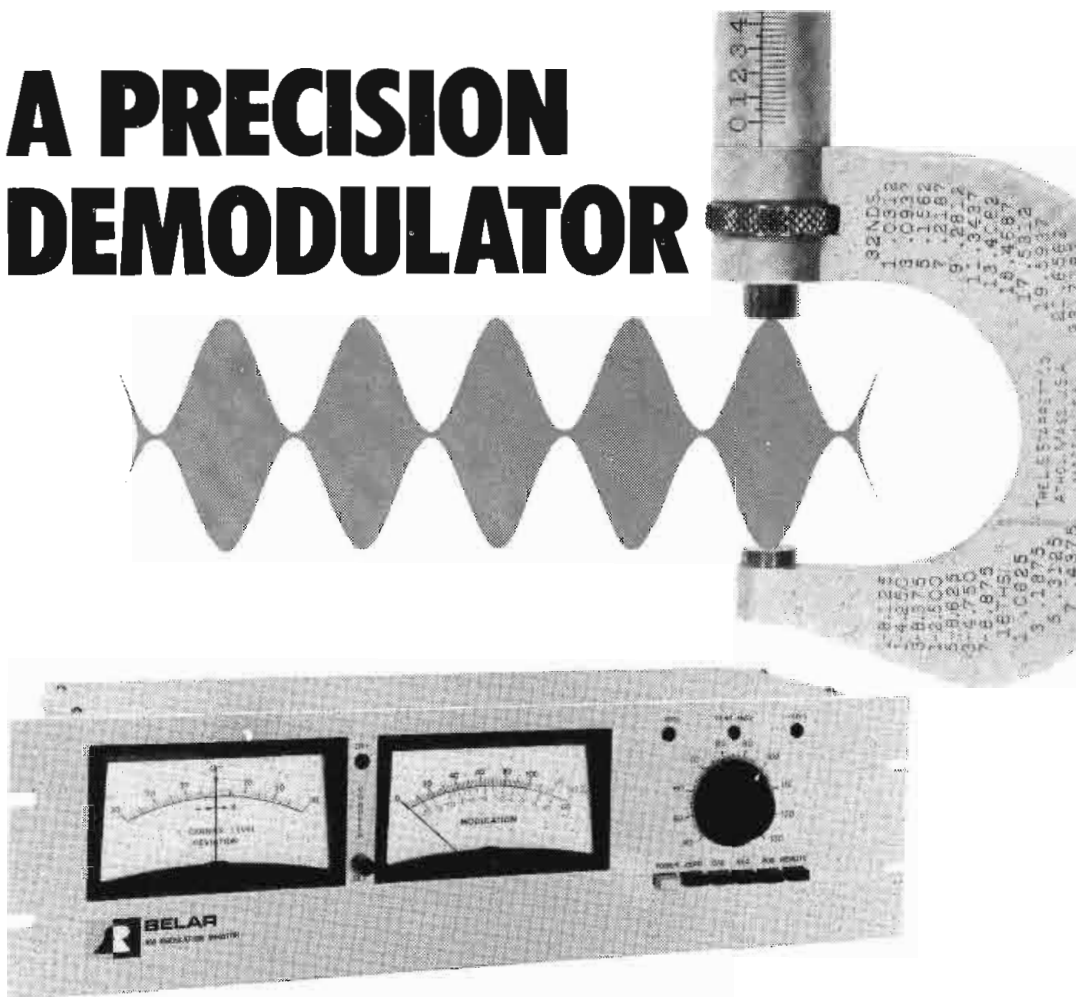
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COMPANY

Model DL42 Cardline® Dynamic unidirectional microphone including shock-mounted bail, noise-isolating coil cord, screw-on handle for hand-held use, Acoustifoam™ 2-piece windscreens, and carrying case, \$349.20 suggested professional net. Prices slightly higher in the West.

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# 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
- 125% positive peak modulation light — independent of input carrier level
- 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**

There are well over 3000 Belar AM, FM and TV monitors currently in use worldwide.

## EIA supports revised TV rules

The Broadcast Equipment Section of the Communications Division, Electronic Industries Association, has submitted a report to the FCC supporting the position for revised unattended operation of television broadcast transmitting systems. The report, "Toward Rules and Regulations for Unattended TV Transmitters," also affirms the feasibility of systems for unattended operation using current technology and readily available equipment.

Prepared by the Communications Division's TR-4.1 Engineering Subcommittee on Television Broadcast Transmitters, under the Chairmanship of T. M. Gluyas, the report relates to the National Association of Broadcasters' report on Automatic Transmission Systems for the Television Broadcast Service, dated August 19, 1974. The EIA report deals primarily with the unattended transmitter portion of the proposed automatic transmission system.

The report makes specific recommendations regarding what features, characteristics, and rules should be required to insure that licenses will implement and operate a station to achieve the full potentially reliable and high quality service of which an unattended plant is capable.

The recommendations include:

- a self-test feature to ascertain if the automatic shutdown circuits are in good working order;
- a requirement for automatic control of aural modulation and important visual modulation levels;
- a requirement to automatically shut down the transmitter if the carrier frequency error or the maximum power output exceeds the tolerance set by the rules;
- the singling out of seven TV transmitter system performance parameters that should be electronically monitored.

Copies of the report are available from John Sodolski, Staff Vice President, EIA Communications Division, 2001 Eye Street, NW, Washington, D.C., 20006.



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# bookreview

Now there's an easy way to get the dreaded chore of Proof of Performance tests out of the way. **The Proof Manual**, prepared by the editors of Broadcast Engineering, provides the precise step-by-step procedures (and tips) by which you readily comply with FCC requirements.

This manual is the first of its kind produced for AM engineers. In simple, easy-to-understand language it spells out the FCC rules...shows you exactly what you must do to comply...includes sample Proof results...provides you with suggested standard forms for logging your Proof measurements...and much more!

By using this new Manual and following its procedures, you'll save time. What's more the report you file will impress even the toughest FCC inspector. Now you can be positive that your station complies with regulations. And at the same time, you get a realistic idea of just how your total facility is performing.

The book is available from Intertec Publishing Corp., Kansas City, Missouri.

**Audio Systems**, by Clyde N. Herrick, presents the latest developments in the ever-changing field of audio systems.

This book is aimed at students with some electrical background, but is also suitable for the practitioner with on-the-job experience. The text covers the conceptual side of audio systems but also includes troubleshooting.

Audio Systems covers such new developments as quadriphonic sound, new or electronic-music, the bipolar and field-effect transistor, the integrated circuit, and the light-dependent resistor. All types of sound systems—stereo components and public address, broadcasting, telephone, and theater systems—are covered as well as electronic organs, carrier current systems, and new-music.

The book is available from Reston Publishing Company, Inc., Reston, Virginia.

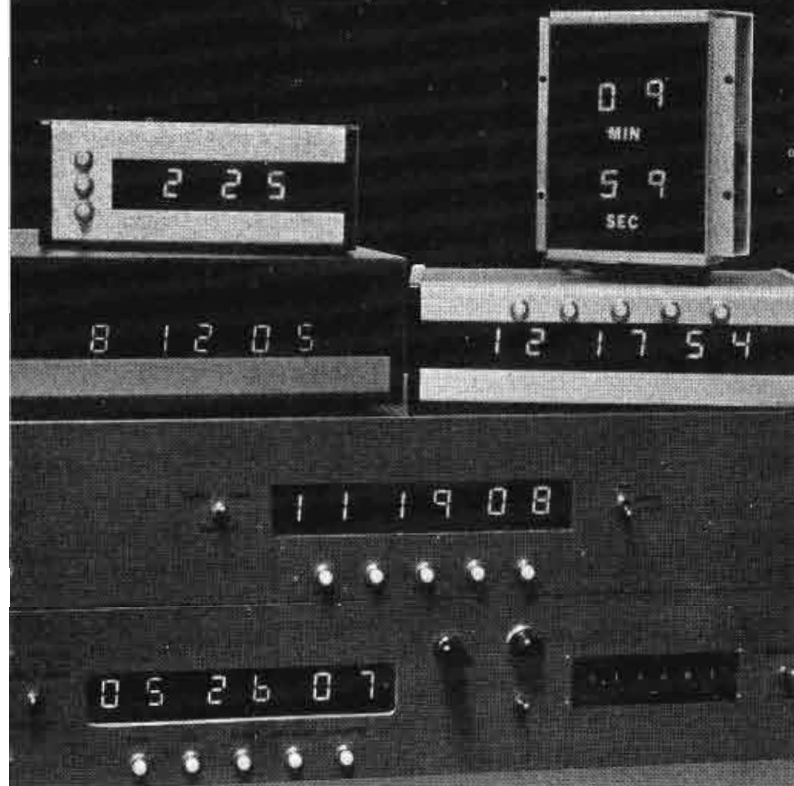
**ABC's Of Computers**, written by Allan Lytel and Lawrence Buckmaster, was designed to introduce the computer to the reader, explaining what it is, how it operates, and what it can be expected to do.

In logical progression, the book describes the two basic types of computers—analogue and digital—and proceeds with simplified explanations of circuits, numbering systems, arithmetic operations, symbolic logic, logic circuits, counters, memory storage, input/output devices, programming, and maintenance.

This book is a basic reference for technicians, experimenters, or literally anyone with an inquiring mind—people who want to know what is going on in the constantly changing technical world around them.

The book is available through Howard W. Sams & Sons Co., Inc., Indianapolis, Indiana.

# LOW COST DIGITAL CLOCKS, TIMERS AND COUNTERS



All ESE digitals are designed and constructed using the latest solid state electronic components and circuitry. This equipment is perhaps the most economical line of digital clocks, timers and counters available. Circuit efficiency and lasting quality are designed into every ESE digital product. Constructed with the built-in ruggedness necessary for studio use. No moving parts.

Special custom items, like the video tape/counter editor, a monitoring system with unique display configuration, 12 and 24 hour clocks or timers, 10 minute timers, 3 digit, 4 digit, 6 digit, record seconds in tenths, hundredths or thousandths . . . All available from ESE. Options include: Thumbwheel switch or patchboard programming, BCD outputs, relay closure outputs, and solid state buffered outputs. Many products available in kit form.

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- ES-500, 12 hour clock/timer:** 6 digit — Records hours, minutes, seconds. Start — Stop — Reset — Slow and Fast Advance buttons. Displays up to 12:59:59 . . . . . 150.00
- ES-510, 60 minute timer:** Displays up to 59:59 — Push-button: Start — Stop — Reset, Only 3/4" deep for flush mounting into walls or std. alum. case . . . . . 125.00



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## A Prime Training Ground For Broadcast Engineers of the Future Finds a Stanton Cartridge in Every Head...



Shown above during a daytime session at WCWP are: Michael A. Phillips and Phil Lebowitz.

Not many college radio stations are as fortunate as WCWP of the School of the Arts at the C. W. Post Center, Brookville, L.I., in possessing such a magnificent building and studios. But, college radio stations all over the nation, in common with WCWP, prefer Stanton cartridges for all their turntables.

WCWP has become a well known source for radio stations in search of Broadcast Engineers, for here the young trainees learn what they must know in order to qualify for that position in a regular commercial station.

William J. Mozer, Director of WCWP, and an Engineer at WABC says:

"We have never used anything but Stanton Cartridges on all of our turntables. Currently, we are outfitted with the 681 EE which meets our needs both in terms of reliability and excellent sound quality in on-the-air playback as well as in our production of transfers. We are looking forward to a future step-up to the new Stanton 681 Triple-E".

Stanton is the choice of a great number of college radio stations, just as it is for the great majority of commercial broadcasters. That is because Stanton cartridges are the Professional Standard and possess outstanding ability to withstand rugged handling without sacrifice of audio quality. Their excellence and reliability assure the highest quality sound with minimum maintenance.

Whether your usage involves Broadcasting or Home entertainment, enjoy professional audio quality with Stanton products.

Write today for further information to Stanton Magnetics Inc., Terminal Drive, Plainview, N.Y. 11803



All Stanton cartridges are designed for use with all two and four-channel matrix derived compatible systems.

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# NEW PRODUCTS

## Color Burst Phase Meter

Video Aids Corporation introduced their color burst phase meter at the NAEB Las Vegas convention. You'll see it on display at the upcoming NAB convention.

Model BPM-1 is a new color burst phase meter that compares color burst phase of cameras, VTR's proc amps, and time base correctors. The error is indicated on an analog meter. As such, can be substituted for many vectorscope needs.

Video input: 0.75 to 1.5V p-p, 10K Ohms, BNC loop-thru. Subcarrier input: 2V p-p plus and minus 3dB loop-thru. Coarse and fine adjustments of null meter displays changes in video burst relative to station subcarrier. Meter range: plus and minus 10 degrees. Stability: plus and minus 2 degrees with time, temperature, and line voltage input changes.

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## Film-Slide Multiplex System

Fernseh Group of Robert Bosch Corporation is now offering a new low-cost film/slide prism multiplex system.

With three projector (or slide) inputs, any standard Fernseh KCP 40 low cost studio camera may be applied to the newly designed Fernseh freestanding triplexer pedestal. Thus KCP 40's used in the studio may be utilized in a telecine mode.

All of the KCP 40 features are retained to give high sensitivity, no smearing effects and a built-in test system. Automatic light control is incorporated into the triplexer lens adaptor which can replace the camera studio lens in seconds. High quality colorimetry, matching all other Fernseh cameras is inherent in this system.

For More Details Circle (74) on Reply Card

## Broadcast Telecine

Cohu unveiled their telecine successor to the standard in the industry Model 1500 "Performer" at NAEB '74.

This Cohu Broadcast Telecine designated the Model 1550 has all the features of its predecessor, the Model 1500, plus new encoder/auto balance/enhancer unit and remote control and

setup panels.

The new Model 1550, like the 1500, has automatic black level and automatic sensitivity control which can correct for as much as a 2:1 change in light level in less than 100 ms. A highly efficient dichroic mirror beam-splitter optical system insures maximum transmission with flare and ghosting virtually eliminated. The modular circuitry design of the Model 1550 allows for the use of low cost, long lasting vidicon image converter tubes. Breech loading yokes minimize down time and registration problems when retubing. The camera rests on a rigid and ultrastable optical bedplate.

For More Details Circle (75) on Reply Card

## Tape Cart Machines

Broadcast Electronics, Inc. announces the introduction of the new Spotmaster® Series 2000 Tape Cartridge Machines. These machines are of completely new design, and the company says they represent the most significant advancement in 15 years of Spotmaster history.

Series 2000 Cartridge Machines have low power consumption and run cool to protect tapes. Their noise figure exceeds 57 dB, and start/stop times are the fastest in the industry—under 80 milli-seconds. Standard features include balanced transformer output, 1000 Hz cue, 150 Hz cue and provision for remote control and telephone interface.

Separate front panel plug-in modules are used to implement record and audition functions. These add flexibility and permit instant field conversion of Series 2000 playback machines. Table top units accept A, B and C size cartridges, and the dual rack mount configuration accepts size A and B cartridges.

Broadcast Electronics is offering the new Series 2000 machines with an unprecedented 18 month warranty.

For More Details Circle (76) on Reply Card

## Time Base Corrector Accessory

Ampex Corporation announces a heterodyne accessory to the new TBC-800 time base corrector that permits either direct color or heterodyne color recovery from helical scan

videotape recorders for use in electronic journalism, industrial and educational video applications.

Ampex said the heterodyne accessory introduces no measurable signal degradation to capstan servoed helical scan recorders and offers superior velocity and dropout compensation.

The firm demonstrated the accessory with its time base corrector, the fourth generation digital TBC-800, at the National Association of Educational Broadcasters convention in Las Vegas.

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### Automatic Video Corrector

The 1460 is a **Tektronix** in-line correcting amplifier using ITS line 330 as a correction reference signal. Correct the Reference Signal and the full field signal is thereby corrected too, that is the essence of the automatic correcting action of the 1460.

The 1460 samples six parameters of the Reference Signal in the vertical interval and then automatically changes its operating characteristics until correct values for the Reference Signal are achieved. The full field signal is simultaneously corrected by the same automatic changes that correct the Reference Signal.

The 1460 takes the work out of video signal quality control...with fully automatic correction of video gain, chrominance to luminance ratio, black level, chrominance phase, burst amplitude and sync amplitude. With a 1460, the quality of program signal is rigidly maintained. Ordinary changes and even many severe distortions are automatically corrected, freeing engineering people from the task of regularly readjusting controls. Attempting to keep up with varying conditions with manual correction is no longer necessary. The 1460 does it all automatically.

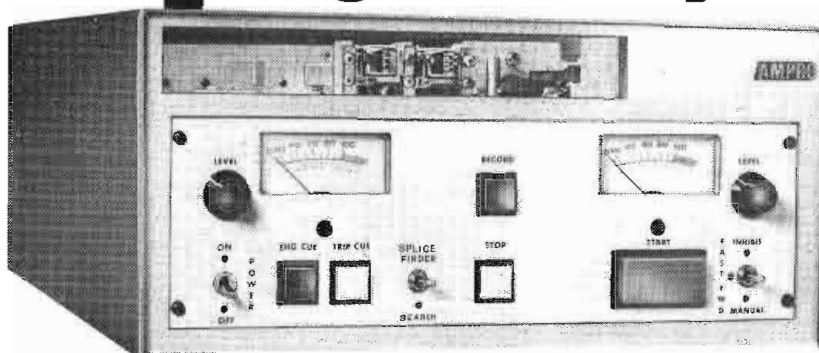
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### Studio-Transmitter Link

The new all solid-state Model PCL-505 Aural Studio-Transmitter Link has been announced by **Moseley Associates, Inc.**, of Santa Barbara, California. This new low-profile STL is available in the 150-174 MHz, 215-240 MHz, 300-330 MHz, 450-470 MHz and 890-960 MHz bands. The Model PCL-505 Aural Studio-Transmitter Link will replace the current Moseley Models PCL-202, PCL-303, PCL-303/C and PCL-404 STL's.

As in the past, direct FM modula-

# tougher than you are



... **AMPRO** Automatic Tape Cartridge Recorder/Reproducers are the rugged ones ... the ones with heavy-duty head mounts, die cast deck and front panel, self-aligning pinch roller and direct drive 4" motor. Silent, both mechanically and over your program line (-58 dB snr, ref. 400 Hz 3% THD), air-damped solenoid operation assures positive stop/start, gentle tape handling and long cart life. Electronic splice finder available as an option on recorders. 34 standard stereo/mono models to choose from, non-slip desk enclosure and rack mount. Priced from \$650 to \$1,775.

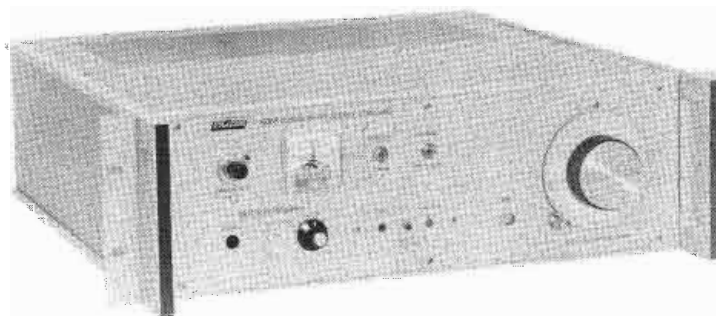
AMPRO also manufacture a complete line of mono, dual mono, stereo and dual stereo/simulcast consoles and multi-cartridge units. Financing available to qualified buyers. Call Alex Meyer collect or write today for details.

## AMPRO CORPORATION

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## BIG TIME NETWORK TV STAR.



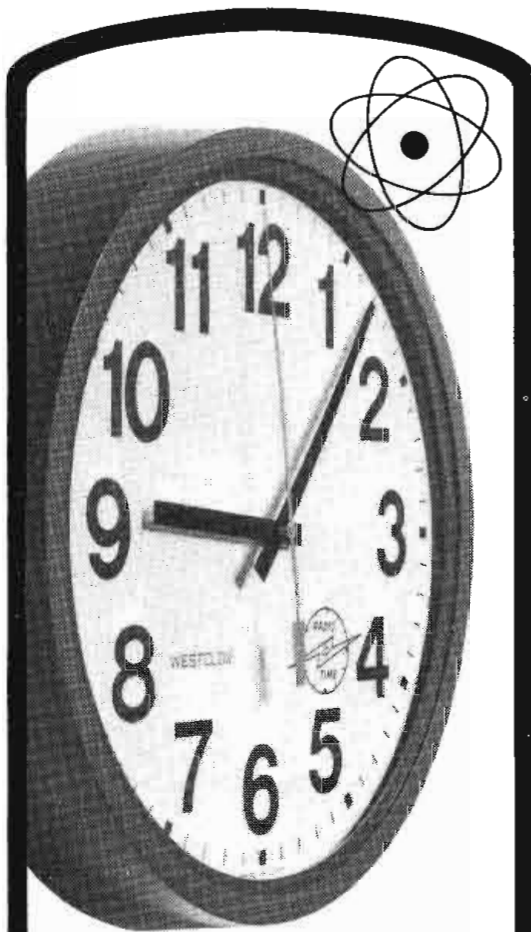
**Tracor Model 600A Rubidium Frequency Standard. Used by NBC, ABC and CBS television networks. Price: \$7,950.**

Only rubidium standard found in TV application. Compact, rugged, designed for color subcarrier generation. Utilizes stable quartz crystal oscillator whose frequency is controlled by the atomic resonance in the ground state of rubidium 87. Features continuous rotation phase shifter and built-in Time Scale Selector. Long-term stability is  $3 \times 10^{-11}$ . Write or call for full technical and application information.

## Tracor

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## ULTIMATE ACCURACY!

Radio-Controlled Quartz Crystal Movement

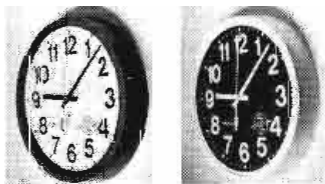
This amazing timepiece solves the problem of *absolute accuracy* that is so necessary in the modern communication industry.

Each clock contains a solid state radio receiver that is constantly tuned to the National Bureau of Standards' station WWV. Periodically the clock hears a signal that triggers the up-dating mechanism, correcting any minor deviation of the second hand.

The clock is also equipped with battery stand-by power. Line power surges, brown-outs, and power failures have no effect on the clock.

Available now for **\$187.50.\***

White or black dial



\*Volume discounts for multiple orders

### RADIO TIME SERVICE INCORPORATED

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(602) 793-8174

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## NEW PRODUCTS

(Continued)

tion is employed in the PCL-505 Transmitter. A brand new approach to AFC circuit design enables a 100 percent duty cycle greatly improving AFC locking capability and providing frequency stability of better than 0.0005 percent. The new system accepts one program feed, monaural or stereo, and two additional sub-carriers. Also considered in the design of the PCL-505 was quadraphonic stereo. The PCL-505/C has the capability of accepting a quadraphonic stereo signal.

For More Details Circle (79) on Reply Card

### Quad Encoder-Mixer

The Model SQE-2000 from CBS Labs provides the broadcaster or producer with full quadraphonic production capability. Employing the CBS-SQ encoding techniques adopted by major record labels, the new encoder is AC or battery operated and may be used as an eight-input mixer or matrix encoder of four-channel program material. It also permits the enhancement of existing stereo record libraries to provide a quadraphonic effect for SQ receivers.

SQ-encoded signals may be broadcast under existing FCC standards without additional authorization. Total compatibility of reception is guaranteed for all stereo and mono receivers.

For More Details Circle (80) on Reply Card

### Video-Audio Logging System

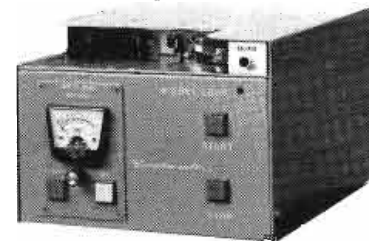
A Video-Audio Logging System designed to provide 24 hours of TV programming on one reel of videotape with intelligible sound playback at time lapse speed is being marketed by GBC Closed Circuit TV Corp.

According to GBC, this new logging system is the answer to furnishing advertisers and their agencies proof of performance of advertising commercials; as a defense against lawsuits; and for providing a program log acceptable to the FCC.

Components of the system include the GBC Video-Audio Logger (Model TVR-321-24A), the GBC Television Time-Date Generator (Model TG-3201) and GBC Solid State Video Monitors.

With these components, TV and CATV stations can now log 24 hours of programming on one 7" reel of videotape and play it back with full

## NEW SERIES 2000 CARTRIDGE MACHINES



Spotmaster's new Series 2000 Cartridge Machines are the most significant step forward in our 15 year history. Complete new design features simplicity and ease of operation, with plug in modules for recording and audition. Superb electrical and mechanical specs at a new low price.

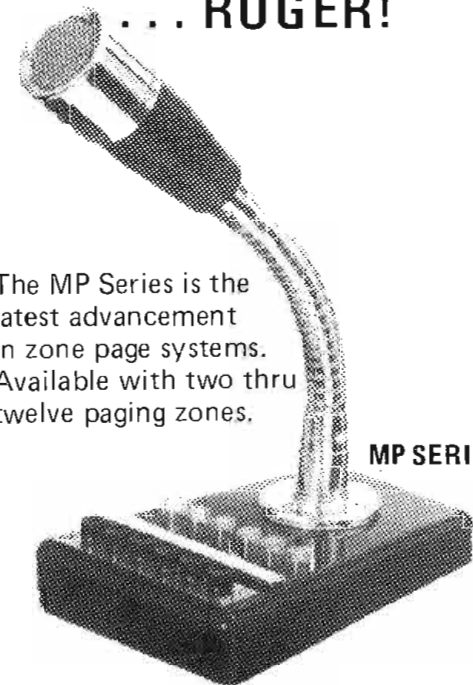
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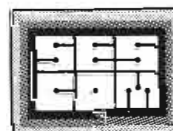
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The FCC now says that you must have an approved Antenna Monitor. Since this is an added expense, consider carefully what is required of the monitor versus what it will cost.

At \$1660\*, the Model AM-19 (204) is the lowest priced, FCC type approved Antenna Monitor available.

Now after several years of use at many stations, it has proven its reliability. And, it is compatible with virtually every type of wire or wireless remote control system.

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\*Based upon 2 tower, DA-2.

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sub-broadcast, educational, medical, CATV and Industrial.

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### Three-Inch Coaxial Cable

Air dielectric Wellflex coaxial cable is now available in 3 inch diameter size, especially for broadcast use, by **Cablewave Systems Inc.**

Construction of the newly available cable includes a corrugated tubular copper center conductor, a spiral fixed vertebrae, polyethylene dielectric, corrugated copper outer conductor and a black polyethylene jacket. The specially constructed insulator contributes to low loss and excellent mechanical stability. The Wellflex cable also achieves a combination of remarkable flexibility, ruggedness and superior electrical performance.

Other specifications include 50 Ohm impedance, .13 attenuation at 100 MHz.-dB/100 ft., 96 percent velocity, 35.9 average power at 100 MHz.-kW. Mechanically, Wellflex offers a minimum bend radius of 30 inches and weighs 1.75 pounds.

For More Details Circle (83) on Reply Card

audio and showing time of day, station call letters and date on the screen.

For More Details Circle (81) on Reply Card

### Color Camera

**Hitachi Shibaden Corp. Of America** announces the first 2/3" 3 Tube Plumbicon Color Camera utilizing the new Amperex 37XQ Series Plumbicon™ Camera Tubes.

This new camera, the FPC-1000P is similar in size and weight to the time-proven FPC-1000B with performance similar to the high quality FP-1212 1" Plumbicon™ Camera.

Electronic and optical factory modifications to the FPC-1000B were required to make efficient use of the all new 2/3" Plumbicon™ Tube.

The FPC-1000P will be shown at the forthcoming NAEB Convention in Las Vegas with a list price of \$13,900 which is complete with: CCU, Electronic Viewfinder, 50 foot of cable, and 5:1 rear cable control zoom lens.

Camera resolution is better than 450 lines with a signal to noise ratio of more than 42dB at 150 foot candle. Low light level minimum requirement is 10 foot candle.

Application of this camera is expected to cover such fields as

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# NEW PRODUCTS

(Continued)

## Special Effects Generator-Switcher

**Shintron** announces the Mark III version of its popular Model 370 Chromatic Special Effects Generator/Switcher for use in color studio programming. Improvements in the front panel design facilitate ease of equipment operation. Split chrome-plated gear-reduction levers control effects with precision. Input sources can be labeled using the convenient label holder. The power switch is handle-protected to prevent accidental shut-off. In addition to improved packaging design, the performance of the new Mark III version of Model 370 has been improved electronically.

The best features of the Model 370 Mark II are continued in the new Mark III. Ten basic wipe patterns, built-in keyer, colorizer, background generator and color black generator are featured effects.

Additionally, the Model 370 input switches are totally vertical interval switches. Programming is made eas-

ier for the producer by automatic take from program systems and the re-entry system.

For More Details Circle (84) on Reply Card

## Mic Transformers

**Shure Brothers Inc.**, Evanston, Illinois, has added two new models to its A95 Series of line transformers. These new line transformers make it possible to connect a high impedance microphone to a low impedance amplifier input.

The new Model A95D features a male professional 3-pin audio connector with a 1/4" phone jack; the Model A95FD has a female connector with a similar phone jack. Neither unit requires wiring or soldering and, thus, can be connected easily and quickly.

For More Details Circle (85) on Reply Card

## Dynamic Noise Filter

Richard Burwen, President of **Burwen Laboratories** announced recently the introduction of a new product in their professional audio line. The component, Model DNF 1500

D Dynamic Noise Filter, is specifically designed for radio station and communications applications. "The applications," Burwen said, "are at every radio and television station which uses class D telephone lines or does any remotes or talk shows. The DNF 1500 D uses a variable bandwidth filter to eliminate unwanted noise present on telephone lines.

It is designed to give better intelligibility to shortwave broadcasts and single side band reception as well as remote pickups which do not use high quality broadcast lines."

The DNF 1500 operates over a bandwidth of 250 cps to 4 kHz. Depending on the level of the high frequency content of the material, the DNF 1500 D opens or closes its bandwidth allowing only the minimum bandwidth required for the program content without reduction of high-frequency response. The unit also includes a sharp 4 kHz cutoff filter for reducing distortion on shortwave broadcasts and a 250 cps cutoff filter to reduce hum and other low frequency noise. The filter has unity gain and is designed to operate at

# AUDIOWAVES

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broadcast levels nominally plus 8 dBm but can operate in a range of -6 to +10 dBm.

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### Modular Console

A new audio control console, Model 1604, from **Automated Processes, Inc.**, offers flexibility to the audio professional. Performance options can be selected from among plug-in modules, and a variety of interchangeable equalizers is also available.

The relatively low cost of this console makes it suitable for use for either fixed or remote recording, and by broadcasters as a production or on-the-air console. It will accommodate 16 inputs, 4 echo channels, 2 foldback circuits, 4 output channels, 4 submasters, 4 speaker monitoring, slate, tone and intercom circuits, and audition and cue facilities.

For broadcast applications, the 1604 console has the necessary foldback, audition, intercom and program interlock features, and may be equipped with optional modules offering remote control of tape machines and turn-

tables, or remote input pre-selection.

All external connections are plug-in to allow rapid installation.

The Model 1604 may be tabletop mounted or free standing, and optional features may be added at any time, since all are factory pre-wired, permitting easy field installation.

For More Details Circle (87) on Reply Card

### Duplex And Simplex Portable Microwave

Duplex and simplex portable microwave systems for TV conferencing and other communications applications from **Communications Carriers** include receiver, transmitter, and 4-foot antenna mounted on heavy duty tripod with pan and tilt adjustment. This configuration can be mounted on rooftops and exposed to weather. There are three types of microwave equipment available for this mounting. They include the ICM-12, ICM-1310, and ICM-1013FM. The equipment covers common carrier, Cars, and business service bands suitable for long, intermediate or short hop applications.

The microwave equipment is all solid state, employing modern long life components and features many extras such as hermetically sealed RF heads, lightning protection circuits, audio and data subcarriers, battery operation, etc.

For More Details Circle (88) on Reply Card

### Cable Sealer

**Communications Technology Corp.** announces Ductsil, a new compound which quickly seals moisture out of ducts containing telephone, power, communications or CATV cables with easy application under field conditions.

A primary feature of Ductsil is its pre-measured packaging in Clipper Paks which are unique to Communications Technology compounds. Ductsil is a patching cement compound which mixes with the water provided in one of the package compartments. The pre-measured concept gives the exact proportions for a proper mix. This will reduce waste caused by mixing too much or too little water in the compound and the required water is

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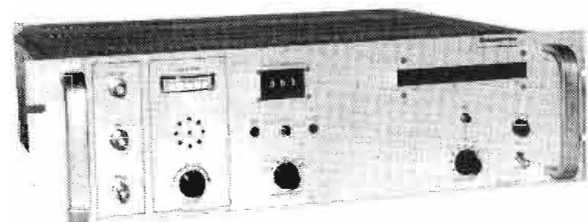
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## Datametrics

### TRACK TIME & FREQUENCY



Model SP-465 WWVB Time Synchronizer furnishes both time and frequency information in synchronization with NBS Radio Station WWVB.

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A valuable instrument for use in Metrology Laboratories, Communications, Power Utilities, and Real Time Data Processing. Write or call for Technical Bulletin SP-465.

## Datametrics

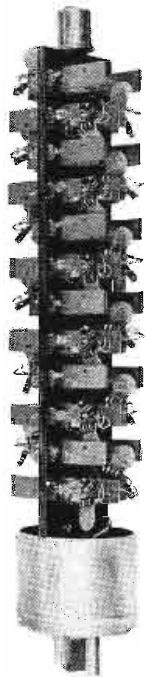
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## NEW PRODUCTS

(Continued)

there—it does not have to be searched out in the field.

Application from the Ductsil Clipper Pak is also easier than from can packaging, as the control over pouring into horizontal ducts is an important improvement.

Ductsil is provided in 250-gram paks.

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### 5 MHz Frequency Counter

Systron-Donner has introduced a new 20 Hz to 5 MHz Counter, Model 6202A, designed for a wide variety of low cost counter applications. Rugged and small, the 6202A is suited for industrial plant environments, production lines, school laboratories, telephone service units and small systems.

Personnel not accustomed to making precision frequency measurements will find this counter easy to use. An "AUTO ranging" pushbutton will program the counter to fill the display register while automatically selecting maximum frequency resolution. The 6202A also has manually adjustable input controls for setting trigger levels and signal attenuation to screen out the effects of noise superimposed on the input signal.

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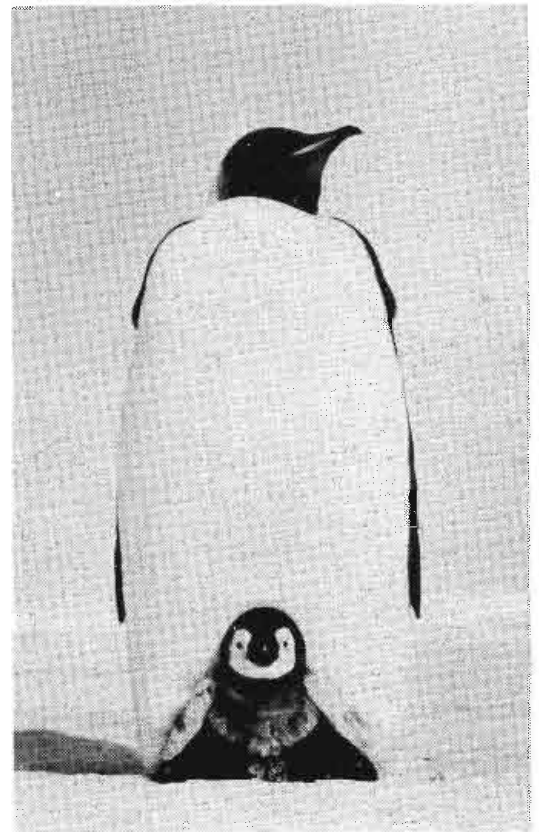
### Audio Switcher

A low-cost audio switching system for use in distribution and stereo applications was recently introduced by DYN AIR Electronics, Inc. of San Diego, California. The new Series-8100 equipment provides an economical solution for remotely controlled switching and is designed to replace large patch boards or mechanical systems in stereo or monaural applications.

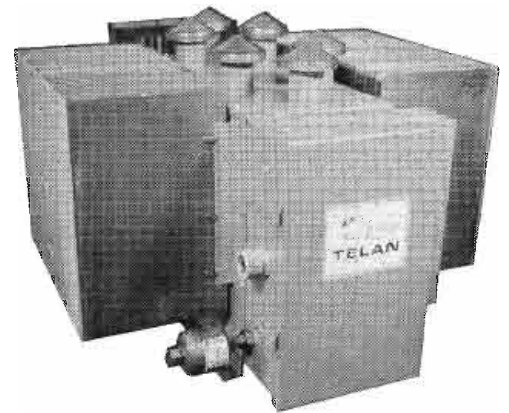
Adaptable to practically any input-output and control configuration, the audio switching system is particularly useful in large audio-follow-video, or straight audio applications. For maximum versatility, the Series-8100 is provided in three basic configurations: a single or dual 20-in/10-out, a 20-in/20-out, or a 40-in/10-out system. Any of the basic configurations can be used as building blocks for larger systems requiring numerous inputs or outputs.

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(Continued from page 15)

## Chapter 15: New York, N.Y. Chairman: John M. Lyons Woodside, N.Y. 11377

For November 14th, Art Silver arranged a tour of the AT&T building and facilities concentrating on "Long Lines". Numerous employees of AT&T and New York Telephone assisted in the tour and in explaining the audio and video networks of the entire country plus other facilities of interest to the broadcaster. Following the tour was a question-and-answer session in the auditorium. During the brief business session preceding the tour, Chairman John Lyons reviewed the 2-day Mini-vention which had been held during the previous month at the Tarrytown Hilton. Many people felt this was one of the best conventions ever staged in the New York area. Virtually every major manufacturer was represented. Chairman Lyons felt that the people who attended enhanced their positions by the extent and quality of the contacts made and the equipment available for inspection. Many of the region's responsible broadcast engineers were in attendance, plus SBE President James Wulliman of WTMJ, Milwaukee, and a number of the national SBE Directors.

## Chapter 16: Seattle, Wash. Chairman: Harry Lewis Seattle, Wash. 98125

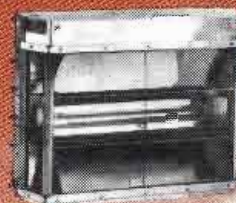
Bio-medical Telemetry and Medical Instrumentation in the Coronary Care Unit was presented by Jim Strang, a registered engineer, and one of the owners of Microtronics, Portland, Oregon, on November 13th at the Norselander Restaurant, Seattle. Nick Foster, editor of the Seattle Chapter Newsletter devoted the major portion of the November issue to his factual knowledge of "The Great Dry Spell", using the opportunity to straighten out or correct some of the information in a recent Seattle newspaper article, especially those parts of the article that implied indirect participation by one of the personalities of a local Seattle radio station in aiding delivery of illegal beverages from Canada to Seattle ports.

## Chapter 20: Pittsburgh, Pa. Chairman: Henry R. Kaiser Pittsburgh, Pa. 15212

Information received from exhibitors at the Pittsburgh chapter

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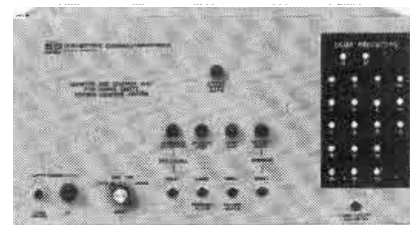


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Mini-vention, which was held November 1st, indicate that the event met their expectations. While no word has been received from chapter officials, Chairman Kaiser had reported right before the Mini-vention that advance payment from 29 exhibitors had been received. These included Alpha Video, Ampex Corp., AT&T/Bell of Pennsylvania, Audio Innovators, CCA Electronics, General Dynamics, Communication Medias, Control Design Corporation, Grass Valley Group, International Video Corporation, Landy Associates, Leff Radio Parts, 3M Company, Opus One, Pennsylvania Educational Aids Inc., RCA Corporation, RPC Electronics, Tektronix Inc., Telemation Inc., and Vital Industries.

The November 21st meeting of the chapter, held at Buddies, included election of 1975 officers and a salute to Lou Wagner, who planned to retire at the end of November.

**Chapter 21: Spokane, Wash.**  
**Chairman: T. O. "Jorgy" Jorgenson**  
**Spokane, Wash.**

The Spokane chapter, headed by T. O. Jorgenson, continues its weekly meetings, week after week, rain or shine. September and October ses-

sions covered the following topics: RF Sweep Generators, IF Modulators, Testing TV Transmitters in Mexico, New IF Modulation Transmitter for KSPS Channel 7, Design Features of RCA and Gates Transmitters, FCC TV Transmitter Inspection Items, Problems of Sampling Lines for Directional Antenna Systems, Replacing a 50-KW Phasor, CCA FM Transmitters, Audio System for KSPS STL., VU Meters, and RF Translator. Those providing the programs included Ron Valley, Dave Green, Vince Hoffart, and M. Jones.

**Chapter 22: Central New York**  
**Chairman: Mort Miller**  
**Syracuse, N.Y. 13214**

The November 21st meeting, held at WIBX/WIBQ, Utica, N.Y., centered on a close-up inspection of the up-to-date, sophisticated, and fully-integrated broadcast automation system at this facility. Everett Radley and his staff conducted the tour and explained the operation in detail. Programming for a week ahead is possible through use of cassette tape memory. Visual display screens show upcoming events.

Information on future meetings is available from Mort Miller, Chairman, WNYS-TV; Gary Hartman, WSYR-TV FM/AM, Vice Chairman; Glenn Hart-

ley, WNYS-TV, Secretary; or Vern Nyman, WCNY-TV FM, Treasurer.

**Chapter 26: Chicago, Ill.**  
**Chairman: Brad Anderson**  
**Chicago, Ill. 60680**

The October 24th meeting included nominations of officers for 1975 and a discussion which led to a decision not to hold a Mini-convention this year but to plan one for 1975 with Chairman Brad Anderson to head the committee formed for this purpose. The technical session featured the Engineering Department of Arthur Anderson & Co., A/V Center, St. Charles, Ill., who provided a program on why this prestigious CPA firm got into broadcast quality videotape and how the A/V Center helped them. Included was a demonstration of the Time Code Editing System as used with the RCA VTR machines. Hosts were department manager Harry Paney and SBE member Tom Hecker.

The November 19th meeting was held at the Sears Tower with the program presented by Weston Instruments. Included were demonstrations and information about various instruments such as digital types as used by broadcasters. Those attending were also provided with a tour of WTTW and WLS-TV Transmitters

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**Chapter 28: Milwaukee, Wisc.  
Chairman: Ed Wille  
Milwaukee, Wisc.**

"The Darn Thing Talks", or "How the WBCS Computerized Automation System Works", were alternate titles for the November 13th meeting presented by Leroy Wolniakowski, Chief Engineer, Dave Janzer, and Jim Wolniakowski, all of WBCS, at the WBCS studios in Milwaukee. The speakers covered the concepts of the system, how some of the more common automation problems have been eliminated, and how they have had to "field-engineer" some of their problems and procedures. The program was arranged by Dave Dzurick, WRJN, program chairman. Results of recent elections are: Chairman, Bob Truscott; Vice Chairman, Dave Dzurick; Secretary-Treasurer, Jan Pritzl. Reappointed Editor of the chapter Newsletter is Todd Boetcher, as a result of the exceptional job month after month. The latest issue of the newsletter included a technical topic review "Tape Talk" by Jan Pritzl, WMVS.

**Chapter 32: Tucson, Ariz.  
Chairman: H. J. "Bart" Paine  
Tucson, Ariz. 85717**

The technical program, "Telecine and Its Applications", was arranged by Gene Stough, director of programs for the chapter. Hank Maynard of Telemation Inc., was the guest speaker at the November 25th meeting which was held at the Medical Television TV Studios, at the Arizona Medical Center. Ray Beck, Chief Engineer, was the host. It was announced that the chapter will hold its first annual Christmas Party, free, at Shakey's. Host will be Brian Mull of Elliot Electronics, and Elliot representatives Guy Travil, Phil Espino, and Jim Whorl.

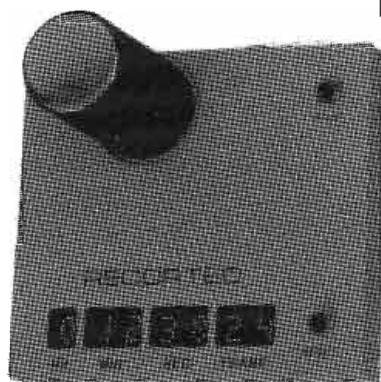
**Quincy, Illinois  
Lynd Carter, Provisional  
Chairman  
Hazelwood, Mo. 63042**

On August 29th, William Woods, Director of Engineering, State of Wisconsin Educational Communications Board, presented a slide program on Design Considerations for a State Educational Communications Network. This network would be in conjunction with the Wisconsin network of 4 TV, 8 FM, and 1 AM stations. The meeting was held at the Holiday Inn, Quincy.

For information on future meetings contact Lynd Carter at the Tektronix office, Hazelwood, Mo., 731-4696.

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# Station to Station

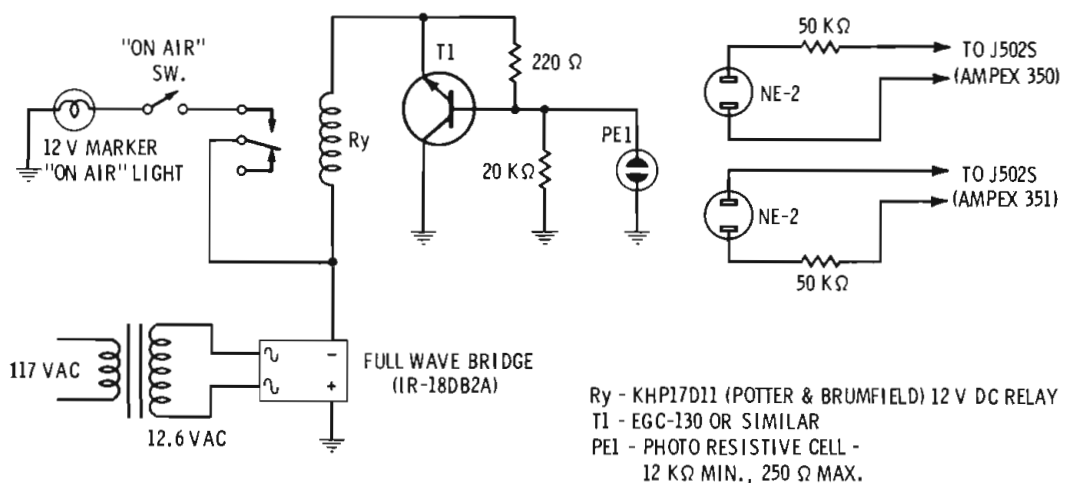
## Air light relief

The problem that we had with our production studio was that every time the announcer left the mike on while doing something other than mike work, such as splicing tapes or recording a record, the "on the air light" would prevent anyone from entering that studio.

The remedy I cooked up was to

possible AC line loop caused by reversing the AC plug to one of the decks. Also, in the event that more decks would want to be added to the system, the only expense is another neon bulb and resistor, instead of more relays.

The transistor was a scrap audio transistor; just about any power or switching transistor would do as



put the "on the air light" in series with relay contacts. The relay coil would be in parallel with the record relay in the tape deck.

At WHCN (FM) we have two Ampex tape decks. In order to maintain compactness and economy I ended up with the circuit shown in Figure 1. The idea behind the two neon bulbs was to prevent a

long as the transistor could handle the relay current. The "on the air light" is a marker light used on the sides of cars and trucks. The marker light is a more aesthetic approach to the "on the air light", than the common bare light bulb, which I have seen in several stations.

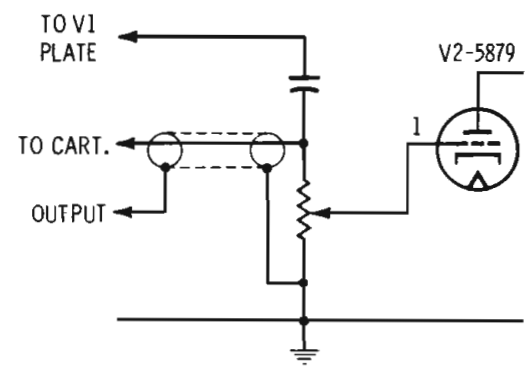
**Lawrence Titus, CE**  
Station WHCN  
Hartford, Conn.

## A lighter load

"Oh, what to do? Oh, what to do?"

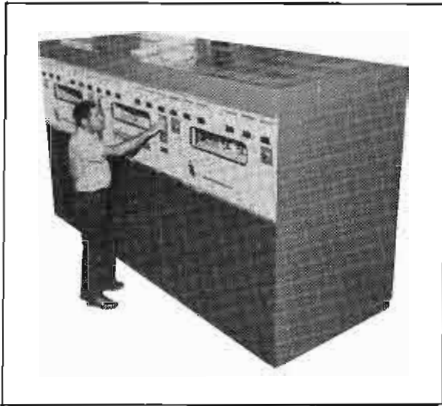
That was the thought of our high school football color man when faced with the necessity of reading all the commercials live for the coming season. KGUL, a day-timer, has always inserted the commercials when the taped play-by-play was aired on the following morning. This year, however, we would be live. (almost). as our play-by-play would be carried on the audio portion of the local CATV weather channel, courtesy of Cablecom's

General Manager, Don Patten. Since the state of mind of the color man is very important, due to his being the KGUL General Manager, I decided to try to lighten the load a little. A cartridge machine seemed



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to be the ideal solution if it could be used with a minimum of effort and cost.

After a little head-scratching, it was decided to try connecting the cart machine across the master gain control of our Gates Biamote. I wanted to make the set-up as fool-proof as possible, with no change in the cart machine output gain control. Connecting the cart output to the high side of the first section of the master gain control, R-4 A, (see Figure 1), proved to be perfect.

The cable from the cart machine to the master gain control was run "the long way around" inside the Biamote, in order to lessen the possibility of hum pickup from the nearby power supply.

I was afraid that there would be problems due to not using a transformer, but it turned out to be a blessing in disguise. When the cart machine is started, it loads down the amplifier to such a degree that the microphones are effectively cut off!! This eliminated any possibility of forgetting to turn off the mikes during commercials, as previously the tape recorder was just stopped during breaks.

A phone plug and female jack were inserted in the line between the cart machine and the Biamote so that, in the event of a long run to cue on a cart, the operator only has to unplug the audio lead to have the microphones live again.

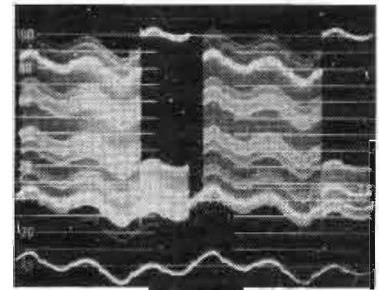
One good thing about this modification is that if it needs to be removed, the two connections to the master gain control can be unsoldered in two shakes of a hot soldering iron.

Having the use of a cart machine on remotes has enabled us to do some things that gave our broadcasts a much more professional sound, such as: produced intros and closings for the game and pre-and post game shows, a statement from the coach about the game, etc.

The using of the cartridge machine has proven so successful that we included it on our many other remotes. . . county fairs, store openings, and other special events. . . in connection with our Marti remote transmitter.

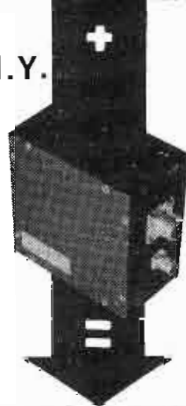
**Lee Wilkes  
Wharton, Texas**

## STOP GROUND-LOOP HUM!

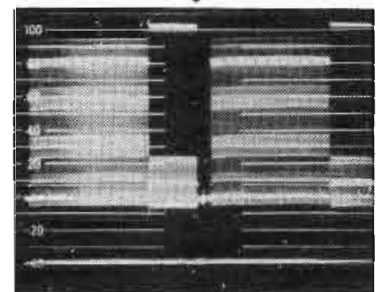


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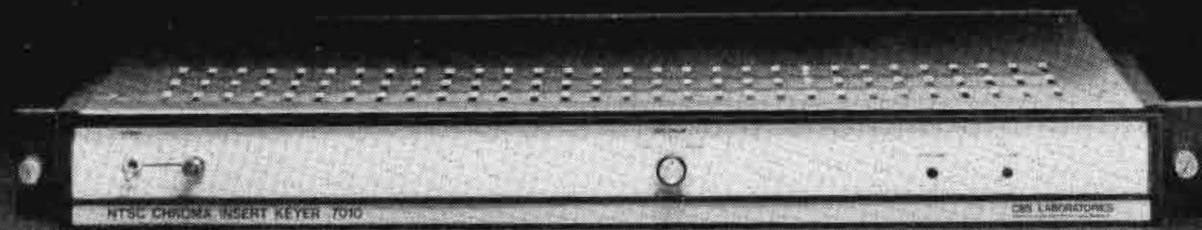
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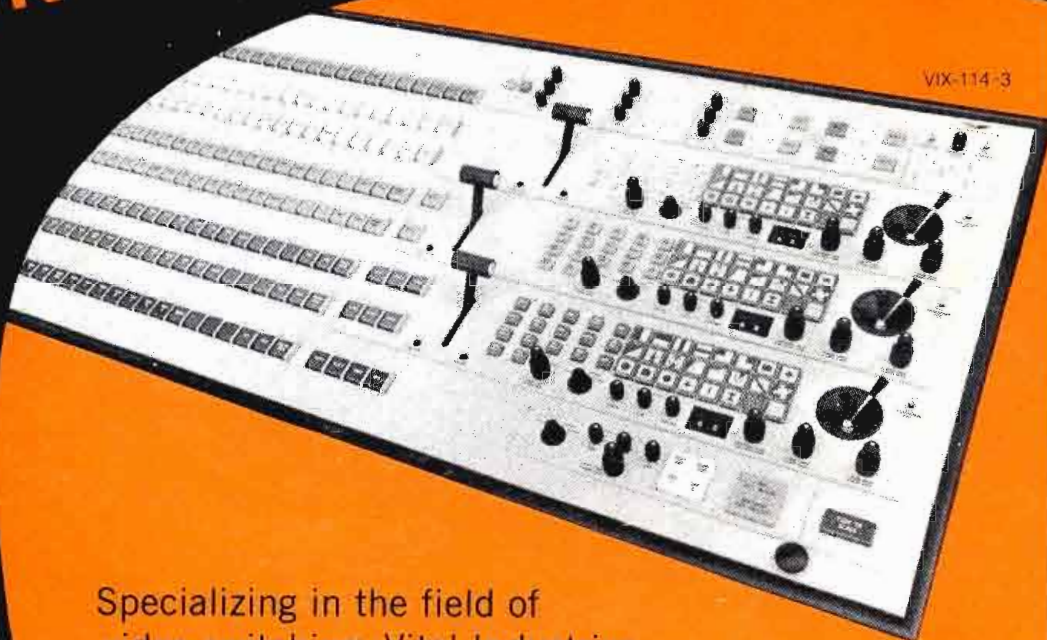
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