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# BROADCAST **engineering**

August, 1976/75 cents

## ELECTION COVERAGE IDEAS

Page 24

DECISION  
**76**

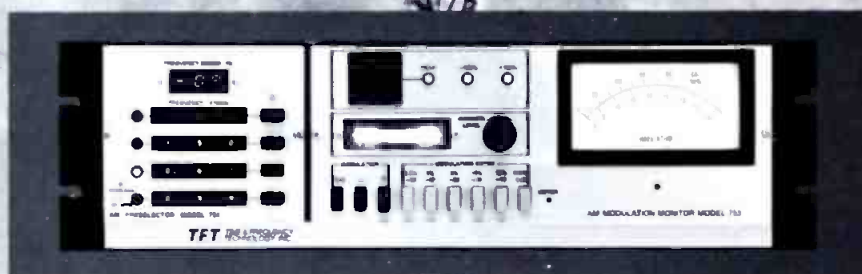


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# BROADCAST engineering.

The journal of the broadcast-communications industry

August, 1976 Volume 18,

- 24 **KWWL Revs Up Election Returns.** With a modest investment, this TV station designed a faster and more efficient method of reporting election returns. *Rodney Hughes.*
- 32 **Elections Mean Community Involvement.** Large or small staff, it does pay to get various local interest groups involved in reporting election returns. *Phil Whitney.*
- 36 **How To Win On Election Night.** Our Radio Workshop editor talks about ideas for reporting and handling elections. *Peter Burk.*
- 40 **Audio Automation Quality Control.** BE audio editor describes audio quality control tests that are easy to pull and that take up minimum time. *Dennis Ciapura.*
- 45 **San Francisco Will Be Radio City.** The National Radio Broadcasters Association will meet in September for their national radio conference. Exhibitors and hospitality suites are included.
- 48 **Eliminating The News Blues.** Manual and automatic color correction is discussed and at-station application examples are included. *Neil Sclater.*

## About The Cover

Our theme this month is the upcoming elections. The photo was taken at KWWL TV and the first of three articles begins on page 4 (Photo by Mike Jamieson)

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Carl Babcoke, *Technical*  
Pat Finnegan, *Maintenance*  
Howard T. Head, *FCC Rules*  
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Walter Jung, *Solid State*

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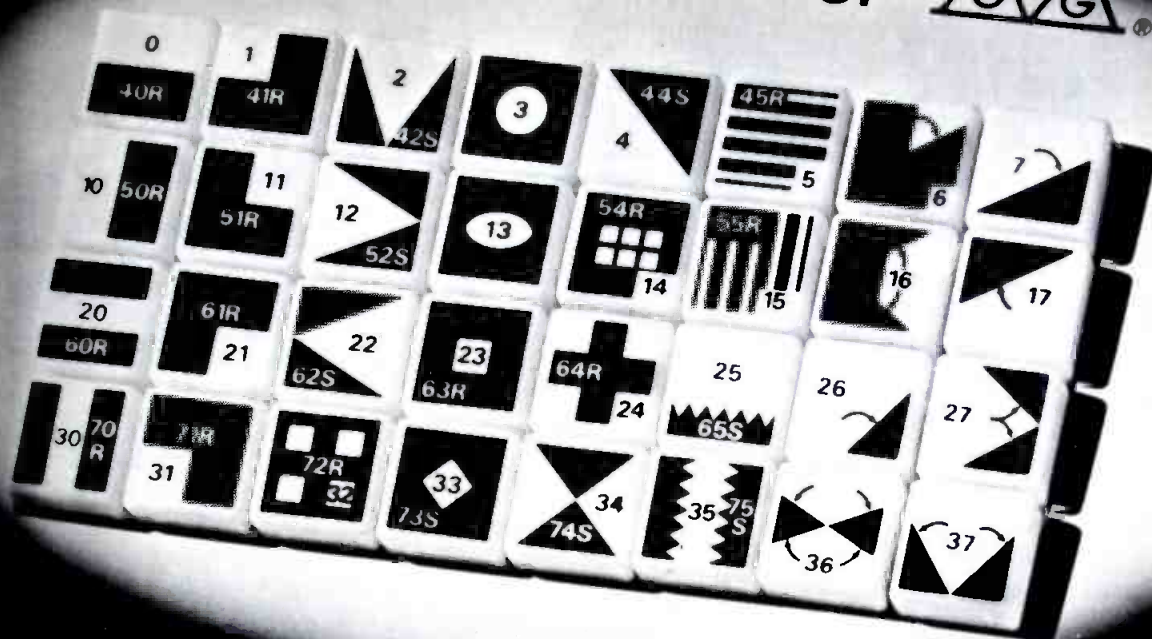


Robert E. Henel, *Editor*

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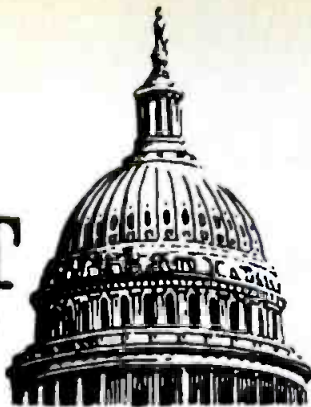
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# DIRECT CURRENT FROM D. C.



August, 1976/By Howard T. Head and Harold L. Kassens

## Radio "Freeze" Deluges Commission with Applications

A veritable avalanche of applications for new AM and FM radio stations and major improvements in existing stations was filed by the Commission's June 30 deadline establishing a "closed season" on the acceptance of such applications. During the month of June the Commission received 85 applications for new AM stations (plus 171 applications for major changes in existing stations); 109 new commercial FM stations (92 major changes); and 76 new educational FM stations (32 major changes).

With these applications added to similar applications already on file, the Commission now finds itself with a total of 1,287 applications either for new radio stations or for major changes in existing stations. If the Commission continues to dispose of these applications at the same rate as the past several months, the last application will have been disposed of shortly after 9:30 a.m. Monday, February 26, 1979.

The Commission is acutely aware of the problem of processing these applications, and is reorganizing its processing staff. Proposals under consideration include expanding the processing staff, simplifying processing procedures, or contracting the job of processing to organizations outside of government.

## CATV Eyes Smaller Satellite Receive Dishes

The cable television industry is urging the Commission to permit cable systems to employ satellite receiving antenna dishes smaller than 10 meters in diameter in order to reduce the complexity and cost of terminals to be used with satellite distribution systems. The present envelope requirements can be met at the commonly-used down frequencies in the 4 GHz band only by employing diameters on the order of 10 meters. This dimension is established for several reasons, including the need for a narrow antenna beam to avoid overlapping into adjacent orbital slots, minimization of side lobes, improved signal-to-noise ratios, and reduction of foreground noise pickup.

Cable industry spokesmen have reported performance satisfactory from the cable system's standpoint using antenna diameters as small as three meters, and an economical transportable earth terminal with an antenna aperture of approximately this size was demonstrated to Congressional staffers in Washington last month.

(Continued on page 6)



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# DIRECT CURRENT FROM D. C.

(Continued from page 4)

Congestion is already heavy in the 4 GHz band, which must be shared with terrestrial common carriers. The Commerce Department's Office of Telecommunications (OT) has urged increased experimentation in the 11 to 14 GHz and 18 to 30 GHz bands as the ultimate home for this type of service.

## Commission Acts on UHF Improvement Proposal

The Commission has proposed to amend its rules governing UHF television receivers to require that any television receiver which is shipped with a permanently affixed VHF receiving antenna also have permanently affixed an effective UHF receiving antenna. Alternatively, the receiver could be shipped with neither antenna permanently connected.

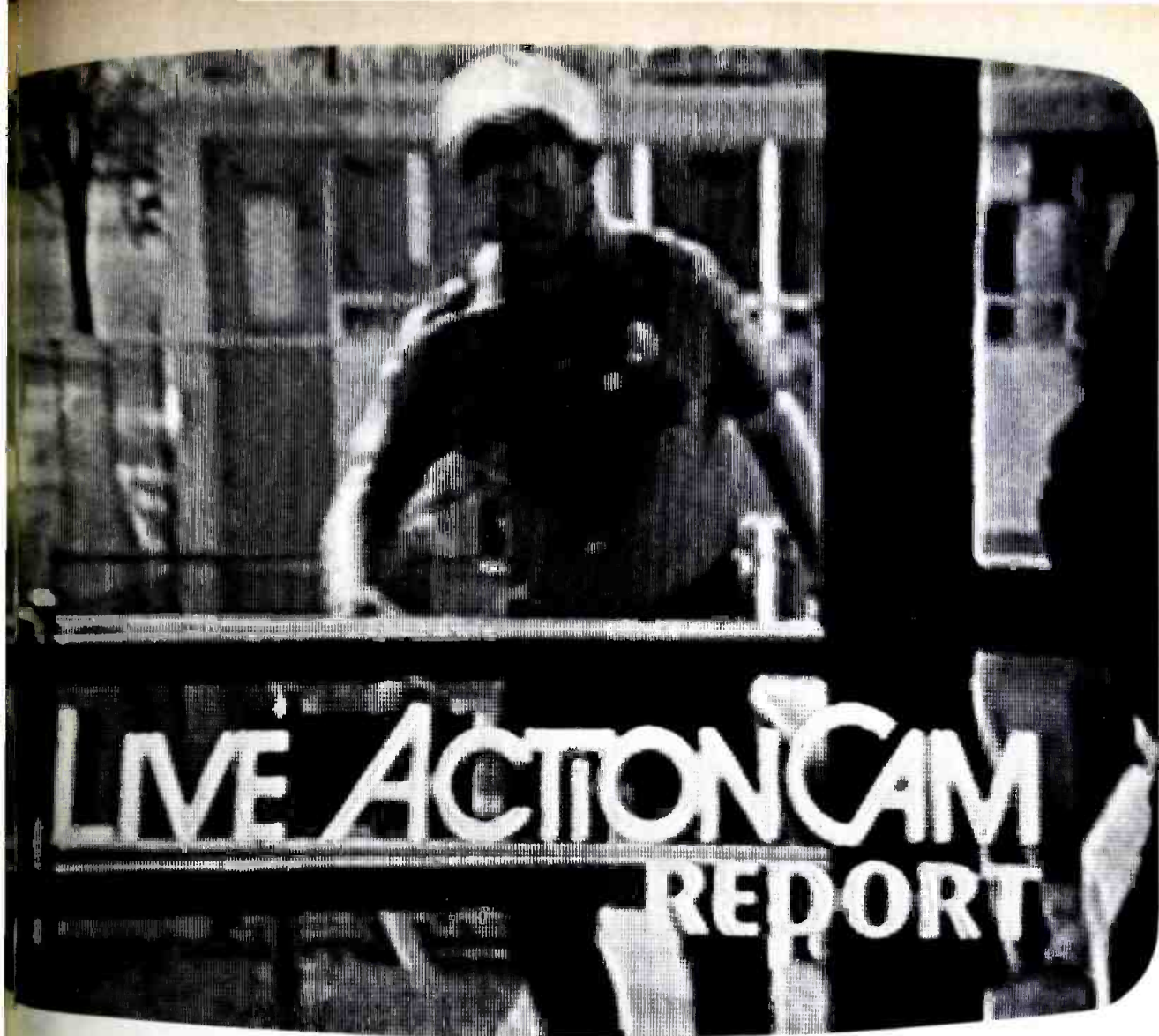
The proposal was issued in response to a petition by a coalition of TV broadcast organizations led by the Council for UHF Broadcasting (CUB). Still awaiting Commission action is a companion proposal filed by CUB asking the Commission to reduce the permissible noise figure for UHF receivers below the presently permitted 18 dB above kTAf (See Sept., 1975 D.C.)

Both of these steps urged by CUB are part of an extensive "Action Plan" aimed at improving the quality of UHF reception by various actions by both governmental and industrial entities. Emphasis is placed on improved reception, improved transmission and an educational program aimed at both the general public and television technicians.

## SHORT CIRCUITS

The Commission has contracted with the Office of Telecommunications (OT) to study the feasibility of VHF television drop-ins at Knoxville, Tennessee and Evansville, Indiana...The Commission has amended the AM rules to make clear that static drains and lighting chokes are permitted in shunt across the tower beyond the antenna ammeter; but be sure there are no shunt tuning components beyond the ammeter...The UHF translator rules have been amended to permit multiple output amplifiers from a single translator to serve different communities...A master antenna television system operator in the West has been ordered to cease and desist from the operation of a system which was generating and radiating the second harmonic of an FM signal in the frequency limits of Channel 7...The Commission received "no acceptable bids" for its television "receiver of tomorrow" (See June, 1976 D.C.)...Class D Citizens Band interference in the 27 MHz band is giving fits to both the Commission and viewers attempting to watch TV Channels 2 and 5; meanwhile the Commission is pressing forward with plans to expand the citizens band from 23 to 40 or more channels, some of whose harmonics would also fall within TV Channel 6...The Commission has informed licensees that the use of "tone clusters" as an attention-getting device is an acceptable practice so long as the frequencies of the EBS tones are avoided.





## **ON SEPTEMBER 11, 1975, THIS WAS THE SECOND HALF OF "THE HOLLYWOOD SQUARES"**

On September 11, 1975, WTVF scooped all the Nashville news media with live, on-the-scene coverage of a riot in progress at Tennessee State Prison. They did it using some of the most advanced Electronic News Gathering (ENG) equipment available today. Equipment which included, not surprisingly, an ENG microwave system from the Communications Equipment Division of Microwave Associates.

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# INDUSTRY NEWS

## Commission Holds Line On Phone Programs

The Commission has denied the request of Quatro Productions requesting a waiver of the advance notice requirements pertaining to the broadcast of recorded telephone conversations.

(Section 73.1206 of the rules provides that when recording a telephone conversation for broadcast, the licensee shall inform the party to the call of his intention to broadcast the conversation.)

Quatro is an independent television program producer. It submitted a program format for a new television program to a national television network which would involve celebrities making telephone calls in which the party called is engaged in a conversation.

The viewer of the program would see and hear the celebrity making the call and would hear the conversation between the celebrity and the party called. The party called would not be given any notice before or during the conversation that the call is being taped for broadcast. When the conversation is terminated, however, a notice must be given that the conversation was part of a television program, if production personnel determine that the party called does not recognize that. If the party is so advised, his consent to broadcast the call would be sought and if consent is refused, the tape would be erased and the party called would be provided with an affidavit to that effect.

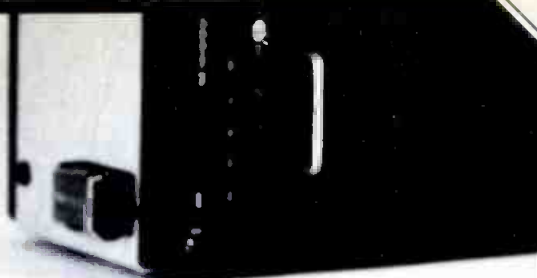
Quatro said the spontaneity, which is the essence of the program, would be lost if advance notice of the ongoing recording is required.

The Commission noted that since Quatro is not a licensee, Section 73.1206 imposes no obligation on it. It said Quatro requested the waiver since the network and other broadcast licensees likely would not risk a violation of the rule by broadcasting the proposed program without it.

The Commission noted that even though a tape would be erased and not broadcast if the party called refused permission, the telephone conversation would already have been heard by the audience before whom the program was taped.

The Commission added that its actions have consistently stated that the production of such programming by licensees must be subordinate to the public interest in protecting individuals from invasion of privacy and preserving their freedom from harassment or embarrassment.

It noted that this same policy is reflected in the common carrier tariffs which permit the use of devices for recording telephone conversations only when an automatic tone-warning (beep-tone) communicating parties accompanies the recording.



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Our new miniature SMPTE Time Code Generator slips right into your portable VO 3800 VTR — and you don't have to go back to the studio for costly and time-consuming after-the-fact source identification processing.

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**Peripheral equipment gives you finesse of SMPTE — even on a tight budget.**

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# CANON'S NEW P18X16B2\* 'INSTANT CLOSEUP' LENSES HAVE TURNED WPIX'S YANKEE BROADCASTS INTO A WHOLE NEW BALLGAME". Otis Freeman

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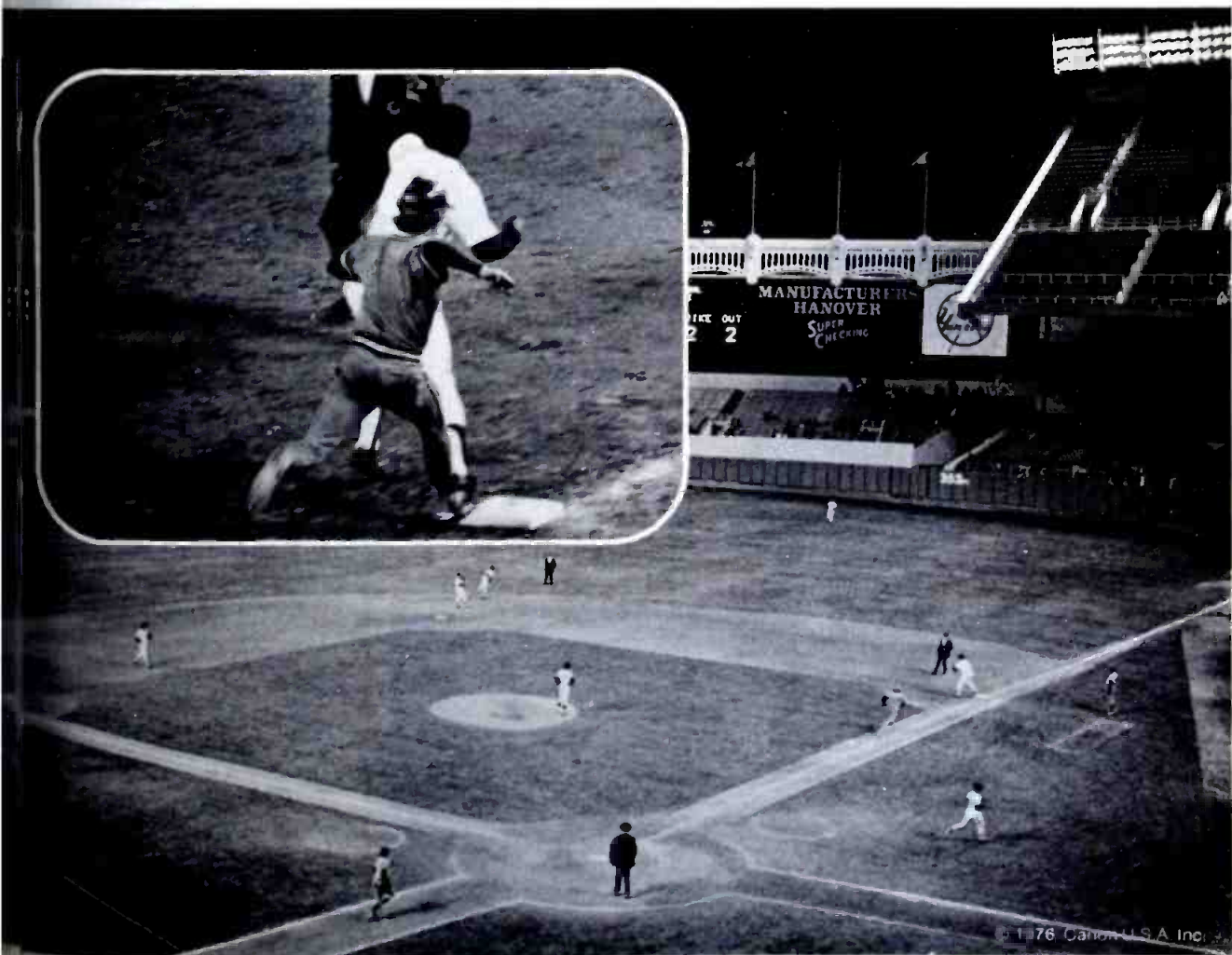
If all this sounds good to you, seeing what our new lens can do is even better. No matter what kind of camera you're using—or contemplating—call us to arrange a demonstration.

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## Industry News

### Radio News Award Houston Station

Houston's KEYH has received a major award in the 1976 Associated Press Broadcast Radio News Competition for an investigative story. The award was given for KEYH's investigation and report of events that led to the suspension of Houston Police Captain Kenneth L. Nixon in November, 1975.

KEYH's award was in the largest metropolitan category for cities with more than 300,000 population. Presentation of the award was made recently at the organization's award luncheon at the Fort Brown Hotel, Brownsville, Texas.

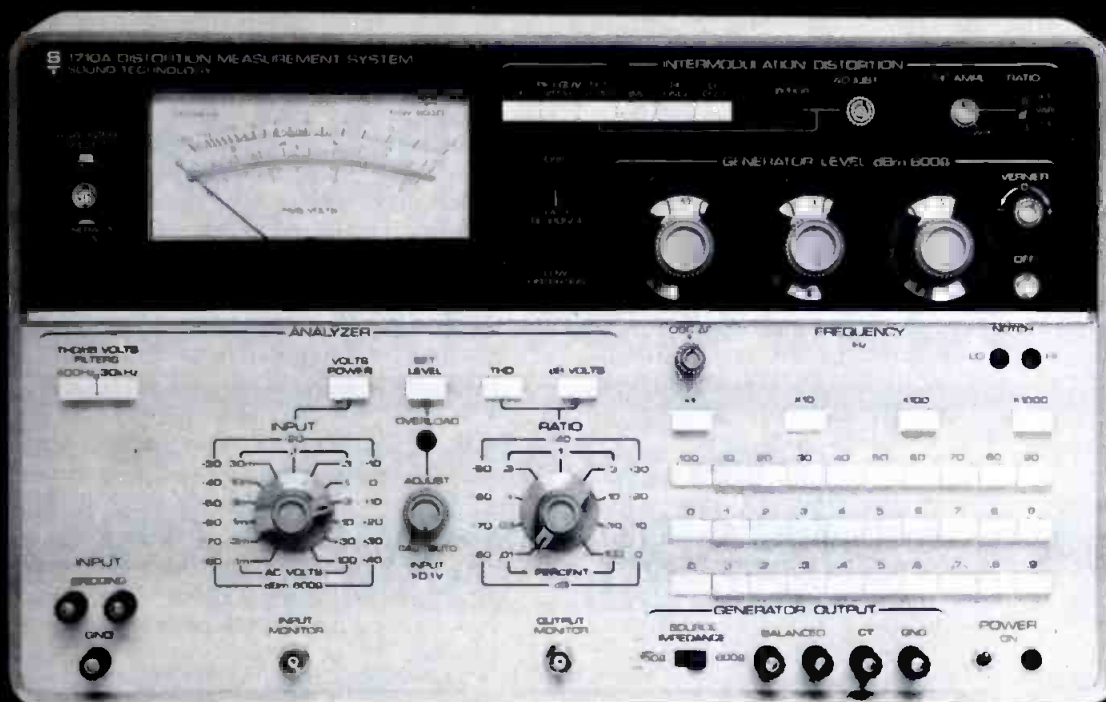
### Commission Eases On DA Designs

The Commission has amended its rules governing certain aspects of the design of directional antennas for AM stations to allow an antenna designer increased latitude in developing a radiation pattern meeting FCC allocation requirements. Many AM stations, in order to provide protection to other stations or to provide coverage in particular areas, employ directional antenna systems. The performance of directional antenna systems is predicted by mathematical calculations. In these calculations, the FCC's rules provide for various mathematical assumptions.

On December 12, 1975, the Commission initiated this rulemaking proceeding to consider modifying some of these assumptions, based on a request by the Association of Federal Communications Consulting Engineers (AFCCCE). Under the modified rules, two basic changes in the mathematical assumptions were adopted:

—the assumption concerning loss resistance in the antenna system (a method of determining the efficiency of the antenna system) was relaxed;

—the mathematical computation in systems using tall antennas (over one-half wavelength) was increased for calculations predicting little or no radiation when there will be radiation.



# Your new automatic distortion measuring system for balanced measurements

**REDUCED OPERATOR ERROR**  
 Here's something you'll like — Sound Technology's new distortion measuring instrument for use in balanced work.

The new 1710A is much more than a distortion analyzer. It's a system. It contains its own ultra-low-distortion generator tracked with the analyzer. It's a system that greatly simplifies measuring — gives you fast measuring and simple operation that reduces operator error.

For example, push the frequency button and you set both generator and analyzer. Push "Distortion" and you have reading. Automatically. No slow, manual null-searching.

Features in the new 1710A include:  
 • a balanced, floating output (600/150 ohms)  
 • a balanced (bridging) input  
 • a high-level +26 dBm signal

- +26 to -90 dBm attenuator
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- both harmonic and optional intermodulation distortion measurements.

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

## FAST, SIMPLE MEASURING

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

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## FCC Asks For Comments On Operator Licensing

The Commission has initiated an inquiry to solicit comments and recommendations on the relevancy of its radio operator rules to the current state of the communications industry.

Under Section 318 of the Communications Act of 1934, the actual operation of all transmitting apparatus for which a station license is required must be performed only by a person holding an operator license.

However, except for ship, aircraft, broadcast and some common carrier stations, the FCC may waive or modify the provisions of Section 318, and to a large extent, has done so. For example, operator licenses are no longer required for the routine operations of stations such as Police, Fire, Business, Taxi and Citizens Band Radio. Only station licenses are required.

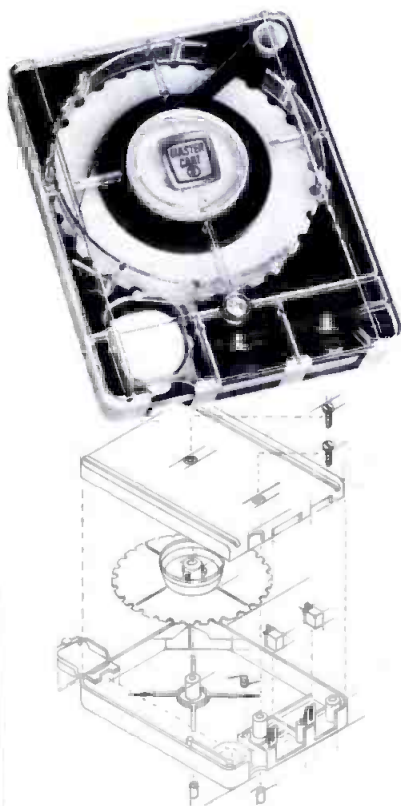
The Commission asked for comments and suggestions concerning the desirability of retaining or waiving the requirement for licensed operators for routine operations of broadcast transmitters.

The FCC asked for comments on the following, should it appear desirable to retain the licensing re-

- quirement for both routine and service operators;
- are current examinations producing technically qualified service operators;
- are the examinations outdated and comprehensive to the extent that licenses can be obtained by technically incompetent persons;
- does the scope of the examinations accurately reflect the knowledge required in light of the current technical state of the communications industry;
- should a period of "apprenticeship" or a "beginner" class of license be required prior to issuance of a regular license to assure some degree of practical experience;
- in view of the wide variety of radio stations licensed by the FCC and unique requirements of some of these stations, would it be desirable to have a basic operator/technician class of license with optional specialized endorsement such as AM, FM, TV, Land Mobile, Radar and Microwave;
- if so, what provisions should be made for persons now holding a Radiotelephone First or Second Class License.

The Commission also asked for comments on whether operator licenses should be issued for a lifetime of the holder, rather than for the current five year term; or should operators be required to take a renewal examination.

Comments are due by September 1 and will be accepted until September 15.



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## FCC Hits Fraudulent Billing

The Commission has amended its rule prohibiting fraudulent (double) billing practices by broadcast licensees. Under the amended rule (Section 73.1205), no licensee of a standard, FM, or television broadcast station shall "knowingly issue or knowingly cause to be issued" any bill, invoice, affidavit or other

document containing false information concerning the amount actually charged for broadcast advertising, or which misrepresents the quantity of advertising actually broadcast, substantially or materially misrepresents the time of day it was broadcast, or misrepresents the date on which it was broadcast.

A new subsection (b) also added prohibiting licensees supplying any document to program supplier providing spurious information concerning the cost of the program or program matter supplied, including non-commercial matter, that contains false information. The Commission emphasized that it was a licensee's responsibility to see that its employees do not issue documents containing false information.

On May 29, 1975, the FCC initiated a rulemaking proceeding proposing amending the fraudulent billing rule, noting that although it had cautioned licensees for years against this practice, it had continued and complaints had increased it might be increasing. The Commission said that when it adopted the fraudulent billing rule in 1965, its concern was the participation by a licensee in fraudulent activity. The amendments become effective July 15.

The Commission said its objective in this proceeding was the same. The FCC said that a fraudulent statement raises the same questions, regardless of whether the subject of the statement is commercial matter or other program matter. It said it also could see no reason to treat fraudulent statements issued to program syndicators differently from those issued to networks. It said the amended rule would make uniform the applicability of the rule to conduct well in substantial part by existing requirements.

In emphasizing the licensee's responsibility, the Commission proposed to find a violation of the rule where employees issue documents containing false information and where the licensee knew or fact, or would have known after a given periodic, diligent and visible supervision to this area of operations.

However, it would not find a violation, the Commission said, in cases where the licensee acted in good faith, where the licensee had knowledge and where the false information appears to have been issued as the result of an occasional mistake not indicating a pattern, where reasonable diligence would not uncover the issuance of the information, such as careful concealed wrongdoing.

## Spotmaster® CART MACHINES THE RUGGED ONES

### SERIES 3000

- Auto release deck — massive, quiet operating air damped solenoid.
- Low power consumption — less than 45 watts.
- PHASE-LOK III head bracket — minimizes stereo phasing problems.
- Full range of mono and stereo models for A, B and C size carts.



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- All the same solid features as the SERIES 3000 with added standard features — microphone inputs, dummy head in record position (on playback models) and many others.
- New styling for the discriminating broadcaster.
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### SERIES 5000

- Modular design with fold down front panel and slide out direct drive decks.
- Auto release decks — massive, quiet operating air damped solenoids.
- PHASE-LOK III head brackets — minimize stereo phasing problems.
- Separate electronics for each deck on 2 PC cards.



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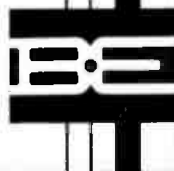
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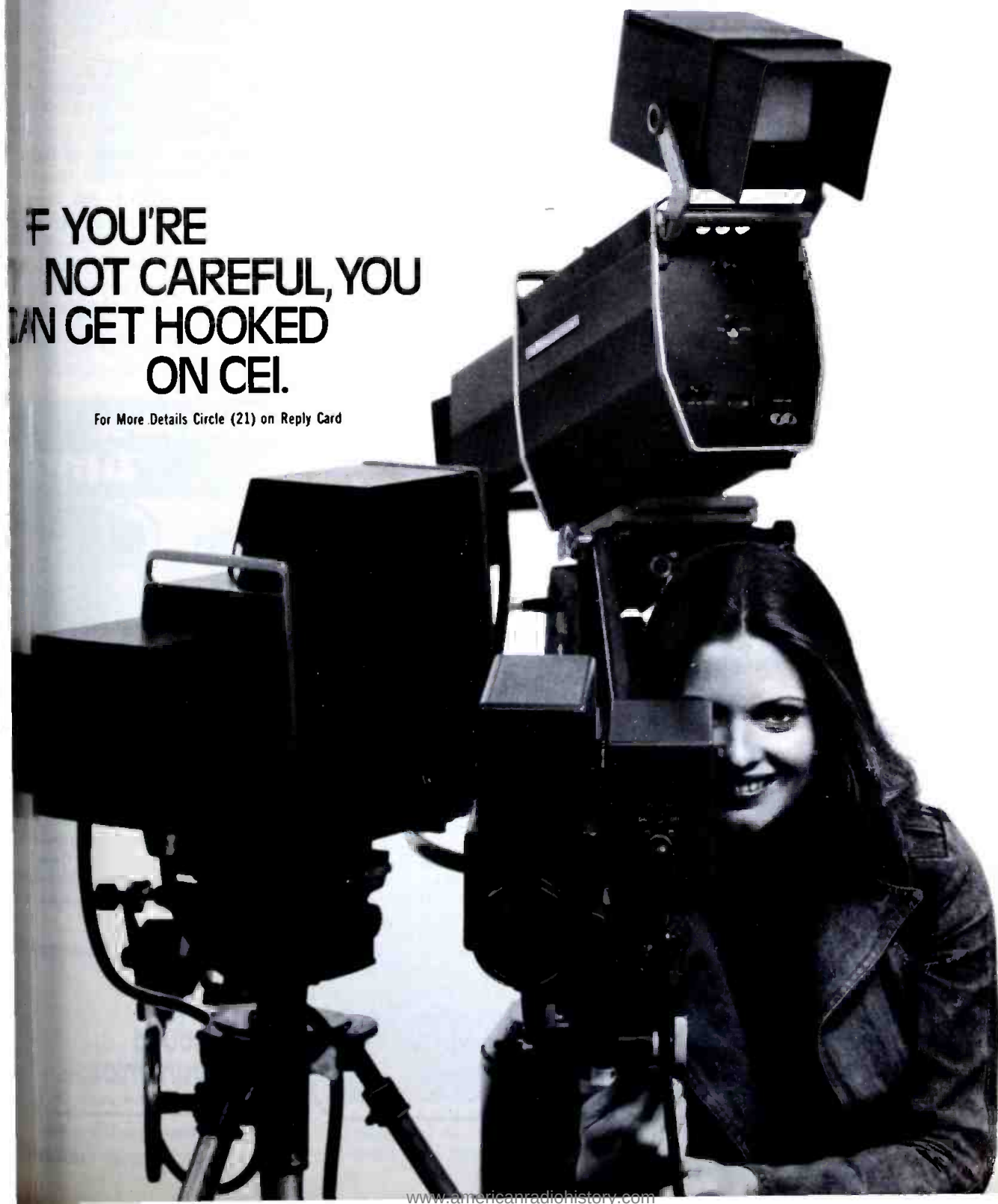
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design, plant layout, or projects directly related to **broadcast engineering** for a period of ten years shall qualify for Certification as a Senior Broadcast Engineer."

The words responsibility and broadcast engineering are the key words to remember—the candidate

## 'Responsibility' Is Key To SBE Certification

The Certification Secretary feels that it is necessary to inform all candidates for Certification to include as much detailed information as possible concerning their job responsibilities when they are completing their Certification applications. The Certification Committee wants to grandfather as many people as possible but they are bound by certain guidelines. The guideline that is most important is: "A candidate who had demonstrated professional **responsibility** in the area of supervision, equipment

must have worked in a responsible position in broadcast engineering. Since these two phrases can be interpreted in many ways it is to the candidates advantage to give the Committee as much detail as is possible.

To receive the complete Certification packet drop a letter to:

CERTIFICATION SECRETARY  
P.O. Box 88123  
Indianapolis, IN 46208

Or call (317) 842-0836 for a packet or if you have any questions concerning the program.

### Chapter 3: Kansas State

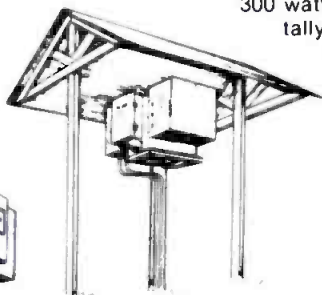
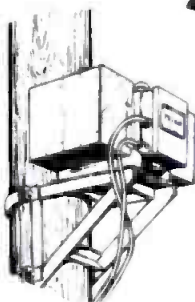
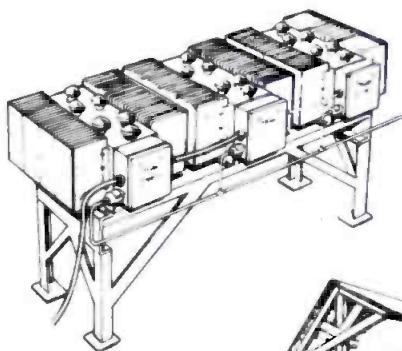
Bob Fulkerson (KPTS-TV) introduced Curt Lutz, Regional Engineer for Harris to the Chapter at its May 11th meeting. Lutz gave two presentations: 1) a talk and slides on micro-computers used in automation systems; 2) a talk and slides on the new first solid state 1kw AM transmitter. (Bill Keegan, Chairman, KTSB, P.O. Box 2700, Topeka, Kansas 66601, (913) 582-4000)

The New York Chapter met on June 10th at the WQXR Presentation Theater to hear James Stephenson of Ampex Corporation give a talk and demonstration of the new Ampex ATR-100 tape recorders. He also gave a presentation on the state of the art in tape recording and there were Ampex personnel at the meeting to answer questions from the members and guests. (Larry Strasser, host, WTFM Radio, Long Island Expressway, Fresh Meadows, New York 11365, (212) 357-8000).

*Continued on page 6*

## VERSATILE

# mount it anywhere



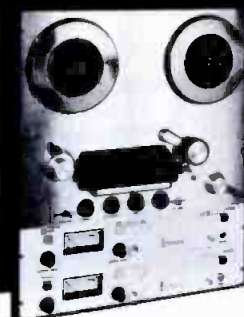
Continuous, unattended power 10 to 300 watts. That's TELAN. So totally reliable and weather-proof, it'll operate in the most remote and inaccessible locations for months without even a maintenance check. Install it in an hour or two, light a match and forget it. No moving parts and it won't flame out. Uses natural gas, propane or butane fuel. TELAN Thermoelectric Generators.

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...and throughout the world, now puts its 3-Plumbi-  
...structure and a beam-splitter prism into the most  
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## **the PHILIPS LDK-11. Full broadcast quality for ENG and commercial production!**

...the LDK-11 no longer must broadcasters or pro-  
...companies sacrifice picture quality or opera-  
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...the LDK-11 in January, 1976 and the reactions  
...have been outstanding. A typical report from one of  
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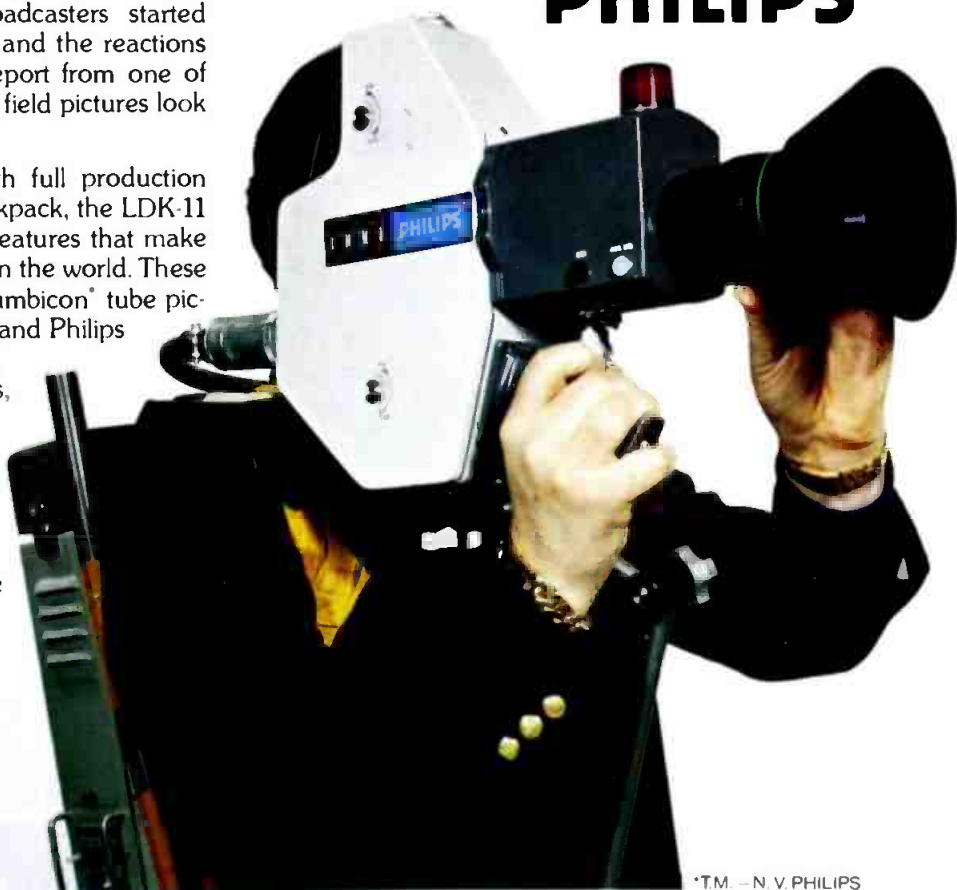
...Battery or AC powered and with full production  
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...is the key Philips engineering features that make  
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The BL-40's patented electro-optical attenuator provides smooth, unobtrusive, true RMS limiting. An ultra fast F.E.T. peak limiting section assures absolute protection from unwanted over modulation without peak clipping. Attack time is essentially instantaneous.

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## SBE Journal

Continued from page 16

### Chapter 17: Minneapolis, Minnesota

The chapter held its meeting May 22nd at KVBR Radio Brainerd, Minnesota. Mark P. Director of Engineering was host. The meeting consisted of tours of KVBR studios, the Translator Site and the KVBR-FM site. There was a talk/demonstration of various types of telephone equipment for remotes and talk shows. Raygor, Chairman, Rt. 1, Box 11 Chisago City, Minnesota 55009 (612) 373-4807).

### Chapter 26: Chicago, Illinois

The chapter met at Hewlett-Packard on June 22nd to hear Don Montoya, Hewlett-Packard Products Engineer, talk on "State of the Art Digital Techniques" with emphasis on tube shooting in the data domain. (Robert Churchill, Chairman, 121 West Wacker Drive, Room 34, Chicago, Illinois 60601, (312) 752-5215).

### Chapter 33: Southwestern

The May meeting of Chapter 33 was held on May 20th at the studios of WXIX-TV. The program was a discussion and slide presentation of circularly polarized antennas was given by Bob Winn from RCA Antenna Engineering Department. A question and answer session followed.

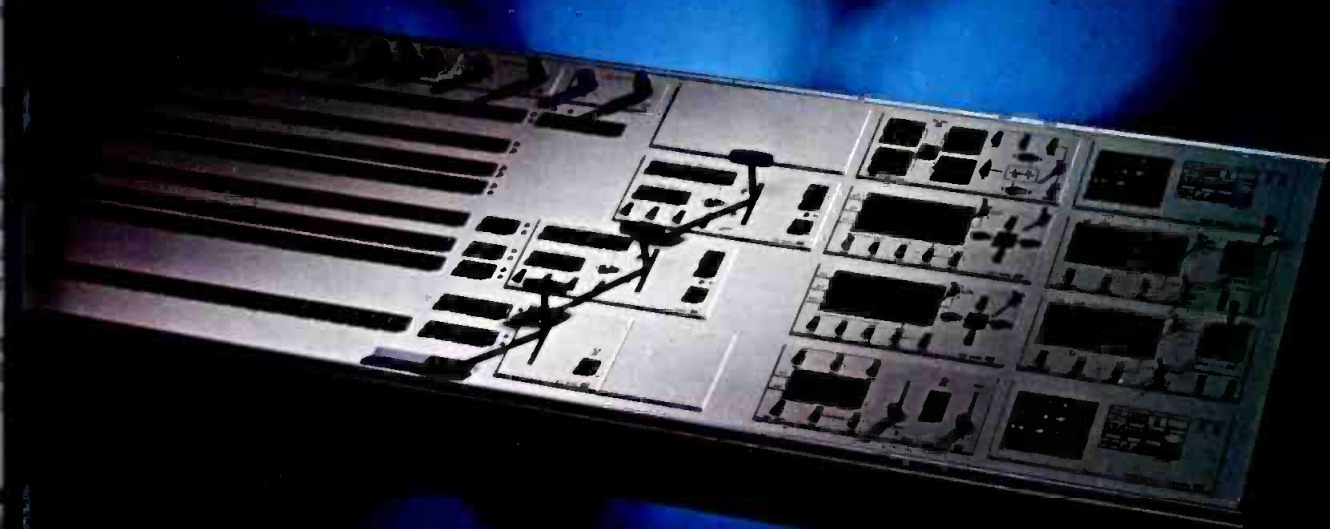
The June meeting of Chapter 33 was held on June 17th at the WCPO-TV studios. The program was a discussion and demonstration of the WCPO-TV instant camera associated microwave link. With increased emphasis on new and especially ENG gear, this proved to be a very interesting meeting. Williams, Chairman, 2092 Ashwood Place, Cincinnati, Ohio 45204 (513) 851-4964).

### Chapter 34: Albuquerque, New Mexico

On June 10th Robert Williams from the Los Angeles branch gave a slide presentation on the application of pulse modulation as used in the new transmitter at KOB and the one ready for installation at KOB.

Continued on page 17

# smart switcher



**CDL has just raised the standard  
for video production switchers. Again.**

The CD-480 is the first totally new full scale  
production switcher from CDL in 7 years.  
It offers every wanted feature, from superb  
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Applied unique technology to create an  
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Pulse duration modulation avoids the use of any inductive reactance, e.g. modulation transformer, so that no ringing occurs permitting the passage of highly processed (clipped) audio waveforms without the attendant increase in peak amplitude produced by inductor energy storage and release. In a nutshell, this type of transmitter permits a modulation density, or

loudness not attainable by conventional plate modulation. (Michael Langner, Chairman, Gaylord Broadcasting, P.O. Box 737, Albuquerque, New Mexico. (505) 765-5600).

## Chapter 36: San Diego, Calif.

On May 26th the chapter met at KPBS-TV to hear Chris Cookson of RCA talk about the RCA TK76 Hand-Held Field and Studio Production Camera. The camera had

been seen by many of the members at leading broadcast shows but it was an opportunity for those members who had not been able to attend to become acquainted with RCA's latest portable camera equipment. Attention was given to Bill Montgomery of Convoy Court, San Diego (California 92111).

## Chapter 37: Washington, D.C. Northern Virginia

The chapter held its May meeting on May 26th at Delta Electronics in Springfield, Virginia. Delta demonstrated a number of products including their new current measuring system, a tour of the Delta factory. Tim Charlie Wright, presented an interesting evening.

The June meeting was a meeting with SMPTE on June 10. At the meeting there was a demonstration of the RCA TK76 camera. (Charles F. Riley, Chairman, Tele-Color Production Co., 708 N. West St., Alexandria, Virginia 22314. (703) 683-3281).

## Chapter 41: Central Pennsylvania

On May 27th the chapter met at the WHP studios to hear Bob Roberts of Harris Corp. give a technical slide presentation on history and development of Pulse Duration Modulation for AM transmitters. (Nelson Maus, Chairman, 221 Enola Road, Enola, PA 17036).

## Nix On New Class

The National Association of Broadcasters has asked the Federal Communications Commission to deny a request to establish a new class of radio stations, a new class of radio stations.

The new class, proposed by Tobi Kanter of Denver, Colorado, would operate at 250 watts daytime and 100 watts nighttime. It would offer locally produced public affairs, musical, dramatic and cultural programming.

In its filing, NAB noted that last year it objected to a proposal to use frequencies 530, 1606 and 6800 to establish a local government service designed to transmit all kinds of information to the listening public.

## AUDI-CORD CORPORATION

ELECTRONIC DESIGNERS AND MANUFACTURERS

Dear Broadcaster:

After un-forscen delays in construction of our new manufacturing facility, I am pleased to announce that Audi-Cord is now in limited production of the Modu-Cart 100 series cartridge equipment introduced at the 1976 NAB Convention. These delays were well spent; in assurance testing, improving assembly techniques and preparing for a smooth flow of materials to production.

Audi-Cord has built the "broadcasters" cartridge equipment in Modu-Cart 100 series. Needed technical improvements were made and include an unusual number of operator features. These are the result of many years of listening to you, the broadcaster who uses and maintains the equipment every day. You will like what we have done, and we hope that we earn your business by providing continuing good service to the industry.

Please review the highlights of our Modu-Cart 100 series below. They are available in 12 model variations. Please call or write us, or place your order for a trial unit for early delivery. Your satisfaction is guaranteed, of course.

Sincerely,

*Carl L. Martin*

Carl L. Martin  
President

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Model 115 Recorder-Reproducer



Model 100 Reproducer

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- Plug-in interchangeable transports.
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## AUDI-CORD CORPORATION

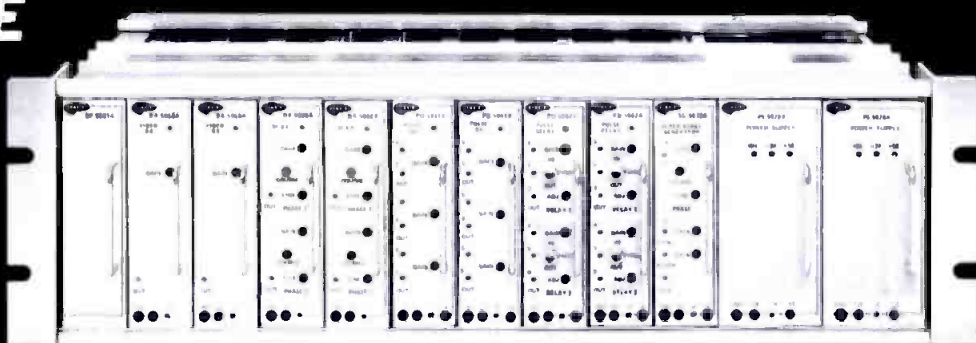
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| <b>UNBALANCED DIFF.</b><br><b>IMPEDANCE:</b> One, 20K<br><b>RETURN LOSS:</b> 40 dB<br><b>LEVEL:</b> 1-2 VPP<br><b>REGENERATIVE</b>                                                                      | <b>UNBALANCED</b><br><b>IMPEDANCE:</b> One, 50K<br><b>LEVEL:</b> 1-4 VPP                                                                                                                                       | <b>UNBALANCED</b><br><b>IMPEDANCE:</b> One, 50K<br><b>LEVEL:</b> 1-5 VPP<br><b>RETURN LOSS:</b> 40 dB                                                                                                                                                                       | <b>UNBALANCED</b><br><b>IMPEDANCE:</b> One, 50K<br><b>RETURN LOSS:</b> 40 dB<br><b>LEVEL:</b> 1-5 VPP                                                                                                                                    | <b>UNBALANCED</b><br><b>SYNC:</b> One, 20K (loop),<br>2-4 VPP<br><b>BLANKING:</b> One, 20K<br>(loop), 2-4 VPP<br><b>SUBCARRIER:</b> One, 50K<br>(loop), 1-3 VPP    |
| <b>IMPEDANCE:</b> Six, 75 ohm<br><b>LEVEL:</b> 1-2 VPP<br><b>COUPLING:</b> DC<br><b>ISOLATION:</b> 40 dB to<br>60 MHz                                                                                   | <b>IMPEDANCE:</b> Six, 75 ohm<br>(two groups of three<br>outputs each)<br><b>LEVEL:</b> 1-3 VPP (each<br>group of three<br>outputs adj.)<br><b>REGENERATIVE</b>                                                | <b>IMPEDANCE:</b> Six, 75 ohm<br>$\pm 1\%$ (three groups of<br>two outputs each)<br><b>LEVEL:</b> 2-4 VPP (each<br>group of two adj.)<br><b>COUPLING:</b> DC<br><b>ISOLATION:</b> 40 dB<br><b>REGENERATIVE</b>                                                              | <b>IMPEDANCE:</b> Six, 75 ohm<br>$\pm 1\%$ (two groups of<br>three outputs each)<br><b>LEVEL:</b> 2-4 VPP (each<br>group of three adj.)<br><b>COUPLING:</b> DC<br><b>ISOLATION:</b> 40 dB<br><b>REGENERATIVE</b>                         | <b>IMPEDANCE:</b> Two, 75 ohm<br><b>SYNC AMPLITUDE:</b> 0 to<br>0.5 VPP<br><b>PEDESTAL:</b> 0 to 0.1 VPP<br><b>BURST AMPLITUDE:</b> 0.2<br>to 0.5 VPP              |
| <b>IMPEDANCE:</b> 60 ohm<br><b>LEVEL:</b> $\pm 0.1$ dB to<br>$\pm 0.5$ dB, $\pm 2$ dB<br>to 60 MHz<br><b>COUPLING:</b> 0.2%<br><b>ISOLATION:</b> 0.1%<br><b>LEVEL:</b> 2%, 50 Hz<br><b>REGENERATIVE</b> | <b>DISTORTION:</b> 1%<br><b>PHASE RANGE:</b> 0 to 360°<br>(each group of three<br>outputs adj.)<br><b>HUM &amp; NOISE:</b> -60 dB<br><b>PHASE STABILITY:</b> $\pm 1^\circ$<br><b>GAIN STABILITY:</b> $\pm 1\%$ | <b>RISE TIME:</b> 100 $\pm 20$ ns<br><b>OVERSHOOT:</b> 1%<br><b>TILT:</b> 0.5%, 50 Hz<br><b>HUM &amp; NOISE:</b> -60 dB<br><b>WIDTH STABILITY:</b> $\pm 20$ ns<br><b>PULSE WIDTH:</b> Equal at<br>50% point<br><b>LEVEL STABILITY:</b> 1%<br><b>DELAY:</b> 120 ns (approx.) | <b>RISE TIME:</b> 100 $\pm 20$ ns<br><b>TILT:</b> 1%<br><b>HUM &amp; NOISE:</b> -60 dB<br><b>PULSE WIDTH:</b> Equal at<br>50% point<br><b>DELAY:</b> 0.35 to 4 us<br>(each group of three<br>outputs adj.)<br><b>DELAY STABILITY:</b> 1% | <b>RISE TIME:</b> 100 $\pm 20$ ns<br><b>BURST PHASE:</b> 0 to 360°<br><b>TILT:</b> 1%<br><b>PHASE STABILITY:</b> $\pm 1^\circ$<br><b>GAIN STABILITY:</b> $\pm 1\%$ |

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 1000 Rte.  
 St. Louis, MO. 63020  
 (314) 441-1100

**General Electronic Systems**  
 1440 San Pablo Ave.  
 Berkeley, CA. 94702  
 (415) 527-7700

**K & M Electronics of**  
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 Minneapolis, MN. 55435  
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DYN AIR





# The Sony BVH-1000. Consider the concept.

The BVH-1000 brings a new, two-in-one concept to professional high band video recording. It meets current broadcasting needs for a top-of-the-line recorder, and does it in an economical package without compromising video or audio quality.

But more than that, the BVH-1000 is the machine of the future. Designed for production and post-production applications, it is a 1" video recorder that can compete with 35mm film techniques.

It wasn't easy, but we have combined transparent picture quality, plus two professional quality audio tracks with advanced editing techniques. That combination simply is not available in any other recorder, no matter what the format or tape width.

Before considering another recorder, examine these eight BVH-1000 features:

**1. Exclusive 1.5 head.** This completely avoids the problem of missing information caused by head switching of single head machines. It also features, for the quality user, a continuity of video information, as well as VIRS record/playback, which may be required of all machines in the future.

**2. Advanced servo design.** The BVH-1000 incorporates drum servo, capstan servo, tension servo, reel servo. This servo system, combined with dual capstan drive, provides highly accurate tape speed and quality interchange, plus gentle tape handling in fast forward and reverse modes.

**3. Five motors.** These eliminate the use of unreliable and inaccurate belt systems for drives.

**4. Standard VH and color framing modes.** Both are standard equipment in the BVH-1000. Two high quality audio tracks and a separate cue track, plus 400Hz tone generator are also standard.

**5. Biderex search control.** Built-in bi-directional search control allows shuttling of the video tape in either direction from 1/3 frame jog to high speed rewind and fast forward. The non-segmented formats allow the operator to see the picture and make fast editing decisions either manually or with computer control.

**6. Standard tape timer.** This features a special memory that prevents the tape from unthreading. SMPTE reader/generator is a plug-in option.

**7. Versatile mounting.** A flexible mounting system and built-in wave form select enable the BVH-1000 to be adapted to any number of mounting or console configurations. The BVH-1000 is at home in a small van or big studio.

**8. New Sony time base corrector.** The BVH-1000 can be used with Sony's new BVT-1000 time base corrector or any other quality TBC. If you don't require time base correction, an optional heterodyne recovery board is available.

This is just the beginning of the BVH-1000 concept. To learn more about the economy, technical performance and specifications, contact your Sony Broadcast representative, or write Sony Broadcast.

## Sony Broadcast

Sony Corporation of America, 9 West 57 Street, New York, New York 10019

DECISION  
76

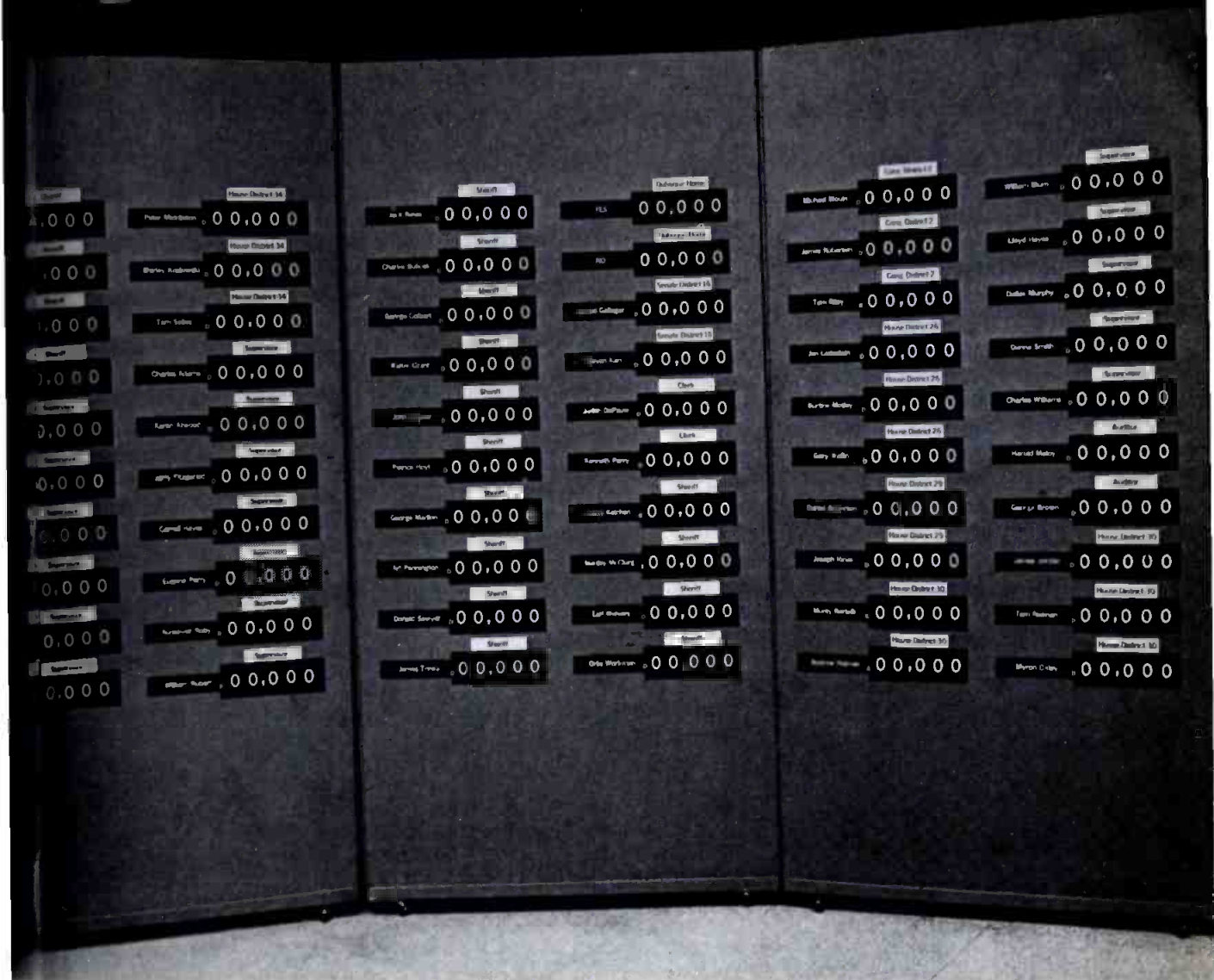


# KWWL Revs Up Election Returns

*By Rodney Hughes*

The Bicentennial spirit has created an unusual atmosphere for the "American Way" of covering election returns this year.

KWWL-TV, in the past, has used several manually operated boards to create a different presentation for these special exciting news events. Shortly after the 1974 elections, Tim KWWL-TV Vice President and Program Director, convinced management of the need to increase the speed and accuracy of displaying election results. After the decision was set, the news department worked out the number



Tom Peterson (KWWL-TV News) and Dr. Russell Ross ("U" of Iowa) anchoring a primary election with the help of their new returns board. These three display panels can handle 60 candidates. Whatever system you use, work with white numbers on black. (Photos by Mike Jamieson)

positions we would need to  
state and local elections.  
while, the production depart-  
ment worked on a layout for good  
shots.

usual, the engineering de-  
partment received the brunt of the  
task was to design and  
build a simple display system  
capable of  
displaying 100 positions capable of  
displaying 1x10<sup>5</sup> votes and 40  
positions capable of displaying  
votes.

One way to increase speed is  
to use an electrical or electro-  
mechanical output device. If an  
electro-mechanical device is to be used, there  
are numerous problems with

studio lighting, lamps burning out  
in the device, power consumption,  
etc. On the other hand, an electro-  
mechanical device consumes little  
power, has no lamps to burn out,  
and most importantly relies upon  
studio lighting for illumination.  
Such a device is type DOU-1, which  
was obtained through a surplus  
warehouse at a fraction of the  
original cost.

The display face is a split-flipper  
which is gear-driven by a 25 rpm,  
110 VAC motor. This motor also  
rotates a 12 position rotary switch,  
Figure 1. The motor will continue  
to operate the flipper display and  
rotary switch until the voltage is

removed from the motor by ener-  
gizing the relay. The relay will  
energize when +24 VDC is applied  
through the rotary switch to the  
relay. Thus, the motor turns the  
rotary switch until the relay is  
energized and stops the motor.  
The extra set of contacts on  
the relay are used to sense when the  
selected number is properly dis-  
played. Total time required to cycle  
through all 12 positions is 3.0  
seconds which is fast enough for  
our application.

Several ideas were suggested for  
a simple, efficient and easy-to-  
maintain control system to enhance  
the dependability requirement for



accuracy. One idea was using thumbwheel switches to select the number to be displayed, Figure 2. Since the displays have a 3.0 second turn around time, taking a few more seconds to dial in the data would not be an unreasonable request. The thumbwheel switches were also used to select which candidate position would receive the data. Therefore, all the data lines are wired in parallel and operate at the +24 VDC level.

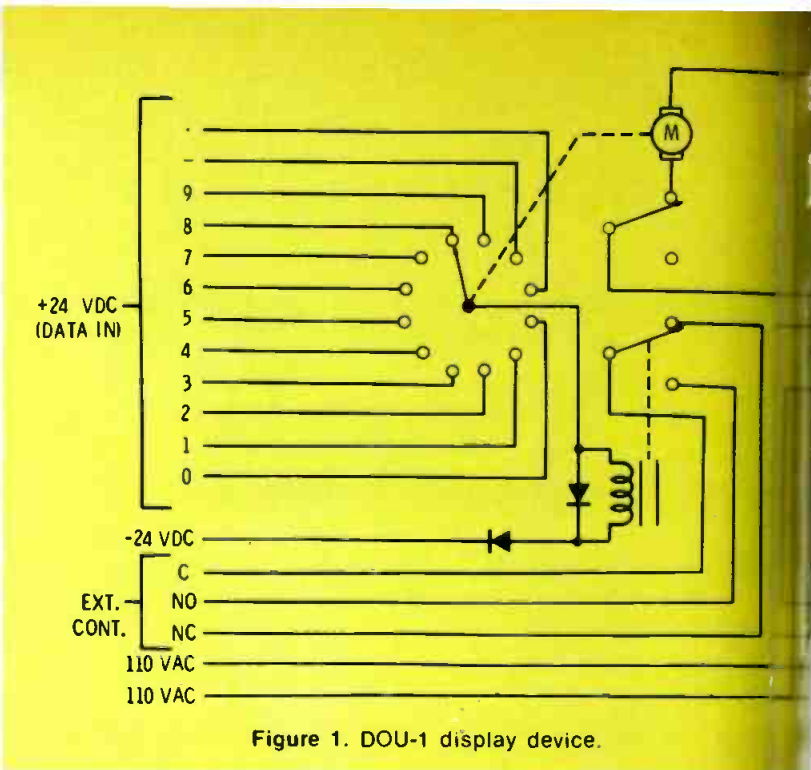


Figure 1. DOU-1 display device.

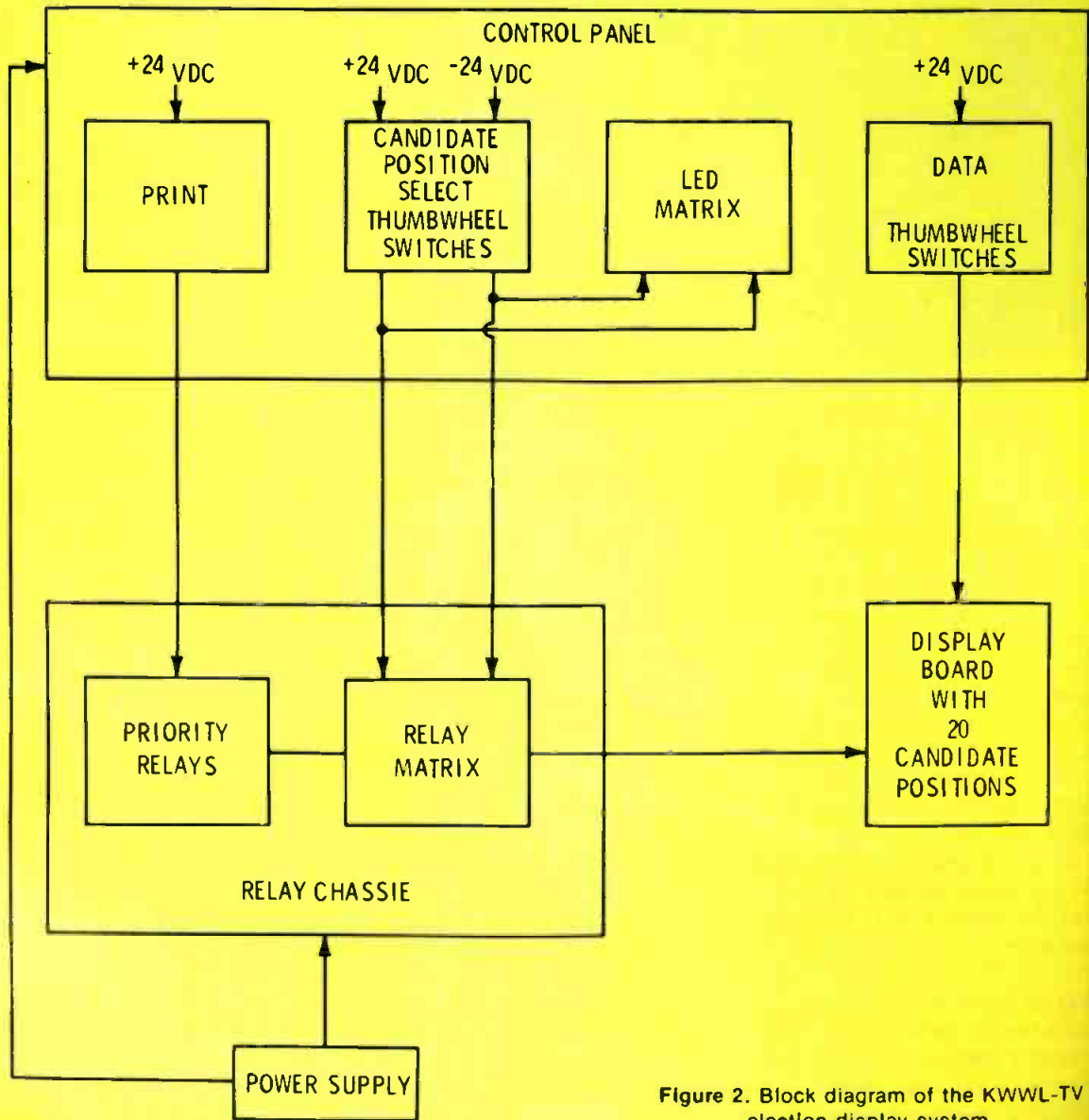
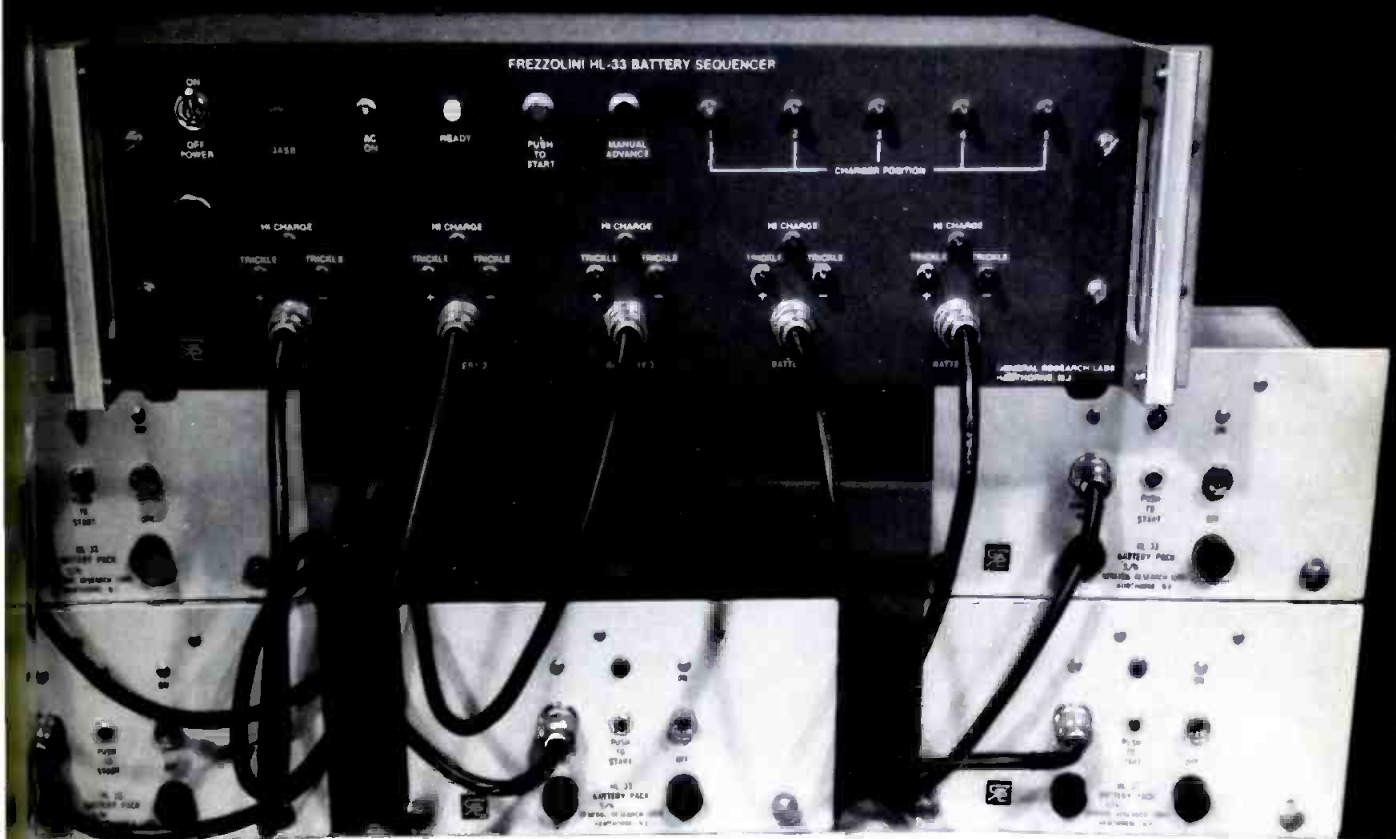


Figure 2. Block diagram of the KWWL-TV election display system.

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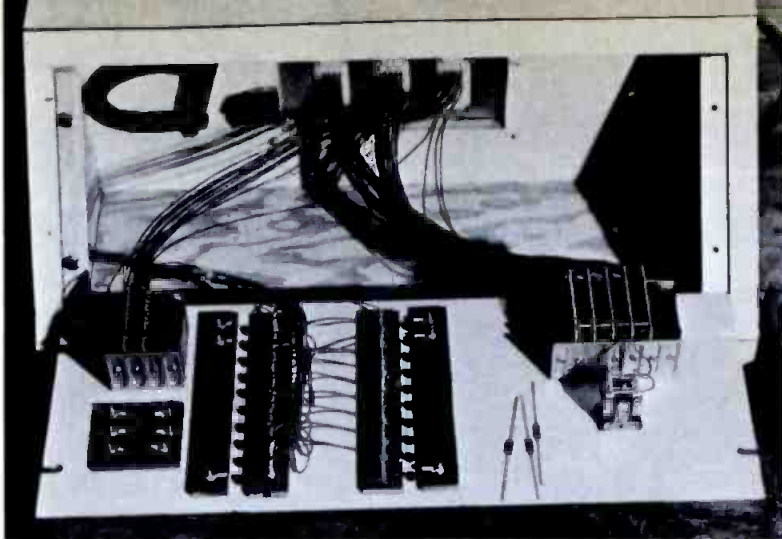


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Control panel wiring is shown here with front panel down.

KHP series relays on the relay chassis and LED's on the control panel are selected by the multiplexed output of the thumbwheel switches that are used to select the candidate position. Thus, the operator can be operating the board remotely and still know which candidate is being selected to receive the dialed in data.

When the print push button is operated on the control panel, the selected relay on the relay chassis connects the displays, for that position, to 110 VAC, -24 VDC, and an all clear bus. This push button remains illuminated as long as the display is printing, by latching one of the priority relays. Once all the digits have been selected, the external set of relay contacts on the display devices, which are wired in series, supplies -24 VDC to the all clear bus to dump the print cycle.

A special problem had to be overcome on the relay chassis. Assume the same data is going to be printed. Refer again to Figure 1. Because the relay takes X amount of time to operate, if both 110 VAC and -24 VDC are applied simultaneously, the motor will turn for X

amount of time. This may cause the display to flip to the next number, depending upon the tolerances of each display. To overcome this, the three priority relays on the relay chassis cover two possible conditions:

1. The 110 VAC must be applied after the -24 VDC is applied.
2. The 110 VAC must be removed before the -24 VDC is removed.

Thus, the priority relays insure proper timing of control voltages to prevent an erroneous display.

After the control and data system was designed, the 140 candidate positions needed, were divided into seven groups of 20 candidate positions each. This enables the production department to utilize seven people responsible for displaying the election returns. The engineering department was able to construct the entire project in a modular fashion.

The most important advantage will be when a problem develops on election night. At least the whole system will not go dead, including the engineers responsible for an 18 month ulcer of constructing some 4 miles of wire, half of which was cut into one foot lengths. □





The control panels went to work in Operations at KWWL along with (left to right) Margene Smith, Pam Magee, Marti Nargang, Don Johnson, Sandy Yoder and John Dodge.



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April 23, 1976

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May I extend our thanks to you and to those members of your staff who have contributed so much in the preparation, design and provision of this forward looking equipment and especially to Dennis Fraser, Tom Meyer and Leo Lewis. It was great having those people work with us on this project and we hope that they will continue to support us as we come to be more knowledgeable and familiar with the equipment.

I just thought you might appreciate our words of thanks.

Sincerely,

R. C. Smith  
Chief Engineer

RCS:rg

roduced at the '76 NAB, the first **Compositor I** Titling/Graphics System was delivered to Time-Life station WTV, Grand Rapids, Michigan, on April 17.

T results?

WTV Chief Engineer R.C. Smith writes that the **Compositor I** "has generated more genuine excitement and enthusiasm on the part of our employees than any other piece of equipment that I have purchased for the station in the last seven years."

We wish to thank Mr. Smith for his appraisal, and extend an invitation to all Broadcast Managers and Engineers to compare these **Compositor I** features with any other multifont character generator:

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- **Automated Election Reporting.** With the addition of the TED (Television Event Display) software package, the **Compositor I** automatically compiles, formats, totals, and displays election returns. No additional hardware is required.

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# Elections Mean Community Involvement

By Phil Whitney, WINC, Winchester, Va.

Most communities expect their local radio stations to give them complete news coverage on election night—both local and national coverage. But without proper preparation, an election night can be hectic, especially for the limited staff. Happily, however, there are some short cuts and advantages which broadcasters can take. These have proven helpful in several markets.

## Get Started Early

The key to success is planning. As soon as possible, preferably six weeks or a month before election day, set up a meeting between

broadcast media, election officials and radio amateurs or CB club. Local radio amateur organizations and CB clubs are usually happy to cooperate with the media. The experience gives them practical operating experience and helps them build a positive image in the community which often blames them for interference, real or imagined. They gain valuable experience which would benefit them in an emergency, and the station develops a rapport with them which would be valuable in an emergency situation.

During the meeting with the local

organizations, arrangements are made which will facilitate a smooth operation. One subject to go over would be identification of amateur or CB personnel who will pick up the returns at the precinct. Ask the radio club to assign a member a job, then turn the matter over to election officials.

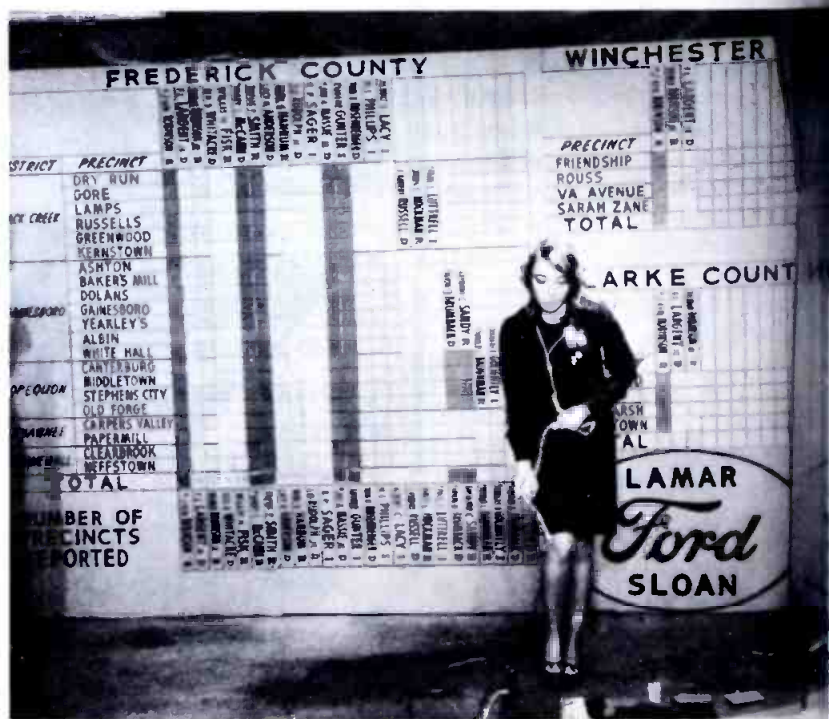
The operators usually show up at the polling places just before closing, identify themselves, then wait either outside or wherever the officials request. They should have forms, mimeographed or printed at the station, to use when the returns come in.

## About The Author

Phil Whitney is a broadcast engineer in the finest sense of the word. He goes back about as far as you'd want, and yet it wasn't too many years ago that he won the coveted Engineer of The Year Award from the NAB.

Over the years, Phil has written several articles for Broadcast Engineering. In fact, it was his idea that we devote time and space to a column now known as "Blue Bananas and Sag Tails".

Meanwhile, Phil Whitney and the WINC staff go about their daily broadcasts in a winning, yet unassuming manner. So winning are they that WINC has won the Virginia Spot News Award four years in a row!



The tote board shown in this photo helps keep the station in total perspective as well as providing the local cable TV outlet a visual aid.

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At polls where voting machines are used, the results will appear quickly. At polls where votes must be counted, the wait could be for hours. Of course radio amateurs don't usually have much trouble finding something to do while they wait.

### **The Base Station**

The amateur two-meter net has been very effective in rounding up the election returns and feeding them into news headquarters from the outlying precincts. Ten, eleven and even 20 meters have also been used, but there's always the problem of DX causing QRM on ten and twenty. With today's almost universal practice of establishing two meter repeaters, most ham groups can cover just any market, unless the station happens to be a 50 kilowatt.

Request the amateurs or CB groups to set up their own network within the framework the broadcaster needs. When hams use a repeater, it is often possible to have the base station at the broadcast station. When this can be done, the

engineering department usually erects a ground plane antenna outside and brings the lead into the operating position. When a low-power transceiver is used to hit the repeater, there is little problem of the amateur RF getting into station equipment.

Higher powered AM units have been known to get into the station audio channels. Most two meter activity now, however, is on FM and usually at comparatively low power. The outside ground plant antenna should help to keep the RF out of the station equipment if there is a problem.

### **At The Station**

When the returns come in, the report forms are handed to the secretaries who are doing the totaling, then on to the news department for use in analyses. They become a valuable reference and facilitate quick transcribing of the returns which come in rapidly at times.

It is good procedure to have a staff member at each of the candidate's headquarters with either a remote pickup transmitter, tape recorder or telephone beeper setup to get quick reactions from the candidate or his representatives as the vote counting progresses, then a victory or withdrawal statement as the outcome becomes known. This is the frosting on the cake and sets the station getting the final statement out as an aggressive news operation.

On election night most of the staff understands that it is a special occasion which requires extra effort on the part of everyone as a team. The program or news director usually stays in the station, coordinating all activities and directing those outside either by telephone or two-way radio. He keeps things moving and fills the dead spots either with material from the network or the news wire. He should also have prepared background material on all phases of the election ready for use so that the entire show moves at a pace

and sounds authoritative to the listener.

### **Pooling Efforts, Trading Reports**

In communities with several broadcasters, it is often helpful to pool efforts. In the markets where there may be two broadcasters fighting for a small amount of business, there may be a pooling of communication between them. At that instance, one station could request the amateurs to help at the other the CB club.

Some stations work out a deal with the local cable TV station, furnishing announcers for the cable and taking their cable audio feed on the air. This allows a few small bodies in a pool effort, where the cable system has local origination facilities.

When the election is statewide, prior arrangements should be made with stations in other markets to trade reports on election night. If earlier such arrangements were made, the better are the chances of getting the best station coverage in each market. They are as anxious to get your progress reports in your area as you are to have theirs. These can be taped on the telephone and the tape put on a reel to use when an opening appears locally.

When the candidate is in another market, this is probably the only way you will be able to get a victory speech actuality. Sometimes if the station you have prior arrangements with has a full-time agreement can be formulated to tape their coverage off an FM receiver and select the most actualities, rather than going to a telephone feed. Permission to use are, of course, necessary from each of the stations involved.

Election coverage, properly planned and handled, can do much toward building an image of competence and professionalism for the broadcaster. One thing to remember is, don't put either the amateur or CB reports directly on the air. This is not permitted by the FCC.



Everyone gets into the act. Of course, the larger the station, the more explicit the duties.



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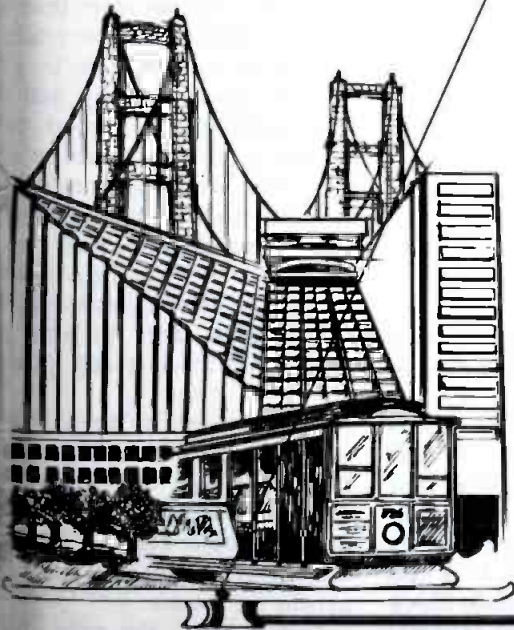
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# Radio Workshop

## HOW TO WIN ON ELECTION NIGHT

by Peter C. Burk, Workshop Editor

There is a growing trend in radio for stations to abdicate the role of covering elections to television. This shouldn't happen because, as you know, God never meant for pictures to fly. Radio can give us the "local" coverage. Television depends mostly on the networks.

The key to good coverage of elections is advance preparation. Planning for a general election should start no later than September.

There are at least three ways to gather election returns. One is through the local county clerk, whose office may collect and post returns for the public and news media. A second possibility is the local newspaper which tabulates returns. You may, with the proper enticement, be allowed to sit in on the process. Those two methods require limited man-power. One person, a telephone and a cassette recorder will provide "bare bones" coverage. The addition of good quality remote pickup equipment and a second person to act as a runner will enhance the production.

A third suggestion is a system of "poll watchers" who will telephone your station with up to the minute returns. This requires a heavy commitment of "people power," but will produce a lasting image of your station as a professional organization.

A good way to get the necessary number of people to serve as poll

watchers is to approach a service organization (Lions, Optimists, or other such groups) and ask them for their help. In return, your station can contribute an agreed-to sum of money for their coffers. You may have to set up several organizations if your county has a large number of precincts.

After getting an organization lined up, schedule a meeting or two. During these sessions, assign specific individuals to precincts and make certain each person knows where his precinct is located. Drill your poll watchers on the necessity for speed and accuracy. Supply forms that are simple to understand and that correspond with the order of parties and candidates on the voting machines or ballots. If you are in competition with other news media, don't be afraid to tell your people they may have to use strong-arm tactics to get to the nearest telephone first.

Instruct poll watchers to arrive well enough in advance of poll closing so that they will have time to familiarize themselves with their surroundings and find out where the telephones are located. It is also prudent to have them double check figures. Each precinct will tabulate totals at varying speeds. The end result should be a smooth, constant flow of returns back to the station.

One precautionary measure should be taken. One or two members of the station staff should be on standby to cover precincts where poll watchers fail to show.

No matter how well the system is planned, a human failure will occur.

### On The Line

Since many of the polls will have their tabulations completed about the same time, it's important to have several telephone lines. Have the station set aside just for poll watchers. Remember, you're asking for volunteer help. If Priscilla, for example, has to make more than two attempts to file her return, she may give up and go to a Disney movie, leaving you out of that precinct. A good rule of thumb is to use one line for each precinct. Rotating lines should be installed so that all watchers have the same number to call.

Assign unflappable people to answer the telephones in the anchor's office and caution them to have good listening ears and to repeat if there is any question at all.

Assign people to keep "running" totals as the night progresses. Have runners to get the totals and to come in from the phone operators to the people keeping an overall tally and finally to the anchor person on the air.

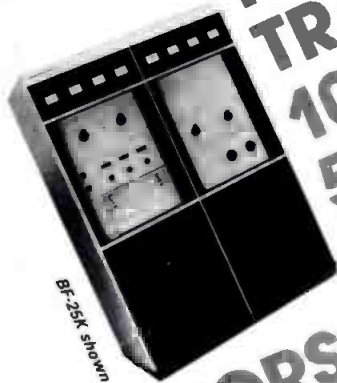
Notations on the tally sheets, precinct numbers and the location of the runner can help the anchor person spot trends, if indeed there is a real trend. Get that deeply into voting patterns. It is important to get the precinct numbers on the forms so you can quickly locate a precinct that may be missing. Some poll watchers

# McMARTIN



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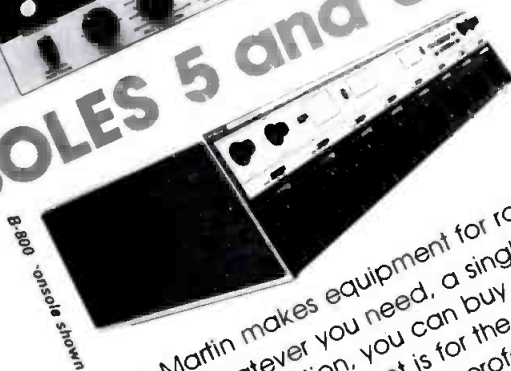
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**WQUA news director Mark Minnick anchors election night from a temporary studio while newsman Norm Cooling prepares last minute on-air script. Sound from the wire machine and typewriter help create an active atmosphere for the show.**



might decide to stop off at the pub before phoning returns.

The anchor position deserves some careful planning. If the anchor person is to sound reasonably intelligent, information will have to be at his fingertips as fast as possible.

### **Background Atmosphere**

A director to coordinate the various activities and punch the buttons will allow the anchor person to work with maximum effectiveness. The director can be in the same room with the announcer. It isn't necessary to create a sterile control room environment for the show; the extraneous sounds in the background actually let the listener in on the excitement of the action. A form of communication must be established between the director and the announcer. You may use pre-written signs or you might try using an earphone so that the director can give verbal cues. The communication is needed, of course, if the director is in another studio.

The announcer should have a wire service as close as possible to stay on top of national and regional races and to plug the holes when the returns thin out. Ideally, the printer should be within reach of

the announcer. Again, the sound adds to the overall air of action. If that isn't practical, use a runner to keep the information coming. **Leave the studio door open** for the outside commotion.

### **Another Angle**

Rather than tie up reporters with the actual collection of returns, assign them to cover various election headquarters and track down candidates, party bigwigs and other political types who will make good interviews both during the counting and after the results are tabulated. These reports can be phoned back to the station, put on cartridge and used by the anchor person as needed. Live reports add even more excitement to the sound of the event.

A staffer should be assigned the responsibility of "tape coordinator." His primary function is to record voices and actualities from the field and shuttle them in to the director. He should be able to record carts from several phone lines, your remote pickup receiver, and a cassette recorder. As the reports come in from the field, they can be dubbed directly to cart, timed, and labeled. A large sign with a lead-in for each cart can be made for the director to hold up in front of the anchor man.

Since the pace of election night can be quick at times, the show should be edited in the field and delivered to the station ready to go. The reporters can make it easier on the tape coordinator by giving a countdown at the start of each report. Strive to make coverage sound as if you have reporters wherever the action is.

Background information on candidates should be garnered on hand along with telephone numbers of neighboring stations with whom you can swap stories of interest.

Make sure each reporter has a transistor radio earphone immediately in his ear. This not only facilitates going live, but helps him stay abreast of the returns. He'll be able to say during an interview, "Clapsaddle, WHIM is reporting that Phil A. Buster is ahead by a thousand votes. What do you think of this big lead?"

Another reporter can be assigned to the newsroom to collect reports from outlying counties and around the state. And, after the show is over, someone should be assigned the task of getting all the reports condensed into usable stories, tapes from the "morning show" complete election wrap.

Everyone on the staff from the general manager to the cue card clerk will probably have a task assigned

ection night. The one excep-  
to this should be the chief  
er. Murphy's Law was passed  
a presidential election, and  
nce, election night brings out  
little gremlins. It isn't very  
traring if the control room  
e catches on fire while ace  
shooter Skip Signal paces  
or at some remote precinct.

### Getting Started

can avoid a tense atmos-  
by starting off the evening  
bit of a party. Have pizza or  
en or some other delicacy  
ht in beforehand, and let  
me in the station get started  
h a full stomach and in a  
d mood. Also, encourage  
members to help out with  
ulation effort...assuming you  
speaking terms with family  
ers. The feeling of a "team  
instills pride in what is  
done and makes for an  
better election sound.

go now we've concentrated on  
istics of election coverage.  
usly, the technical aspects  
ate planned carefully and pre-  
if Murphy is to be beaten at  
en game. The key thought is  
p **simple**. Election night is not  
te to experiment with lots of  
z new gadgets. Along the  
ines, make each electrical  
ention as if it were going to be  
led at the arts and crafts fair.  
have to get started a little  
e but it'll save time when it  
the most.

you have remote pickup units,  
sk them from the intended  
all, well in advance. If you  
ly one dead spot in town,  
band to be right where you  
anned to use the RPU.  
er possible, have a backup  
on hand and ready to use.  
rotoring in the field has been  
tice of embarrassment for  
an one engineer. During the  
hen you check things out  
ng seems fine, how is it  
u change pattern or power?  
of your reports will prob-  
me by telephone so make  
order additional lines well  
nce and that your connec-  
he line is clean. At the send  
the line, it's pretty hard to  
cassette recorder for a line  
the way, some of the new  
won't go into record without  
e: moving. This eliminates

the very handy technique of using  
the microphone for the intro,  
pressing play for the actuality and  
then back to record for the close.  
Too bad.

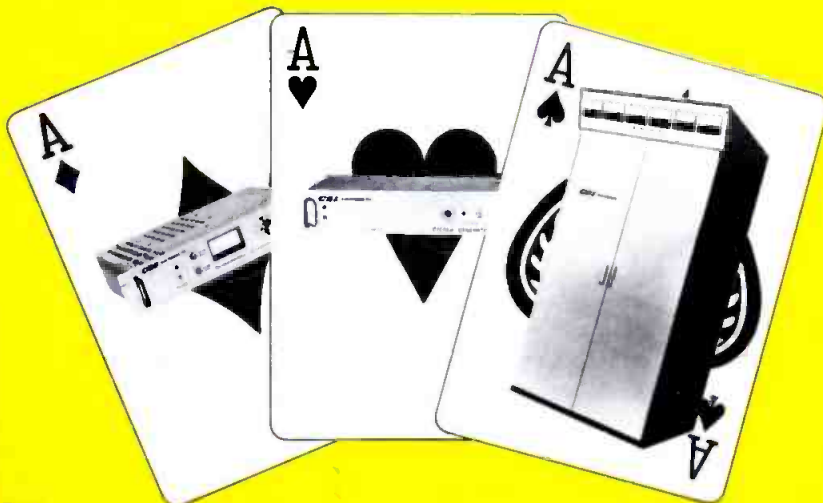
### Use Your Own Imagination

Coverage of an event as it  
happens is what radio does best.  
What has been lost is the ability to  
make the listener use his imagina-  
tion. It would probably be difficult  
for many of us to present a radio  
format without the use of records

over and over and over. Covering  
an election is one step in the direc-  
tion of recovering the ability to use  
radio to its full capabilities.

Take the opportunity. It doesn't  
come along that often these days.  
With some planning and a little  
sweat you can have one hard, long  
day and go home blurry-eyed with  
the feeling that at least once in the  
last 365 days you did something  
that "knocked 'em dead." You did  
something that was important. You  
actually did provide a public ser-  
vice. □

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# Audio Automation Quality Control

By Dennis Ciapura, BE Audio Editor

Modern automated broadcast stations often employ three to six reel-to-reel tape decks as well as a number of cart playback units. Even keeping track of the frequency response of this number of program sources can be a full time job in itself when done by the usual methods. It is surprising that in an age when automation of broadcast programming has reduced the amount of manual labor required to get a well controlled, top quality signal on the air, little has been done to make comprehensive testing of these systems as commonplace as it should be.

Even the very best quality audio automation gear will only provide an air product as good as the maintenance program that rides herd on the myriad of audio parameters which combine to create what we call the "sound" of the station. Multiple program sources complicate the situation from the standpoint of source-to-source uniformity, too. Non-uniform response from one tape deck to the next is a dead giveaway of a sloppily automated station, aside from being poor broadcast practice.

One partial solution is to run a standard alignment tape through each tape source each week to assure proper operation of each unit. As anyone who has done this procedure very often knows, this can be time consuming task. Aside from being time consuming, a frequency response check alone is only

half the job—how about distortion checks? Testing tape decks for distortion can be a rewarding effort because a "muddy" or "scratchy" sound can often be isolated quickly, but, unfortunately, distortion testing for tape decks at the station level is almost non-existent.

One reason is that low distortion test tapes are difficult to obtain and interpretation of the test data is not as straightforward as you might think. When attempting to measure distortion with a common nulling type of harmonic distortion meter, any speed variation will result in the test signal falling out of the notch, thus clouding the true distortion reading. Since tapes hiss is rarely more than 50 dB down, which will show as 0.3 percent distortion, the rather high noise level of tape systems can be a problem too.

The state of maintenance at most automated radio stations these days goes something like this. Since the annual proof tests the system for distortion, frequency response and noise from the console input to the transmitter output, it is assumed that the station will accurately reproduce what the automation system puts out. Meanwhile, automation audio maintenance usually consists of routine mechanical maintenance, frequency response checks with a standard test tape once in a while and, at some stations, a phasing check and adjustment when the response is checked. It is assumed that the tape heads, playback preamps and all intervening electronics are distortionless. Now that's a pretty big assumption!



The author is shown using new "tools of the trade". Ciapura checks scope camera photo in this article. The photos were taken directly from a low frequency spectrum analyzer.

## Better And Practical

Fortunately, there is a better way. A new breed of lightweight relatively inexpensive low frequency spectrum analyzers has become available in the last couple of years and these units can be just the ticket for speeding up real time rough testing of tape deck performance, thus making complete testing of each source practical on a routine basis.

The low frequency spectrum analyzer makes it possible to plot amplitude vs. frequency rather than amplitude vs. time, as an oscilloscope does. This means the amplitude response of a source across the audio range can be displayed. If a variable frequency audio generator is synchronized with the sweep of the display, the frequency response of the system can be displayed. The most popular form of low frequency spectrum analyzer is one that is coupled to a scope with storage capability. This type of test setup will plot the frequency response and freeze it on the screen for detailed examination and/or photographic recording.

Units like the Tektronix 511, which we use for many of our magazine's lab tests of new equipment, contain a built-in test signal generator. The Tektronix 511 is available with a 20 to 20,000 Hz sweep scale to conform to many audio testing configurations, as well as linear sweep ranges from 100 to 100,000 Hz for filter testing. Vertical deflection sensitivity is available in either 10 dB or 2 dB per division.

The low frequency spectrum

Continued on page 46



## Maintenance....As The Manufacturer Sees It

broadcast automation equipment becoming more complex and changing all the time. If you think the old statement is contradictory, you're right. But, it's also true. The new breed of digital broadcast automation gear has capabilities that no one dreamed of just a few years ago, and yet, new advances in circuitry technology, like microprocessors, have reduced the complexity, if you know the right approach. To get a broad idea of how automation can most efficiently be used at the station level, we decided to visit an automation engineering factory and talk to the people who make the stuff and see what they had to say about field service. After all, they design and build it, and if they can't fix it, who

is the host company was Control Design Corporation.

In charge of Control Design's R & D department is Tom Kitaguchi, who had an opportunity to talk to me, some length, particularly in regard to field service of digital broadcast equipment. Tom had 17 years of experience before joining Control Design, having worked in circuit design for Bunker and Martin Marrietta.

He has a CD28APM at the end of his finger in the shot of a digital system. This unit understands and speaks English and is the easiest automation system program that we've ever seen. It should be a hit at some of the smaller stations that have to do with semi-engineers.

Broadcast equipment manufacturers don't usually like to admit that their products fail (but neither do reluctant manufacturers) and we have to give Control Design a credit for their candor in discussing the topic with us. But, let's face it, anything more complicated than a pet rock has got to

drop out sometime, and your trusty old programmer is no exception. You would hope that your trusty new programmer will display some measure of restraint in this area.

However, let's assume that some unforeseen gremlin has taken up residence in the innards of your digital automation system. First of all, we ask Tom to think for a while and describe the largest or most frequent difficulty in servicing digital automation systems in general. His reply didn't surprise us, for as we had suspected; lack of familiarity with digital circuitry at the station engineering level was his report. This is not to say that broadcast engineers are short on smarts or that the new systems are too complicated to be successfully repaired at the station level.

The simple truth of the matter is that the state of the broadcast automation art has reached the point where the station engineer cannot be expected to completely understand how his system does everything that it does. It is difficult for full time design engineers to keep abreast and broadcast engineers should not feel guilty, inadequate or incompetent for not understanding totally all the details of how the mini-brain works, and it's not necessary.

Many engineers are discouraged by the futility of trying to troubleshoot digital circuitry by the classic DC or signal flow method and become soured on digital equipment. The correct approach is to learn how to use a logic probe and become familiar with the logic flow as well as the audio flow so that the defective module or card can be found and a replacement obtained.

In many cases it is not practical or advisable to attempt to troubleshoot a defunct logic circuit right down to the defective component, and it's not necessary. You may be surprised to know that it sometimes

takes a great deal of time to troubleshoot a circuit even at the factory where super test gear, 100 percent spare parts and the guy who designed it are all available to the repair technician.

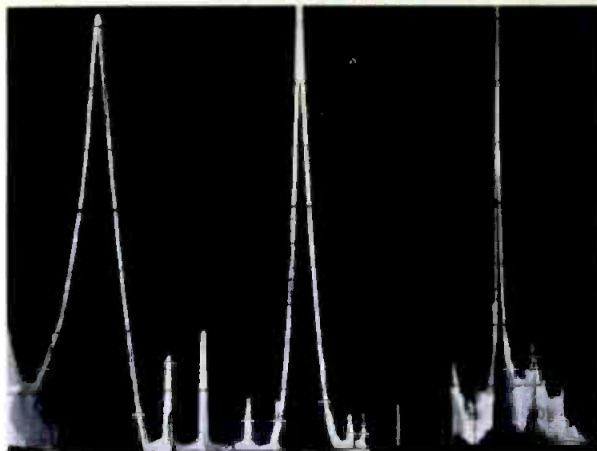
Many manufacturers operate an emergency service to assist engineers who have problems in the field and provide replacement modules and cards. The station engineer need only locate the defective sub-assembly.

What we are getting at is a whole new approach to equipment servicing. Learn how your system works at a module level and understand as much as possible about how the electronics works. For example, the audio circuitry and power supplies should not be formidable troubleshooting problems, but leave the really hairy digital problems to the factory. If you learn how to use a logic probe, you can sometimes find the defective component very quickly with no further assistance, but if that doesn't work, trade in the card.

With automation systems like those built today, the use of redundant circuit cards in both digital and audio switching sections makes it possible to keep the most important sections of the system operative in the event of a circuit failure. All the redundancy in the world, however, won't help if the engineer is not aware of which circuits are redundant. So we see that the emphasis should be placed on knowing how to use the modular building blocks in modern digital systems to their best advantage, thus simplifying the service process.

In the beginning we said that broadcast automation systems were getting more complicated and simpler all the time and they are. They are more complex electronically, but for the broadcast engineer who plays his cards right, simpler to service.

Figure 1. Shown here are 70, 700, and 7000Hz test tones and harmonics at tape deck output. Harmonics for 70Hz are -50dB or 0.3 percent. For 700Hz, -60dB or 0.1 percent, and -50dB for 7000Hz or 0.3 percent.



*Continued from page 40*

analyzer can paint a very detailed frequency response graph in 90 seconds, but the method really earns its keep in the distortion measuring department. When set for 10 dB/div. vertical response, it is possible to display the fundamental audio frequency and all significant harmonics in a single trace. The harmonics really show up since the screen is eight divisions high and a harmonic amounting to 0.1 percent or -60 dB, would be six divisions of vertical distance from the fundamental.

With a narrow bandwidth setting, noise does not enter into the picture at all, only the distortion components of nonlinearity. Since we are looking at the reproduction of the input signal and the spurious outputs that result from the imperfection of the reproducing equipment as they really are with no nulling or gain setting functions, the method is ideal for tape work and thus valuable for automation maintenance where several units need to be checked often.

### Three Range Tests

To be able to paint a comprehensive distortion test in one sweep of the screen so that test time can be minimized, careful selection of the test frequencies to be utilized is required. Ideally, we would like to have a distortion check in the bass range, one in the mid-range and one at the high end. To be able to paint three fundamentals and harmonics up to the limit of the audio range test frequencies of 70 Hz, 700 Hz and 7,000 Hz were chosen. 70 Hz was chosen because it falls between the 50 and 100 Hz frequencies usually used for low-end testing and is really low enough to

give a good indication of how strong, low frequency music fundamentals would be reproduced.

700 Hz falls in the mid-range portion of the spectrum and is high enough in frequency to allow for the second and third harmonics of the 70 Hz tone to be clearly seen. Since FM stereo bandpass is usually limited to 15 kHz, there is little point in using a fundamental above 7 kHz for the high-end test since even the second harmonic will be on the edge of audibility. The spacing across the screen also allows for unobstructed viewing of the harmonics associated with the 700 Hz mid-range test.

For tape deck testing the test tone must be recorded on tape, and this task is not as difficult as it may seem. Using a Scully 280, we were able to easily generate test tapes with less than 1/2 percent distortion at the low end, 0.1 percent in the mid-range and less than 1/2 percent at the high end. The duration of the tones should be timed to match the sweep speed of the spectrum analyzer as it traces across the screen. A 90 second sweep speed is most practical for two reasons. First of all, it provides greater resolution than faster speeds and secondly, is easier to synchronize.

The test tones were applied to the tape at full 0 reference level using Ampex 406 tape which will not saturate at 7 kHz even at full level. The end result of using the distortion test method just described, is that a very accurate picture of the mid, low and high frequency distortion of a tape deck or tape source of an automation system can be obtained in 90 seconds or about as much time as it might take to decide whether the meter is pro-

perly nulled using conventional methods.

For normal audio equipment where there is no time lag between input and output, the tracking generator built into the low frequency spectrum analyzer can be used to paint a frequency response graph with 2 dB/div. vertical deflection. This type of response is great for consoles and mixers, but it is not possible to use a tape deck because the space between the record and playback heads of a tape deck results in a time lag that precludes tracking generator/analyzer synchronization.

After experimenting with various pink noise techniques, these were finally discarded for lack of synchronization and difficulty in obtaining repeatable results. The best method was to use the tracking generator to apply an audio band sweep to a test tape and manually synchronize the beginning of the sweep to the spectrum analyzer with the start of the audio sweep on the test tape. The tape deck output cannot be displayed through the spectrum analyzer input, however, since an exact coincidence of input frequency at tape and analyzer would result in a trace. It is, of course, impossible to obtain such synchronization due to the variations of manual start timing. The problem was solved by using a storage oscilloscope coupled to a conventional preamp with a second sweep timing coming from the spectrum analyzer. This provides a linear voltage versus logarithmic frequency display. In other words, our graph will be a standard 20 to 20 kHz frequency response graph from left to right, but the read output voltage vertically across the screen overlay was constructed to convert the vertical divisions to decibels for convenience.

The two test procedures just described each require about 90 seconds to accomplish. Assuming a stereo system, frequency response and distortion measurements on both audio channels would require about three minutes of test time, of course, as with any test procedure there is some space between measurements and set-up time, but there is no doubt that low frequency spectrum analyzer testing of tape is the hottest thing on phosphor.



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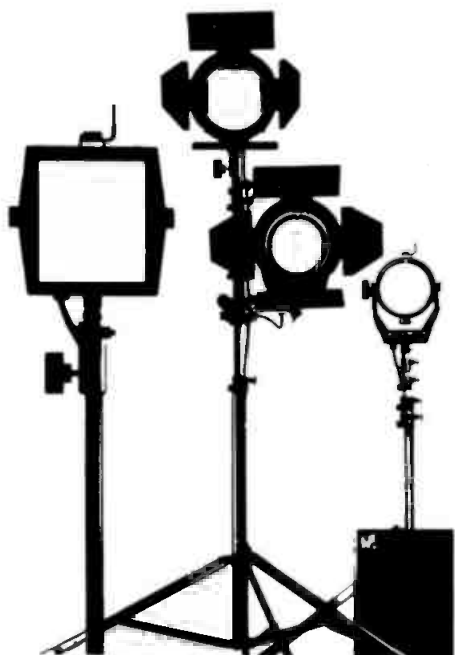
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then scheduled to be rebroadcast in Sacramento. The show required two receivers, so it called for both stations to promote combined listeners to have "Quad Parties".

"In the final analysis," Gabbert said, "this is the first attempt at network broadcast of discrete four channel stereo is both innovative and exciting."

### **Not ALL AM**

While this sounds very much like a strictly FM assignment, remem-

ber that lots of interest has generated in AM stereo. And when the NAFMB changed name to the NRBA, they made clear that the organization and activities would be directed to AM and FM.

If you haven't already plans to attend the conference time to get started. Drop a line to NRBA, 500 Fifth Avenue, New York, NY 10036, or call Larry Saldan at NRBA headquarters (212) 869-8873.

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Even Lon Chaney Would Applaud...

# Eliminating The News Blues

By Neil Sclater

TV stations are getting the annoying blues and greens out of their news film, correcting sour colors in old TV movies, and shaping up their videotapes with an automatic color correction system. Designed for use with film chains, electronic color conversion can "paint" video signals to wipe out the leading causes of color mismatch: black-white level imbalance, colorimetry errors, and variations in film processing.

Color mismatch in TV pictures on the viewer's set may be due to the interspersing of live, videotaped and filmed program material or it may be caused by variations in the quality of the projected films or slides. Non-uniform color densities in film are due to errors in film exposure or processing. If the filming was done under adverse lighting conditions or the film processing strayed from the narrow limits of time, temperature or chemical mix, you can expect color errors.

Another factor, color temperature, is introduced when films are processed for projection with a light having different spectral characteristics from the light source employed in the telecine chain; color variations will be apparent. Also, the splicing of color film strips processed by different methods leads to color mismatch.

Color errors can also occur in live programming where cameras of different design or manufacture are used—even when they are properly adjusted and operated. These errors are due to differences in response between the video tubes and their related optical trains.

## Different Problems, Different Solutions

WZZM-TV, Grand Rapids, Mich., wanted to improve the

quality of its news film that was frequently shot under adverse lighting conditions. In addition, the station had been troubled by a residual green cast in its processed films. Filters did not solve the lighting problems and a concerted effort on the part of the station's lab technicians and the film manufacturer failed to root out the cause of the green cast.

Dale Wolters, chief engineer at WZZM, heard about a new color correction system and thought that it could solve both problems at once. Wolters says, "As soon as it was put in service, our news film showed a definite improvement—flesh tones became natural and the sky looked normal." As an afterthought he added: "Our local news film now looks better than many of the filmed stories from the network."

The color corrector was coupled to one of the station's two film chains and, according to Wolters, both are run together about 20 hours a day. "That one film chain handles all of the news film and movies—everything but the commercials which are run on the other chain," he explains.

Although Wolters says that the color corrector is operated more than 99 percent of the time in the automatic mode, he is particularly impressed with what can be done in the manual mode. "We are able to make significant off-line improvements in old movie films that have discolored with age," he says, explaining that the films can be run through the corrector as many times as needed to preview the required corrections and the final results can then be videotaped for later replay. He tells of one instance where money that had turned to a revolting sepia in an old commercial film was restored to an accept-

able green with manual "painting."

Mr. Wolters reports that station management may purchase a second system for the other film chain to help balance the work load.

Two TV stations in the St. Louis area are using color correctors to accomplish different objectives. KSD-TV, a network affiliate station, is primarily concerned with news videotape color correction, while KPLR-TV, an independent station, is funneling all of its programs, the majority originating from local films, through its color corrector.

Ed Risk, chief engineer of KPLR-TV says of the system: "We are glad to have it—it does not do everything in the world, but it helps." He explains that technicians must be aware of the situation where an electronic color corrector will help and must not expect it to overcome poor signals or poor equipment.

"We are using the color corrector for news tape correction only," says Risk, since the use of film and film station is diminishing.

The color corrector is an integral part of the station's electronic journalism project and station personnel are hard at work perfecting the internal distribution installation. He reports that the color corrector is most often used in automatic mode (taking most small deficiencies), "but people once a week we might get something that is so bad we have to do something about it manually."

KPLR-TV, by contrast, sends outgoing pictures to its transmitter regardless of source, through the color correction system. To accomplish this unusual air-line application, the station assembled an equipment package of its own design made up of a station-built process amplifier and automatic gain control, a color corrector system and a



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"For more about the WTAJ-TV system, see Broadcast News #155.

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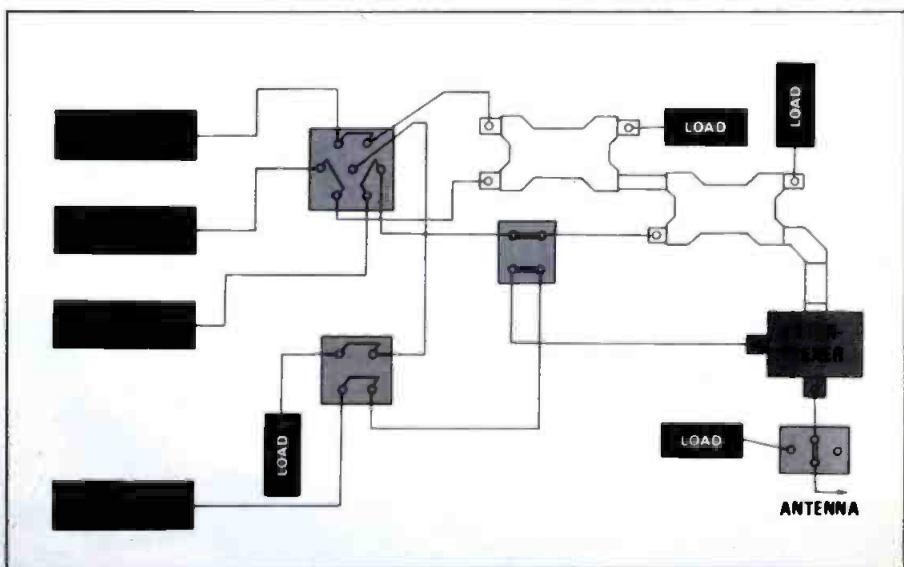
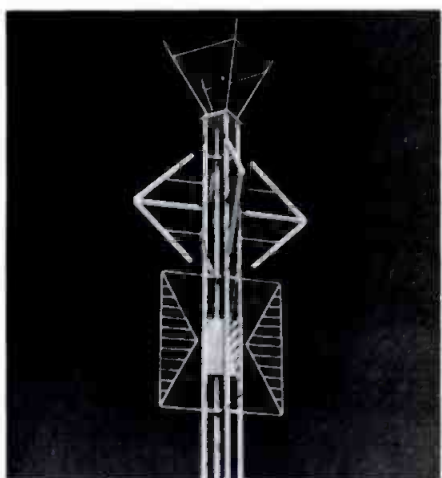
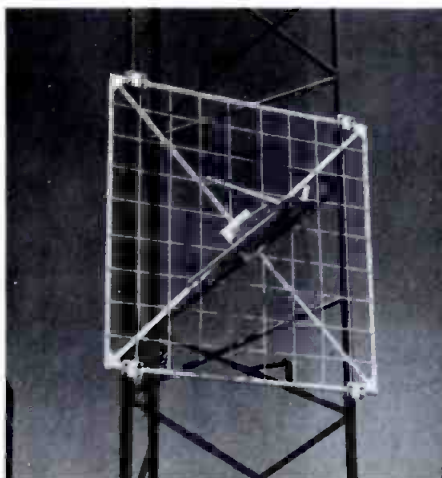
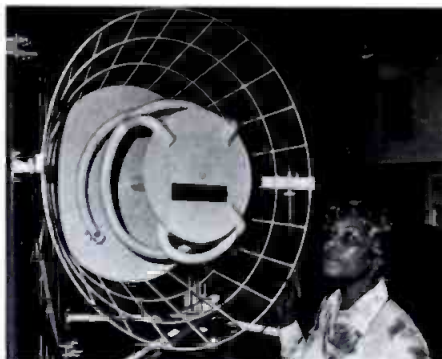
One is a top-mounted Fan-Vee for Channels 2 through 6. It uses individual radiators for horizontal and vertical polarization. They are phased to produce the circularly polarized pattern.

Another circularly polarized antenna, the End Fire Helix, is for Channels 7-13. It uses three small reflecting dishes mounted per layer around the top-mounting pole to

produce an omnidirectional circularly polarized pattern.

A panel antenna for face mounting on the tower (Channels 7-13) may be installed as a horizontally polarized antenna, with the ability to be converted to circular polarization.

Ask your RCA Representative for full antenna information.

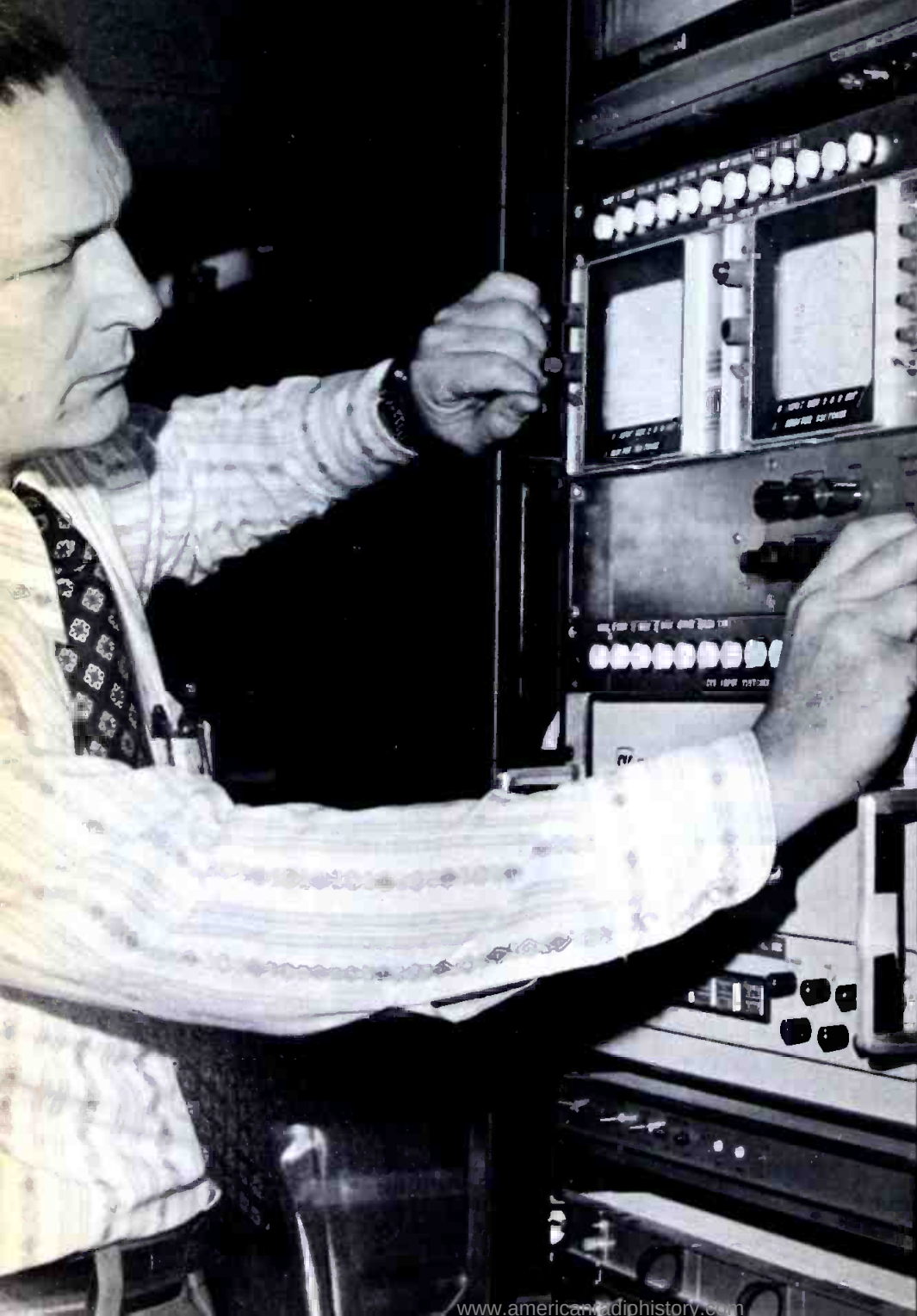


Four 55 kW vapor-cooled klystrons are used in the TTU-165c. A unique triplexing system developed for the WTAJ-TV transmitting plant combines the outputs of three of the klystrons. As shown in the diagram, visual amplifiers 1

and 2 are combined through a 3 dB combiner to produce 110 kW peak power. The signal is fed through a 4.77 dB combiner where it is added to the output of visual amplifier 3 for combined visual peak power of 165 kW.

For More Details Circle (15) on Reply Card

Monte Walpole,  
KSD-TV, St. Louis,  
is shown here making  
color correction  
adjustments from the  
remote control panel.





automatic level control. Combination of equipment put together forms a very nice package that enables produce network quality at low cost," declares Hal Rice president and general manager of KPLR. He asserts that the station's use of the color correction in that way is unique and meets the recommendations of Thomson-CSF Labs.

Rice says that the station is impressed of the value of color correction, but it wanted to ensure the equipment's ability to correct completely automatically, day after day, seven days a week, without having to be touched. "The automatic and manual paintbrushes are nice, but for us the automatic operation is far more important," he stated.

The color corrector is most often in automatic, and when it is doing good dark blacks and bright whites there is almost nothing it can't handle," he said in explaining why the station designed its own preliminary AGC and AGC stages. "They are at the color corrector is to set the signal levels it needs." The station manager said that he was bothered more by a green cast in its slides, and that this situation was easily corrected. He also said that the color corrector is very good in correcting color camera during live programming.

### How It Works

Color correction behind the scenes at these stations was developed by Thomson-CSF Labs. The package is a three-unit color correction system consisting of an NTSC color corrector (model 5500A); a sensor unit (model 550) and a remote control (model 555). Together, the color corrector and sensor handle the common black-white imbalances under conditions automatically, manual controls on the color corrector permit an operator to adjust, or at least minimize, the color problems such as color mistracking.

As two 1 1/4-inch high, rack mounted cases with an integrated remote control for mounting, the equipment connects directly on the NTSC en-

coded output of telecine chains, camera chains and videotape recorders. And, as you've already seen, no two stations are using it in exactly the same way.

The color corrector "disassembles" the NTSC video signal into its constituent components so that access may be gained to these components for correction purposes, either automatically by the sensor or manually with the color corrector controls. The luminance component of the NTSC signal is first removed and isolated from the chrominance component.

The chrominance component is then demodulated to form R-Y (red minus luminance) and B-Y (blue minus luminance) signals that are sent to a mixing matrix and the sensor unit. The R-Y signal is also sent to the phase detector which also receives a burst gate pulse needed to form a color correction signal. Both of these signals control the 3.58 MHz color oscillator that supplies subcarrier inputs to the internal demodulator and modulators.

Color gain and gamma control circuits provide manual control of all variables, or they can be controlled by the output of the sensor. Re-encoding and modulation circuits (including the R, B, and G black-level controls) re-assemble the video signals to form the final correction signal that is added to the main video in the output amplifier. The color corrector also contains circuitry for color killing to prevent mis-correction of monochrome signals.

### Sensor Subsystem

The sensor unit is selected with a switch for automatic or semi-automatic black and white level color balance control. It works on the red and blue color axes to remove residual coloration (chroma) from the black and white regions of the composite NTSC encoded signal. The unit automatically provides the feedback that otherwise would be introduced by manual controls in the color corrector circuitry.

A feedback arrangement generates and adjusts the correction control signals and sensor circuitry examines the uncorrected signal for maximum and minimum luminance levels. If a chrominance level is

found in the black and white regions, a circuit determines the relative phase and amplitude of the error component and generates a matching signal of opposite phase. When summed with the error signal, the correction signal cancels the unwanted chrominance component.

The sampling is continuous with the error signal integrated over eight to ten TV frames. These adjustments are automatically updated at one of several attack time rates that can be selected. Correction release-decay time is also selectable in several steps.

### Correction Limits

The system is designed to correct NTSC signals containing improper black and white video levels only if those limits are within specified ranges. Black must be within the range of 7.5 to 12 IRE units and white must be within the range of 95 to 100 IRE units.

When these levels are absent, no corrections are made because it is possible that neither black nor white were intended to be in the picture. However, active corrections for the presence of chroma are made in magnitudes up to 20 IRE units. No correction is made for greater magnitudes because the chroma could be a desired part of the picture.

The system cannot overcome the effects of poorly adjusted or defective film chains and cannot correct signals that depart from NTSC standards.

### Editor's Note:

Automatic color correction systems will continue to be a factor in technical color fidelity at station. But, as we all know, the end result must have some effect on the viewer. As much television as we all watch, it's obvious that some technical help is needed. As Ed Risk says, it doesn't do everything in the world (for the signal), but it helps.

The examples cited here show how one system was used to solve color problems. Other manufacturers can be found on page 82 of the Broadcast Engineering 1975 Buyer's Guide. And as a reminder, the Reader Service cards in our annual Buyer's Guide are good for one year from the date of publication. □



# Station to Station

## Controlling Two Stations With One EBS Unit

Just wanted to send you a copy of a scheme I worked up here for controlling two independent stations with one EBS unit, with no patching and a minimum of switching. This system also provides good impedance matching and allows the entire control room facility of an AM station to be used for actual EBS emergency programming into the AM and an FM station as well.

I realize that there are many schemes which would work equally as well, but naturally I favor my own. If you think it might be of interest to your readers, please feel free to use it.

When planning for the new EBS system installation at WSSV/WPLZ, it was felt that means must be provided to make the system operation as simple and foolproof as possible. The diagram shows our system, which provides for separate AM and FM testing, and for simultaneous operation in emergencies. Provision is also provided for simulcasting a regular program without a lot of patching schemes being necessary.

The left and right audio lines from the WPLZ automation system are fed into an auxiliary, locally constructed EBS control unit, as is the AM line. The FM lines go through the normally closed contacts of relay K1, and the AM line through the normally closed contacts of K2. An 8-pole, 3-position rotary switch selects the three EBS functions: AM TEST, FM TEST, and OPERATE. Transformers T1 and T2 are Thordarson 25A46 interstage transformers containing two 500-ohm primaries and two 500-ohm secondaries and are used for coupling between the AM, FM, and EBS tone generator. The EBS unit is the TFT 760.

When the EBS FUNCTION switch is in AM TEST, it activates the COMMAND switches on the TFT closes relay K2, coupling the AM signal through transformer T2. At the same time, the two-tone signal is fed into winding 2-4 of T2 and coupled into the AM line. Our TFT was modified in accordance with TFT Application Bulletin 75-02 for automatic reset, so after the

tones end, K2 is deenergized, the line is returned to normal. Originally, K2 was omitted, but it was found that there was an excessive amount of bass roll-off in the audio fed through T2 at this time, and rather than re-equip the system the relay was added.

In FM TEST, activating the COMMAND switches closes K1 and the EBS tones are fed to the transmitter through windings 2-4 and 6-8 of T2 and 1-3 and 6-8 of T1. The automation system deenergizes K1, connecting the transmitter back to the automation system.

In the OPERATE position, both K1 and K2 close and the tones of both transmitters simultaneously. The NORM/SIMUL switch is in SIMUL before the tones else the relays stay energized and emergency programming can be broadcast on both stations. Switching back to NORM will place the stations in normal operation. The AM position may also be used for simulcasting a regular normal emergency program which originates the AM, and saves patching schemes.

In normal operation, the control room operator activates the COMMAND switches for the AM after the EBS announcement programming ends. For FM, he monitors

*Continued on page 53*



The Studio Compact Shown With Optional Accessory Shelf

SEE US AT NRBA BOOTH 243

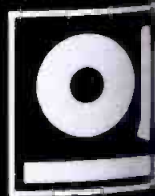
**MICRO-TRAK CORPORATION**  
620 RACE ST., HOLYOKE, MASSACHUSETTS 01040

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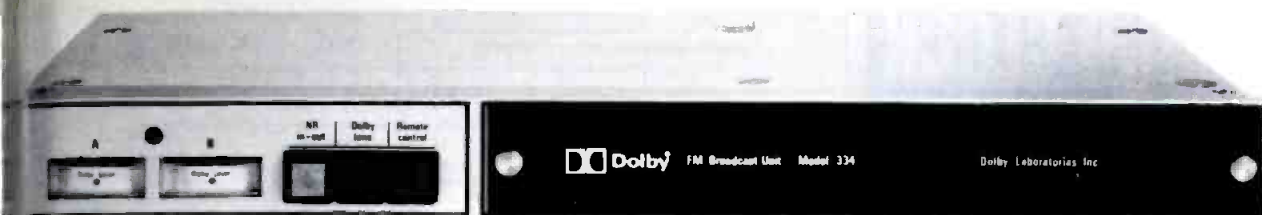
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For some listeners like to take  
advantage of every opportunity for  
improvement. If they use Dolby circuitry  
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reception closer to the quality of the  
source material used at the

Naturally, the noise is reduced. But that's  
not all. Dolby compression is  
standardized, recoverable compression.  
By using Dolby encoding instead of the  
conventional high frequency limiting  
normally required during transmission,  
the station gives the listener at home the  
opportunity of recovering the full  
frequency range and dynamics of the  
signal. Furthermore, depending on the  
amount of limiting previously used, many  
stations find that Dolby encoding permits  
them to increase their level - which is  
good for both the listeners and the station.

If these prospects excite you, we think you  
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improvement we think both you and your  
listeners will appreciate.

\*July 1976. The products are tuners, receivers, and  
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calibration procedures. Write for the latest list of FM  
products made by Dolby licensees. Technical litera-  
ture describing these developments is available.

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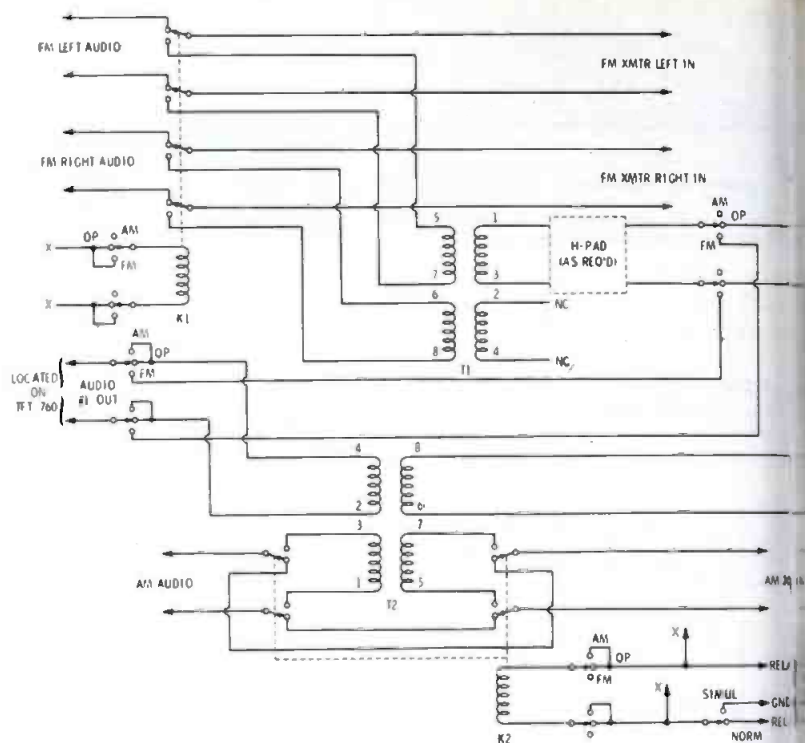
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## Station-to-Station

Continued from page 52



FM signal and when he hears the opening, he activates the COMMAND switches (with the EBS FUNCTION switch in FM TEST, hopefully). The EBS cartridge for the FM station carries a 35 Hz tone at -18 db during the 25-second silent period to disable the automation "silent sensor".

K1 and K2 are Potter & Brumfield KHP17D11, and all audio lines are brought out to patch panel jacks "just in case," so the EBS system can be patched out in case of a stuck relay.

This system works very well and is very popular with the operators since EBS testing is simpler than

the old carrier break method. They now have one-switch casting to boot.

By the way, switching the line through T2 causes about a 2 db drop in line level, unnoticed with normal compression and limiting. The H-pad on the FM was necessary since the levels are normally used on no lines than on the AM line.

**P. H. Beck**  
WSSV  
Petersburg, Virginia

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BROADCAST ENGINEER



## Information Needed Antenna Filters

We are seeking any information regarding FM antenna filters such as cavity or helical resonators, the type of which is to attenuate own FM carrier enough, at 10 dB or greater, in order to keep other FM adjacent signals for broadcast purposes.

We would deeply appreciate any information on who or which company makes such products and where these items may be obtained. Can anybody help us out?

**WHRM/WHRM-TV**  
3200 Park Road  
Wausau, Wisconsin 54401  
(608) 845-1319

## Label Everything Watch VU's

and BE from cover to cover month and have picked up a ton of useful information in its pages—both from the book and from the information provided by station engineers in the country.

In the June '76 issue, I was extremely pleased to see the article by Burke "Facility Construction: Proceed With Caution." The point he brought out very clearly was the need for cable labeling, cable labeling and documentation. In addition to engineering work at WZRD, I am also responsible for the planning and labeling of all audio and video gear on our university campus from the basic PA system to television facilities. In the six years that I have had this job I have emphasized the use of labeling and documentation, and it has paid off on numerous occasions. You'd be surprised at how difficult it is to find some people of the value of the extra work, however. Many times it's a waste of time.

It was one thing in the article that bothered me. Did you notice the console VU meters in the photo on page 43 are pinned? The students here at WZRD like to point this out to me. I'm sure it didn't go unnoticed either.

Thanks go to BE and Mr.

Burke for a fine article (despite the pegged VUs).

**Lawrence P. Kenney**  
WZRD

## Video History

Part 2 of the "Videotape Recorder Revolution," on page 52 (May '76), shows a photograph of the inventors of the Ampex video tape recorder.

Philip Gundy, who appeared in that photo, left Ampex in 1961 and joined Cetec Corporation as Executive Vice President. Cetec's broadcast group includes Schafer Automation, Sparta Electronics, Vega Electronics, CETEC Audio, and Jampro Antenna Company. He retired last year, after 35 years in the broadcast equipment business.

Thought this information would be helpful to readers of Joe Roizen's fine article which tells of the present whereabouts of the original team of video tape inventors.

**Peter K. Onnigian**  
President,  
Jampro Antenna Company

## Xmtr Help Needed

I am interested in contacting station engineers who have had experience in operation of RCA-3B FM transmitters. Of special interest is experience in converting or modernizing such units.

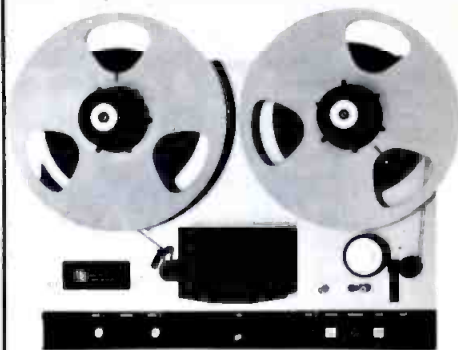
I am also interested in obtaining catalog sheets and/or operating manuals for such transmitters.

Recently I came upon a station where an engineer had cut an antenna to frequency, a Collins unit, I believe. It may be of interest to some engineers to read an article about such FM antenna conversions, procedures, planning and problems involved, etc.

I have enjoyed your magazine since its first issue in 1959 and still have most of the issues. I need a few issues to complete my file and have a few extra copies of back issues for trade for those I need. Would like to hear from anyone who has a complete file or would care to trade or sell some issues before 1964.

**Harold A. Jahnke**  
421 Central Avenue E.  
Hampton, Iowa 50441

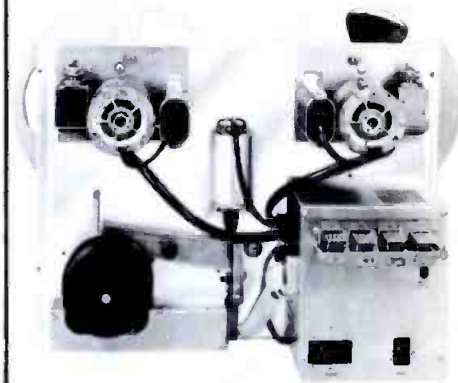
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# PEOPLE IN THE NEWS

**Paul Richard**, chairman of the Board of Directors of Thomson-CSF, died June 7. Vice Chairman **Jean Pierre Bouyssonnie** moves to become President of the Board and President. **Michel Villard** became President of Thomson-Brandt and **Jean-Marie Four** named to replace **Paul Richard** as member of the Board.

**Ampex Corporation** announces the appointment of **Richard Sirinsky** as National Marketing Manager for its audio-video systems division, and **Chae Steinberg** as Vice President of audio-video storage and data products.

**George W. Hamilton** has been assigned to the position of Manager of International Sales Administration for the Broadcast Products Division of Harris Corporation. He is reporting to **James Delisso**, Director of International Sales.

Newest members of the National Association of Broadcasters Board of Directors are **Dond Thurston**, President-General Manager, WMAZ, North Adams, Mass., as Chairman, and **Dord Jones**, President, PSB Radio Group, Fond du Lac, Wis., as Vice Chairman. **Richard H. Croft**, President of LPB Inc., announces the appointment of **Harry N. Larkin** to the post of Marketing Director.

For the third time in 57 years, RCA Corporation elected the same person to hold the position of President and Chairman of the Board, **Anthony Conrad**. **Robert N. Hurst** has been appointed to the staff of the RCA Broadcast Systems training program.

**Felix D. Bonvouloir** is now serving as the Midwest Regional Manager of Broadcast Sales for International Video Corporation. He is headquartered in Glenview, Ill. **William E. Beard** has been appointed by MICROTIME as Central Regional Manager for offices in Minneapolis, Minn.

After 40 years with Eastman Kodak, **William Phillips**, a Vice President and General Manager of the company's marketing division, is announcing plans to retire. **Anthony Frothingham**, an Assistant Vice President and Assistant General Manager of the marketing division, is succeeding **Phillips** as General Manager.

**CCA Electronics Corporation** announces the following appointments: **Bruce D. Buck** as Vice President International Sales and **Edward Lauman** as Field Manager, Saudi Arabia. **Elven Harvey, Jr.** is the new Vice President of Dyma Engineering and has been elected to the Board of Directors.

**Jarrell C. Lester** is a new member of the Regional Sales staff of Video Tape Division of Photo Film U.S.A., Inc. **Audiotronics Company**



AUGUST, 1976

# CABLE engineering





# Is Docket 20508 Really "Unsound"?

Staff members of the Cable Television Information Center termed "unsound" the provisions of the FCC's access and channel capacity decision (Docket 20508), which require a cable system to provide a composite access channel only where there is sufficient activated capacity and proof of demand, as well as the Commission's failure to require converters to meet access obligations.

In a **Petition for Reconsideration** filed June 21, Sheila Mahony, the center's Executive Director, and four other staff members said that these newly adopted rules represented "a fundamental reversal of long standing FCC policy of encouraging surplus channel capacity" as a means of fostering cable's growth. This decision by the FCC replaces the rules adopted in 1972 which would have required major market cable systems to provide four access channels and 20 channel capacity by 1977.

In their petition, the center staff members urged the Commission to adopt a policy which leaves the determination of delivered channel capacity to negotiations between cable operators and the franchising authority without Commission review. The staff also called for the requirement that large systems (over 3500 subscribers) provide at least one composite access channel, subject to a waiver based upon a demonstration of financial hardship by the operator. They also suggested that medium-sized systems (1000-3000 subscribers) with adequate capacity be required to make one composite access channel available with the modulation equipment necessary to permit transmission of the signal.

In urging the Commission to reconsider its decision, the staff members said that this reversal in Commission policy which limits cable's capacity "subverts the basic value of cable to the national communications system." The staff noted, "Without excess channel

capacity, the development of alternative uses and special services will never flourish, for the regulatory and economic constraints which apply to broadcasting will also become the dominant considerations in cable. Without capacity, access is impossible."

In its "zeal" to relieve the financial burdens of cable operators, the Commission has "ironically" shifted the burden "to those who were to be the beneficiaries of the Commission's access and capacity requirements," noted the staff members.

As for the Commission's decision not to require converters, the staff said that the Commission should

withdraw from negotiations between operator and municipality and leave this area to the influence of the marketplace. A municipality which "is permitted to negotiate with an operator for a package of broadband communication services" should not be "prohibited from requesting the installation of converters to ensure delivery of a service that it deems to be sufficient."

The Cable Television Information Center, a part of The Institute is a private, non-profit advisory group which assists local governments in the development of cable television in the public interest.

## Commission Hits Franchise Fees

The Commission has amended its cable television rules to indicate that, to the extent any franchise fee is above three percent of the franchisee's gross subscriber revenues per year, and a waiver request for a higher fee is denied, the excess fee will be considered void.

On August 13, 1975, the Commission proposed changing the wording of Section 76.31(b) of its rules so that applications for certificates of compliance containing franchise fees inconsistent with the rules might be processed with less unnecessary delay.

(Section 76.31(b) specifies that franchise fees imposed on cable television system operators should not exceed three to five percent of gross subscriber revenues per year from cable television operations in the community. If a franchise fee exceeds 3 percent, the cable system will not receive certification until the reasonableness of the fee is approved by the FCC.)

That proposal resulted from a Commission report and order in Docket 20272 in which the Commission addressed the problem of duplicative and excessive over-regulation of the cable television industry.

In that proceeding the Commission determined that "some of the most significant delays" in processing certificate of compliance applications occurred when franchise fees were submitted that do not conform with the rules.

The Commission then changed its processing procedure so that certificate applications no longer held pending removal of the inconsistent franchise provisions by the franchising authority.

Instead, certificates are now issued but the violative provisions are "considered null and void, but not preempted by federal action." The Commission said, however, that due to the wording of Section 76.31(b), it was not clear whether it could void inconsistent franchise fees. It initiated the rulemaking proceeding to change the language to allow for the application of processing procedures.

The Commission pointed out that the proposed change will either treat as "null and void" a franchise fee to the extent it violates the limit imposed by Section 76.31(b) of the rules in which a waiver is not obtained.

## ports Continue To Hold Center Stage On Cable

Federal Broadcasting Company has signed additional CATV systems to air its Sports-70 hour per week package. This brings the number of cable systems airing the FBC package to 40 and the number of subscribers to 100,000. The systems include Hawkeye Cablevision (Des Moines, Iowa); TV Systems Inc. (Honolulu, Hawaii); Cities Communications (Appleton-Beloit, Wisconsin); Warner Cable (Oshkosh, Wisconsin); C-K (Kenova, West Virginia); CableCom General (Oklahoma); First Illinois Cable TV (Springfield, Illinois); and Texarkana TV Cable Company (Texarkana, Texas).

In a meeting of earth station vendors, antenna receiver manufacturers and representatives of the cable television industry, a unified approach to the Federal Communications Commission for approval of small-diameter satellite earth stations was agreed upon.

The conference, attended by representatives of more than 20 firms with an interest in satellite communications, was initiated and hosted by Home Box Office, the national pay TV network, at its headquarters in New York.

Participants in the day-long meeting agreed to pursue a technical approach to FCC approval of the small earth stations. Present FCC policy requires receive stations to have a minimum diameter of 29.5 ft.

According to Home Box Office Engineering Director Robert Tenten, it appears that television reception—as opposed to other satellite transmission services—will tolerate higher adjacent channel interference levels.

This would make possible smaller, less costly receive-only antennas for television reception, requiring a change in the FCC's present policy on the spacing of satellites in orbit. The close separation policy originally led to the stipulation of a 9-meter-or-larger earth receive station.

Technical papers showing the acceptability of the small earth station were assigned to representatives of cable companies. Tenten said a follow-up meeting to review these papers is now being scheduled. He pointed out that while the FCC has permitted use of small earth stations for experimental and "special services" applications, the goal of the agency was to achieve FCC approval for normal, everyday operational use of the small stations in mass transmissions.

When the full technical package is completed, it will be made available for filing with the FCC by firms interested in installing a small-diameter earth station. In addition, HBO plans a filing on its behalf for installation of such a station to serve a location in Manhattan.

Continued on CE-4

## some inventions SAVE you TIME, WORK & MONEY

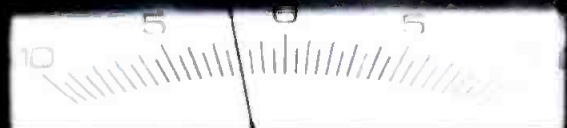


### THIS ONE DOES ALL THREE

Color sub-carrier burst phase requires close attention to prevent visible color faults (objectionable hue shifts) during a production or duping. Especially if you want to keep normal fleshtones when using special effects, supers and chroma key during color productions. Phase shifts greater than 5 degrees can distort normal fleshtones creating visible color faults. This can result from mis-adjusted video equipment or from various cable lengths and amplifiers which create delays and different burst angles according to their location in a color video system. Phase shifts could also result from normal aging of various components throughout the video system. You can check for phase shift the old way or the VACC way.



the old way



the VACC way

VACC's Burst Phase Meter (model BPM-1) is a \$437.50 replacement for most vectorscope applications. The unit requires only ac power, video and subcarrier inputs. An easy-to-read analog meter indicates phase shift in the video burst relative to the subcarrier over a full 180 degree range with 1/2 degree accuracy. (360 degrees phase range can be obtained with a coax delay line).

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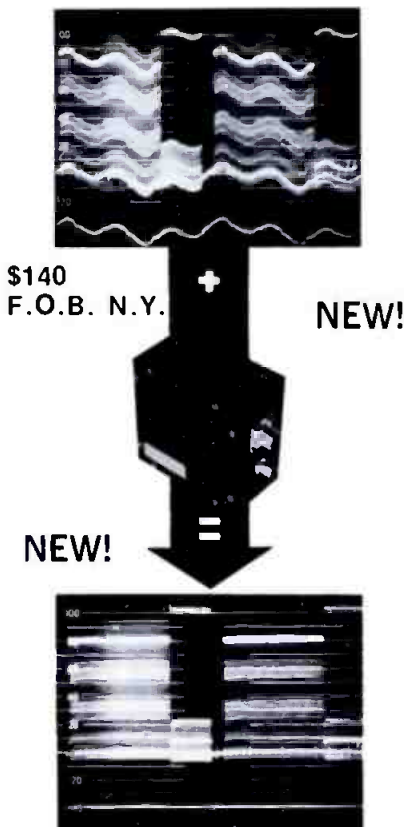
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CE-3

# FCC Approves NY Cable Law

The Commission has ruled that Section 817 of the New York Executive Law is consistent with FCC rules insofar as it permits the state's Commission on Cable Television (CCT) to allocate and collect its operating expense by assessing a fee of up to 2 percent of "gross annual receipts" among the various cable systems in the state.

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It also found that CCT has made the special showing required to justify cable operators in the state paying in excess of 3 percent of their total gross subscriber revenues when the state fee is combined with an applicable municipal fee.

However, it found that insofar as the state fee, when combined with a applicable grandfathered municipal fee, exceeds 5 percent total gross subscriber revenues of a cable system, Section 817 was not consistent with FCC rules.

The action was in response to a petition by CCT for Commission advice on whether its system of assessment of its operating expenses on New York cable systems was consistent with the FCC franchise fee limitations contained in Section 76.31(b) of the rules.

(That section states that a franchise fee shall be reasonable (in the range of 3-5 percent of the franchisee's gross subscriber revenues per year from cable television operations in the community, including all forms of consideration, such as initial lump sum payments).

If the fee exceeds 3 percent of revenues, the cable system will receive FCC certification on the reasonableness of the fee proved on showings by the franchisee that it will not interfere with the effectuation of federal policy goals, and by the franchisee's authority that it is appropriate in light of planned local regulatory goals.)

CCT noted that Article 28 of the New York Executive Law, enacted May 24, 1972, provides a comprehensive state regulatory program applicable to cable television systems and for the establishment of the CCT charges with the administration of the regulatory program.

It said Section 817 of Article 28 established a procedure by which CCT's costs and expenses, which are defrayed in the first instance out of the state treasury, are reimbursed by the cable television industry in proportion to a company's gross receipts, not to exceed 2 percent of a company's gross annual receipts for the 12 months designated by CCT.

For  
Better  
Results  
Use  
Reader  
Service  
Card  
In  
The  
Back  
Of  
This  
Issue

## Sports *Continued from CE-3*

It was noted by HBO Senior Vice President Heyworth, that the acceptance of a small station by the FCC, would bring the cost of installations within the reach of many small television firms which cannot afford the large stations now being installed at a total of \$70,000 to \$100,000.

The FCC has proposed comprehensive legislation prohibiting the dissemination of obscene or indecent material by radio communication and cable television.

The FCC said its action was necessary because of recent court decisions in the First Amendment and technological advances in the communications industry that out dated existing statutes. If approved by the Congress, the proposed legislation would amend the Communications Act of 1934 to make it a criminal offense for any person to disseminate obscene or indecent material by means of radio communication or cable television, and that it would be empowered to impose various administrative sanctions for such dissemination.

The term "obscene" is defined in keeping with recent decisions of the Supreme Court to be patently offensive representation or verbal exhibition of sexual intercourse, masturbation, or exhibition of a human genital or excretory organ which appeals to the prurient interest of the person applying contemporary community standards and which lacks serious literary, artistic, political or scientific value.



a newly-formed in-house advertising agency  
Electronics Corporation, will be headed by  
**R. Grindinger** as Director.

National Broadcasters Club announces the  
of their June elections: President—**Leonard**  
RCA; First Vice President and Treasurer—  
**Wesley**, Assn. of Maximum Service Telecasters;  
Vice President—**Wally Briscoe**, National  
TV Assn.; and Secretary—**Patty Grace**, NAB.  
Board members are: **Tuft**; **Grace**; **Sam**  
**Gray**, FCC; **Russell Eagan**, **Ellis and Rowe**;  
**Marquis**, Public Broadcasting Service;  
**Louise Lovett**, American TV and Communica-  
tions Board members confirmed for another year  
are **Wesley**; **Briscoe**; **Charles Macatee**, WMAL,  
Washington; **Warren Zwicky**, Storer Broadcasting  
Company; **Pygden Prestholdt**, A.D. Ring & Co.; and  
**Gray**, NAB.

The Federal Communications Commission an-  
nounces the appointments of four officials: **Jerold L.**  
**Rock**, Deputy Chief of the Cable Television  
Division; **Roscoe E. Long**, Chief of the Broadcast  
Policy and Rules Division; **Philip Permut**,  
Chief of the Common Carrier Bureau Policy and  
Regulation Division; and **J. Clay Smith**, Associate  
General Counsel.

**John Swanson** is now serving as Chief Engineer at  
KATV in Nashville...**Bob Galen** has joined KARN,  
Fayetteville, Ark., as morning host and Chief  
Engineer...**James B. Barnes**, Director of program-  
ing and Development at KETC-TV, St. Louis, is  
beginning another three year term on the Board of  
Directors of the Adult Education Council of Greater  
St. Louis.

**Pat Sieler** joined KEVN-TV/KIVV-TV, Rapid  
City, Dak., as Station Manager...**Marvin Young**,  
Chief Engineer, WSVL, Shelbyville, Ind., died June  
15 after a brief illness. **Young**, 53, had been with  
the station since it began broadcasting in 1961 and  
was the Chief Engineer in 1964.

**Pat Pappas** is now working as President of Big  
D Broadcasting, owner of KTRB Radio and  
KTRB-TV, Modesto, Cal....**Mike Pappas** has  
been named President of KMUV-TV, Sacramento.  
...**Harry Pappas** is the new President of Pappas  
Broadcasting Inc., owner of KMPH-TV, Tulare-  
County, Cal.

**Bob Santos** is operating as General Manager of  
KATV Radio and KBOS Radio, Tulare, Cal....  
**Joao Azevedo** now occupies the position of  
Sales Manager of KGEN Radio and KBOS  
Radio, Tulare, Cal.

Among radio station executives, **Jerry Fitch**, **Elliott**  
**and William F. O'Shaughnessy**, have been  
nominated to the Radio Information Office Com-  
mittee of the NAB.

Those interested in CATV will want to note that  
**John Harris** has been elected chairman of the Na-  
tional Cable Television Association.



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# From BLUE BANANAS to SAG TAILS

## Former Father Makes The News

Our mini crew of five manage to put on a five-minute TV newscast at 7:25 for the early morning San Diego viewer. Our announcer often suffers the "marble mouth" syndrome at that hour and all in one show spewed forth with:

"...and we'll have a live report from the fire by our fume crew."

"And from the state capitol, our Sacramento reporter talked to Governor Junior Brown." (He's Gov. Brown, Jr., of course.)

And concluded with another story regarding former Governor Brown, Sr. which came out "Governor Brown's former Father."

And that's the news at this hour.

**Mary Zoller**

**Video Engineer  
KCST TV**

**San Diego, California**

## How To Massage The Message

I have been enjoying your "Blue Bananas" in addition to the other excellent articles, and I thought this may be of interest.

KRBB-AM and KRBB-FM have a program every hour called "Community Events" which feature news about civic clubs, church revivals, etc. Recently, we received a letter asking that we announce a revival at one of the local churches with a closing statement informing us that MASSAGES would be brought to all by Rev. -----.

Luckily, we never read anything "cold" on the air.

I hope this brings a chuckle to all of your readers.

**Paul S. Demaree  
General Manager**

**KRBB  
Sallisaw, Oklahoma**

## Epat Drawkcab? You Knew It Could And It Did

In my last week of college radio, at WYBC, New Haven, I found myself alone in the studio for several hours running three independent programs: While our FM channel carried our regular, Sunday classical-music schedule, one of our carrier-current AM channels carried two remotes, back-to-back (one each from the chapel and the stadium), while our other carrier-current AM channel carried a review of all the listening assignments for History of Music 10, whose final exam was the next day.

Cueing up records and announcing for the FM programs simultaneously listening to the mote for commercial cues cueing those up on ET's) kept quite busy. But at least the history announcements were on the tapes, so I didn't have to worry about them, as long as I could see the Ampex turning.

Halfway through, though, I got a phone call: "I'm just a fresh mind you, but...isn't the tape backwards?". It was.

Another time, good training paid off in keeping a bright blue tape off the air. Had the static warned me to keep my eye on a few words ahead of my mouth, our rip-and-read newscasts, I had broadcast this little gem right on the UPI wire: "Said one witness the crash. 'It was terrible!'" There was this awful noise as everyone was running and screaming!"

**Ivan E. ...**

**Electronics & Photographic  
Popular Mechanics Magazine**



"The opinions expressed by the weatherman are his own and are not necessarily those of this station."



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# Zoom in!

1... "A Letter From Andy"  
 Typical of the many letters  
 received at the ASTVC office in NY  
 is one from a young hopeful we  
 identify only as "Andy". Andy  
 is inquiring as to how he may  
 "break" the market....get a foot in  
 the door....or more explicitly....get a  
 job on one of the major nets in New  
 York City, sometimes referred to as  
 "the Big Apple".  
 Andy assures us that although  
 he has failed in all areas of TV  
 broadcast operations, he will be  
 more than happy to start "any-  
 where at all" for almost any  
 price....All he wants now is a  
 "contract"....who does he have to  
 pay for help or advice we can give  
 him? He will be deeply appreciated....  
 Andy do you answer "Andy"?....  
 Andy you might start by telling him  
 that there is no set answer. You  
 might also tell him that the various  
 stations, representing the Tech Ops  
 at the three nets, do not do  
 anything. They may refer people  
 to proper management people  
 at the nets, but that's about  
 as far as it goes. From there on, it's up to the  
 individual to sell himself. Now-  
 days most people who "make it"  
 are VR's (vacation reliefs).  
 VR's are VR's for several summers  
 and finally becoming permanent,  
 then dropping out. At least, as far  
 as the particular net is concerned.  
 Does it help to know someone? It  
 doesn't hurt....Not only doesn't it  
 hurt but in too many cases it is the  
 sure way of "making it"....It is  
 common knowledge that it is al-  
 most embarrassing to find the high  
 school friends of relatives that are being  
 put onto the job.  
 It is the position of the  
 ASTVC on this?....Quite simply....  
 we see this kind of nepotism as ob-  
 jectionable and undesirable when it  
 involves individuals with little or no  
 experience over those much more  
 experienced and/or qualified.  
 It is because of some "relation-  
 ship". It is degrading to the  
 industry as a whole and, in the long

run, detrimental to that same em-  
 ployer. If....the relative happens to  
 have the same (or better) qualifica-  
 tions than the stranger....no prob-  
 lem....at least not now apparent.

What do YOU think? Send us  
 your views.

## Take 2...Do You Want To Be A Producer?

We are holding auditions. The  
 ASTV is thinking seriously of pro-  
 ducing its own "in-house" docu-  
 mentary. We will script, cast, shoot,  
 edit and then peddle it....Well,  
 maybe not peddle....but certainly  
 plug it and aim to make it available  
 for distribution.

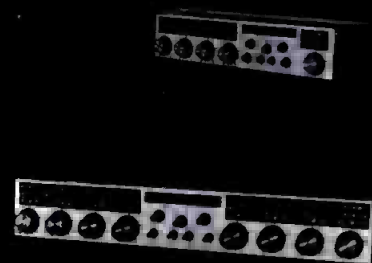
The idea was first presented at a  
 meeting at the West Point chapter  
 back in May. The thinking was:  
 We certainly have the talent in the  
 Society. The equipment can be  
 made available. So, why not?  
 Although there is no agreed-on  
 subject as of now, we had toyed  
 with the idea of something tied-in  
 with the Bi-Centennial. Inasmuch  
 as we have chapters or members  
 from Boston down to Washington,  
 and this entire region is rich in the  
 history of the founding of this  
 nation, we might exploit this po-  
 tential. But, as we said, we have not  
 made a decision yet. We now ask  
 our membership to get involved.  
 Send us your ideas as to what you  
 think would be a suitable or ap-  
 propriate theme for an ASTVC  
 package. AND....if you would like  
 to play a part in that production,  
 please so advise in your letter.  
 Direct all mail concerning the  
 above to: Mr. Tom Jocelyn,  
 ASTVC, Box 296, Sparkill, NY  
 10976.

## Take 3...John Cordone Retires

He is not retiring from the  
 industry....only from the Board of  
 Directors of the ASTVC. Johnny,  
 one of the ASTVC's EMMY win-  
 ners, has announced that he will  
 not seek reelection to the Board  
 this next election. Although John  
 did not spell it out, the fact that he  
 has recently moved "on" to be-  
 coming a TD at ABC may have  
 been a factor in his decision.

Slow fade to black...

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 select from mic thru high level. All  
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 venture!

#### Models & Prices

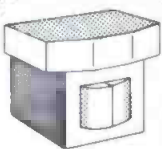
|                             |         |
|-----------------------------|---------|
| SC-5M Single Channel, mono  | \$ 780  |
| DC-5M Dual Channel, mono    | \$1,032 |
| DC-5MS Dual Channel, stereo | \$1,252 |
| DC-8M Dual Channel, mono    | \$1,390 |
| DC-8MS Dual Channel, stereo | \$1,880 |

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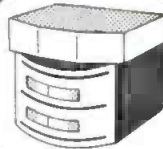
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## Commission Adopts EEO Guidelines

The FCC has adopted new equal employment opportunity guidelines designed to reaffirm the Commission's commitment to genuine equal employment opportunities, strengthen the elements of the equal employment opportunity program, and provide an opportunity for self-evaluation of the effectiveness of such programs by broadcast licensees.

This action was the result of a notice of quinquennial rulemaking released on July 25, 1975. Itasked for comments on certain changes in the equal employment opportunity guidelines including a model EEO program, new enforcement procedures, and raising the filing threshold for filing a written EEO program from five or more full-time employees to more than 15 full-time employees.

Under the new guidelines, the Commission has adopted, with minor modifications, the model EEO program proposed in the notice of inquiry. The model program, which is designed to serve as a sample program, contains ten elements including sections devoted to a licensee's recruitment techniques and sources, training efforts, the availability of women and minorities in the applicable workforce, and a job structure analysis to be submitted by licensees employing 50 or more full-time employees.

### New Filing Threshold

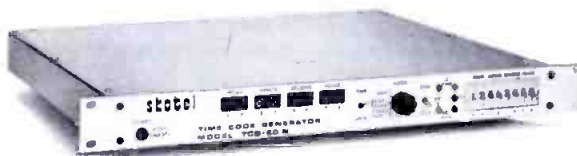
The Commission also amended its EEO rules to provide for a new filing threshold for those stations required to file written EEO programs from the present five or more full-time employees to more than ten full-time employees. The Commission noted that written EEO programs were of questionable value in the smaller broadcast stations at the time of the new threshold. 91,889 full-time employees representing 84.9 percent of the broadcast industry's total full-time workforce would still be covered by the new threshold. The Commission noted that while it requested comments on an exemption from the new threshold to 15 full-time employees, the more than ten threshold represented a more reasonable standard.

The Commission affirmed its use of the "zone of reasonableness" standard in contested cases and indicated that it was in the process of developing a new processing standard for noncontested cases which would be "more in line with the standard used in contested cases." The Commission also noted that it would continue to report on reporting requirements and conditional renewal where it appeared that a licensee's EEO program was passive or not achieving desired results.

In addition, the Commission indicated that it will require that a licensee set forth goals and timetables to "demonstrate the applicant's good faith intention to increase minority and female utilization."

## Who Has The Time?

Skotel time code readers and generators. High performance timekeeping for greater flexibility in programming and commercial production. Models feature full user data facilities, high visibility LED display, low power consumption and cool reliable operation. Skotel is



compatible with all other SMPTE code equipment and options plug in with no special tests or tools required. Our reader reads 80 bit SMPTE code from any source at speeds from hand turn to 40X. Self-contained character generator gives precise, single frame accuracy.

Like to see more? We've got the time.

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## Manufacturer Helps KRXX Back On The Air

On August 20, 1975, the Commission released a notice of proposed rulemaking in this matter and received comments from five persons, all supporting the proposal. Replies were received.

In the notice of proposed rulemaking the Commission pointed out that it had received applications for instruction permits for several FM translators from the same applicant proposing to serve two different communities from the same site on the same output channel. Noting that this was obviously an effort to achieve the same results which would be achieved with a multiple output amplifier but at twice the cost, the Commission said that in the absence of valid and compelling evidence, applicants should not be treated in this manner.

Setting up temporary quarters in a mobile home, KPXX, Rexburg, Idaho's only radio station, was able to resume broadcasting only four days after its transmitter shack had been destroyed by flood waters on the breached Teton Dam 15 miles away. Surprisingly, the station's antenna remained standing.

Responding to a request from Gov. Cecil D. Andrus, RCA helped KRXX get back on the air. Cooperation was needed to help Rexburg's 4,700 citizens locate family members and friends and to broadcast emergency rescue and evacuation messages in the area.

RCA notified their transmitter manufacturing plant in Meadowdale, Pa., near Pittsburgh, and a low watt AM transmitter was packed out and packed for air shipment.

The following day, June 12, a 200-pound transmitter was loaded on board a National Guard aircraft that had been dispatched to a forward base adjoining the Pittsburgh Airport.

Meanwhile, transmitter specialists from RCA Broadcast Systems, Camden, N.J., arrived in Rex-

burg and were flown by helicopter to the KRXX site. They found only a concrete floor slab where the transmitter shack had been, but the station's antenna tower remained standing.

The new transmitter was trucked to the site and the RCA engineers, with the help of National Guardsmen, went to work installing it in a large house trailer that was to be its temporary home.

## Discreet Quad Stereo Network

The world's first Discrete Quadraphonic Stereo Network Broadcast took place July 24 in California.

Billed as a "Complete Sound Experience," the program was aired throughout most of Central and Northern California. K-101, San Francisco, was the flagship station, and the show involved the combined efforts of EBRG, San Francisco, and KZAP and KSFM, Sacramento.

The show was produced from K-101's custom-built four channel studios. K-101 broadcast two of the four channels over its stereo signal on 101.3 mc and the remaining two channels over KBRG's signal on 105.3 mc. The show was rebroadcast over KZAP (98.5 mc) and KSFM (102.5 mc).

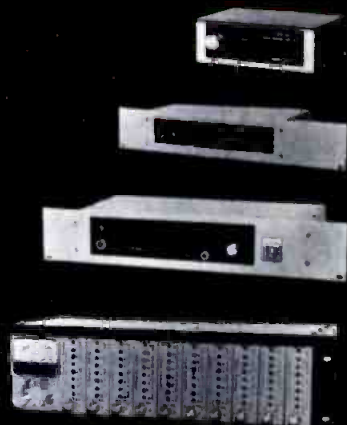
The program featured a variety of music and artists. It took two stereo receivers to listen to the experimental broadcast, so all four stations promoted to their combined listeners to have "Quadraphonic Parties"—invite a friend with another stereo system.

## Commission Amends Rules

The Commission has amended its rules to allow UHF television translator stations to use multiple output amplifiers. Only UHF translators with 100 watts or less power that are not operating on channels listed in the FCC's Television Table of Assignments will be eligible to use these amplifiers.

Under the former rules, use of multiple output amplifiers was limited to VHF translator stations.

## Audio Distribution...



...made easy!

**Six different audio DA's designed to solve all of your distribution problems.**

From our table top 1 in/6 out to our powerful 20 in/80 out. Stereo or mono operation, output metering, individual level controls and balanced inputs and outputs are just a few of the many features found in these superb DA's. Performance? Response — 10 Hz - 20 KHz  $\pm 0.5$  db; Dist. — 0.1%; Output level — +20 dbm max; Signal/Noise — -90 db; Channel separation — 80 db. Quality? All RAMKO products are backed by our 10 day free trial and 2 year warranty. They have to be good to do that.

Call collect or write today!

### Models & Prices

|                                    |                 |
|------------------------------------|-----------------|
| DA-6/E 1x6 (table top)             | \$ 145          |
| DA-6R/E 1x6 (rack)                 | \$ 165          |
| DA-6BR/E 1x6 (rack, indiv. cont.)  | \$ 179          |
| DA-6RS/E 2x12 (rack)               | \$ 239          |
| DA-16BR/E 2x16 (rack, meter, etc.) | \$ 295          |
| DA-2080 up to 20x80 (rack)         | \$325 - \$1,675 |

## RAMKO RESEARCH

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## Quality Control

Continued from page 44

### A Word About Standards

Since there are no sweep frequency and low distortion test tapes of the type described here available from test tape manufacturers, they must be made by the broadcaster. This is not a difficult task, and very good tapes can be made on any professional quality tape deck. Since the spectrum analyzer deals

in relative values, the exact levels are not critical, but, care must be taken to assure that the recorder used to generate the test tape is in perfect alignment.

Start out by adjusting your mastering deck for as perfect reproduction of a standard NAB alignment tape as possible. Most decks can be made flat within a dB from 50 to 15,000 Hz. Next, adjust the bias for lowest distortion reproduction of a 0 level input signal. With most decks, adjusting the bias for

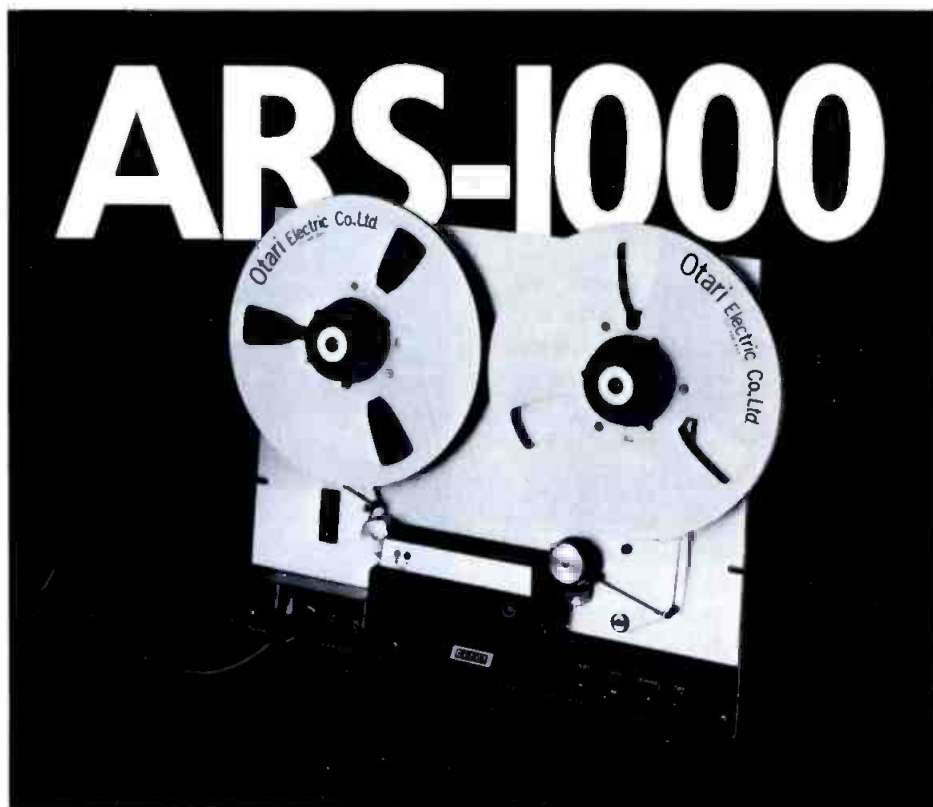
maximum output with a 1 kHz level input then adding an extra dB of bias results in lowest distortion. If the tape deck has a distortion adjustment, use marked linearity, the next step is to adjust it for minimum third harmonic, which is the type of distortion inherent in magnetic systems. Any second harmonic you see is most likely due to electronics.

After the bias has been set for record equalization and azimuth should be adjusted for the flattest possible record/play response. With most decks, it is possible to get alignment close enough to duplicate a standard NAB tape within 1 dB. Now the 90 second sweep tone and the tracking generator can be recorded with good accuracy. We found the Scully 280 that was used to make the prototype tape, most perfectly flat up to 17 kHz.

The distortion test tones can be recorded at full level. I usually take a little more drive at the low and high end to come up with exactly the same output level at low, mid and high, but once again the exact level is not really critical since on the screen we will be looking for the difference between the fundamental and its harmonics and not the absolute value of either.

If the results are to be recorded on a scope camera, such as the expensive Polaroid, can save a lot of time. The photos for this article were taken from the face of the Tektronix storage display in a SL4N series mainframe, which also accepts SL4N spectrum analyzer as a preamp. The photos can be filed as an ongoing record of the information system's audio performance, making it easy to spot slow deterioration before it begins to bother listeners.

As the trend toward satellite engineering staffs continues, many readers may ponder how a direct below one is possible, so also does the sophistication of automated radio formats, which often need more tape sources. What this amounts to is more work for fewer people. Less people with better methods can keep quality up even if years of routine service never detects a defect, would you like to bet the success of your station on it?



## Specifically designed for automated systems

Otari, Japan's leading producer of professional recorders, announces the ARS-1000 Automated Radio Station Reproducer. This new machine is based on the successful MX-5050 professional recorder, with several components modified to meet the special needs of the automated broadcaster for consistent quality and greater reliability under heavy duty continuous operating conditions.

Compare these features:  
2500 hours MTBF; 7 1/2 or 3 3/4 ips;  
front switchable speeds; preamp in

head assembly for minimum RFI and improved S/N; optional 25 Hz sensor; improved low frequency response for reliable 25 Hz sensing; +4dB 600 ohm output; improved flutter performance; plug-in boards with gold-plated contacts; nationwide parts and service from Otari MX-5050 service centers (mechanical parts are interchangeable); one year parts and labor warranty.

If you're considering automation, ask your automated system supplier for full details on the ARS-1000 or call Otari.

# OTARI

Otari Corporation  
981 Industrial Road  
San Carlos, California 94070  
(415) 593-1648 TWX 910-376-4890

For More Details Circle (43) on Reply Card



# NEW PRODUCTS

## Hand-held ENG Camera

A versatile, "take-it-anywhere" hand-held camera for professional video productions is now available from the Broadcast Equipment Division of Philips and Video Systems Corp. Known as the Philips LDK-11, the camera has many design features for a wide range of on-site television assignments, such as electronic news gathering, local station commercial productions, documentaries and special events.

For flexibility, the LDK-11 may be either battery or AC powered. The system design permits operation of the camera either as a fully contained portable unit, or as a disconnected, remote-controlled camera when integrated with additional cameras in a multi-unit studio or field pickup.

Compactly constructed, the LDK-11 camera head with lens weighs only 15 pounds. It contains a 2/3-inch Plumbicon pickup tube and integral bias light to minimize lag at low light levels. Excellent pickup quality is a result of beam splitting prism which provides high quality pictures compatible in colorimetry with studio cameras. For added operational efficiency, it is equipped with automatic white balance and auto-focus.

For More Details Circle (80) on Reply Card

## AM Modulation Monitor

The new AM broadband modulation monitor that measures up to 100% positive peak modulation of broadcast transmitters has been introduced by Time and Frequency Technology, Inc.

The Model 753, the new modulation monitor has an internal

*Continued on page 64*

*designed for television...*

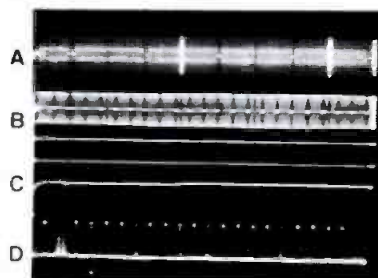


# Datatek video sweep generator

TYPE D-630 A

## Features:

- Self contained video sweep generator with internal or external sync and blanking.
- Wide sweep range, variable up to 10-0-20MHz or 20-0-10MHz. Excellent linearity.
- Variable sweep rates from 20 sec. to 1/60 sec. Fixed rates at power line and video field (locked) frequencies. Manual sweep.
- Sweep range set by separate start frequency and finish frequency controls. Sweep reversible.
- Built in frequency readout, switchable to show start, finish, variable marker and sweep output frequencies.
- Comprehensive marker facilities. Fixed markers at 1MHz and 5MHz intervals, color and aural subcarrier frequencies. Two continuously variable stop markers. External marker input.
- Symmetrical marker blanking in sweep output. Separate marker pulse output.
  - Internal or external sweep modulation, for applications including envelope delay measurement, detected amplitude displays, etc.
- Conveniently small unit, with signal connector facilities for either front or rear access.



- A. Modulated sweep, non-comp., 20-0-20MHz, marker blanking 5MHz intervals, variable stop markers at 7.5 and 17.5MHz.  
 B. Composite video sweep, 20-0-20MHz, marker blanking at 1MHz intervals.  
 C. Detected non-comp. sweep, variable stop markers at 7.5 and 17.5MHz.  
 D. Marker pulses output, 1MHz intervals (5MHz intervals evident).

## Other Advanced Datatek Products:

- Transmitter Phase Equalizers and Waveform Correctors
- Differential Phase & Gain Measuring Sets
- Envelope Delay Measuring Sets
- Video Waveform Equalizers
- Video-Audio Routing Switchers
- Video, Audio & Pulse D.A.s

**DATATEK**  
CORP.

1166 W. CHESTNUT STREET, UNION, N.J. 07083  
(201) 964-3656

## New Products

Continued from page 63

noise level of better than -75dB, distortion of 0.15% at 99% modulation and audio frequency response of  $\pm 2\%$ . Built-in meter attenuator is provided for proof-of-performance measurements. Linear phase filter design is used to achieve zero overshoot for square wave modulated RF carrier. The Model 753 is FCC type approved for AM broadcast monitoring.

By adding the Model 754 RF Preselector, broadcast stations, consultants, and regulatory agencies can tune in any one of the AM broadcast stations and precisely monitor its modulation and frequency off-the-air. A low cost tunable frequency-synthesized RF preselector is also available for off-the-air modulation monitoring.

Optional carrier power level alarm, absence-of-modulation alarm, off-frequency alarm and over modulation alarm are avail-

able. By adding external detecting circuitry, it is fully able for Automatic Broadcast Transmission System (ATS) applications.

For More Details Circle (81) on Reply Card

### Transmitter Conversion Kit

Wilkinson Electronics announces a kit to convert the RCA BT1, BT5H, BTA10G and BT11 AM Broadcast Transmitters. Thyratron high voltage power supplies to solid state power supplies.

These kits are adaptable to configurations, including cutback, remote power change or motor power change.

For More Details Circle (82) on Reply Card

### Audio Attenuators

A new line of audio attenuators is available from Modular Products, Inc., a unit of Modular Devices, Inc. of Bohemia, New York.

The new models, 8160-Mono (2-gang), 8260-Stereo (2-gang) and 8460-Quad (4-gang); utilize a precision conductive plastic resistance element in a 600 ohm constant impedance ladder network configuration in conjunction with mirror-finish precious metal wiping contacts. The mirror-finish elements are rated in the millions of cycles of operation.

Resolution is infinite, and operating accuracy is within  $\pm 0.1\%$ . Maximum attenuation is greater than 95 dB, with interchannel isolation in multi-gang units greater than 80 dB.

All three models are housed in the same standard size case featuring a black anodized aluminum faceplate with a permanent epoxy scale, calibrated in dB of attenuation. A slide type indicator knob is provided. Dimensions: 1 1/2" wide x 7" high x 3 1/2" deep. External connections are made via a P.C. connector furnished with each unit.

Available as an option, internal SPDT microswitch provides both normally open and normally closed contacts, and operates at the bottom of the travel (infinity position) for to cast CUE, channel ON/OFF or other desired functions.

For More Details Circle (83) on Reply Card

## You Have a Right To Expect More from Scully's Family of Recorders.



And look what you get with Scully's 280B/284B series. One to four tracks. Plus these important features:

- Optional DC capstan servo
- Motion direction sensing logic
- Innovative low-noise electronics
- Functionally illuminated controls
- Optional 14" reel capability
- Reproduce-only version (285B)
- Variable speed accessory with L.E.D. speed read-out

For multi-channel application, Scully has the 284B-8, one inch 8-track master recorder with DC servo and 14" reels. You'll solve a lot of recording problems at once with the versatile Scully family.

Sales, service and replacement parts are available from over 200 worldwide distributors.

Get the facts. Write, Telex or phone:

### ► Scully | Metrotech

Division of Dictaphone

475 Ellis Street  
Mountain View, California 94043  
(415) 968-8389 TLX 34-5524

Scully and Metrotech are trademarks of Dictaphone Corporation, Rye, New York.

For More Details Circle (45) on Reply Card



## Oscilloscope Measurements Instruction Book

A comprehensive book in instructional format entitled "Zeroing in on Ones and Zeros" was announced by Philips Test & Measuring Instruments, Inc., a North American subsidiary of Philips Company.

Written for Philips technical personnel around the world, the book provides theory and operational information on oscilloscope and digital measurements. The book is divided into six parts:

- 1 Basic Oscilloscope Principles.
  - 2 Additional Functions, Principles and Operating Information.
  - 3 Measurement Considerations and Definitions.
  - 4 Oscilloscope Probes.
  - 5 Digital Features and Versions.
  - 6 Measurement Examples in Analog and Computer Applications.
- Starting with a basic oscilloscope and operation discussion, the book progresses through multi-triggering, differential modes and delayed timebase operation. Measurements in pulse applications are discussed, including rise time and width and risetime considerations.

Oscilloscope probes with active and passive devices included are discussed with their relationship to use in pulse measurements. Various digital features, such as digitally delayed sweep, word-squeezers, TTL triggering and more are also described. Measurement examples in digital and computer applications are also included.

For More Details Circle (84) on Reply Card

## CW Klystron Amplifiers

Varian introduces two five-cavity, water-cooled klystrons for use as amplifier tubes in both visual and aural sections of UHF-TV transmitters.

The VA-953H and VA-954H provide a gain of at least 47 dB, 55 W peak-of-sync output with an 0.7 W of rf drive, up to 42 percent efficiency at peak-of-sync and one dB is at least 7 dB over the tuning range.

For information, write: Varian, Microwave Tube Division, 3400 Hansen Way, Palo Alto, CA

For More Details Circle (85) on Reply Card

# Now is the time to buy Harris' Circularly Polarized Television Antenna.

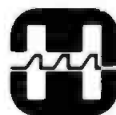
The new Harris CBR (cavity backed radiator) CP antenna is developed, pattern tested for CP and horizontal radiation, and ready to go.

You can install it today and radiate a horizontal pattern. Then, when approval comes from the FCC, you're ready for circular polarization, with minor field modifications.

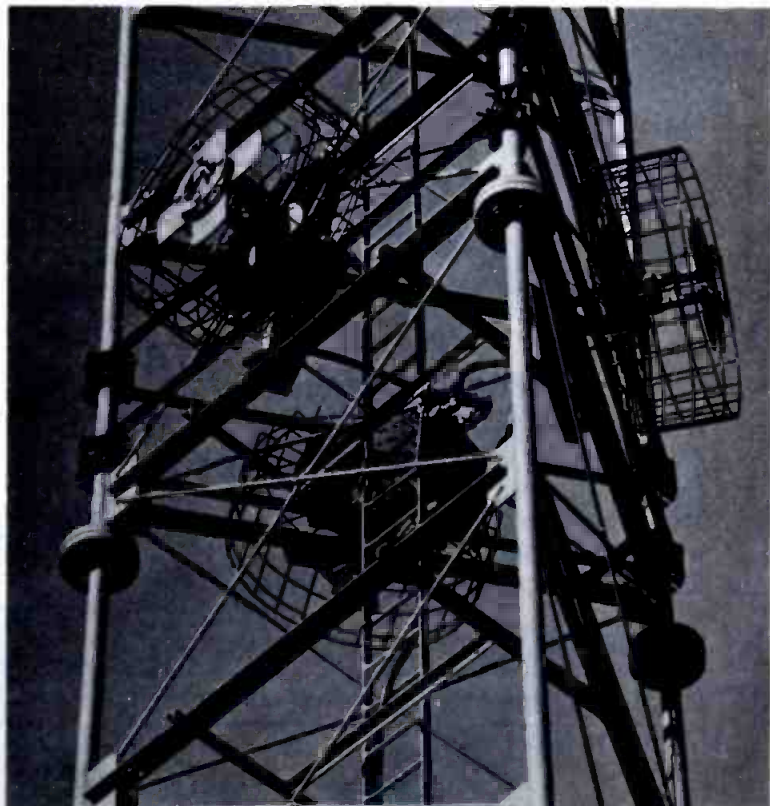
The Harris CP antenna offers the very finest in signal transmission, with significant reduction of ghosting effects in problem areas. In addition, signal-to-noise ratios in fringe

areas are improved. And the extremely wide bandwidth inherent in the Harris design permits multiplexing of any two or more stations in the VHF high band channels.

For complete information about the Harris circularly polarized TV antenna that's "slightly ahead of its time", write Harris Corporation, Broadcast Products Division, Quincy, Illinois 62301.



**HARRIS**  
COMMUNICATIONS AND  
INFORMATION HANDLING



For More Details Circle (46) on Reply Card



## New Products

Continued from page 65

### Time Calculator

ESE has introduced its latest digital timing product. A four digit, 60 minute time calculator/timer which adds or subtracts minutes and seconds, and at the flip of a switch, can count and display elapsed time.

The timing and calculating modes may be mixed so that an

operator may time an interval in the timing mode, flip the switch and add or subtract a time value, then switch back to timing an additional interval.

Since the display does not change, the ES 230 can be used as a presettable timer by entering a time while in the calculator mode and then switching to timer mode.

The ES 230 has been used by broadcasters to calculate time segments for programming, as well as by time study personnel.

The unit measures 3½" high, 8½" deep x 6½" wide and weighs 2½ lbs. and operates from 117-120 V, 60 Hz.

For More Details Circle (86) on Reply Card

### Stereo Generator

QEI Corporation, Kresson, New Jersey 08053, has announced the availability of its new Stereo Generator Model 772. The Model 772 meets or exceeds FCC requirements for stereo MPX transmission.

The stereo signal is generated through the use of a time division technology to reduce the complexity of the circuit and to minimize the number of adjustment points. The technique passes both left and right signals through identical circuits to ensure close phase and amplitude tracking, resulting in minimum cross talk.

A precision phase linear low-pass filter is used to attenuate unwanted harmonics of the 38 KHz switching wave.

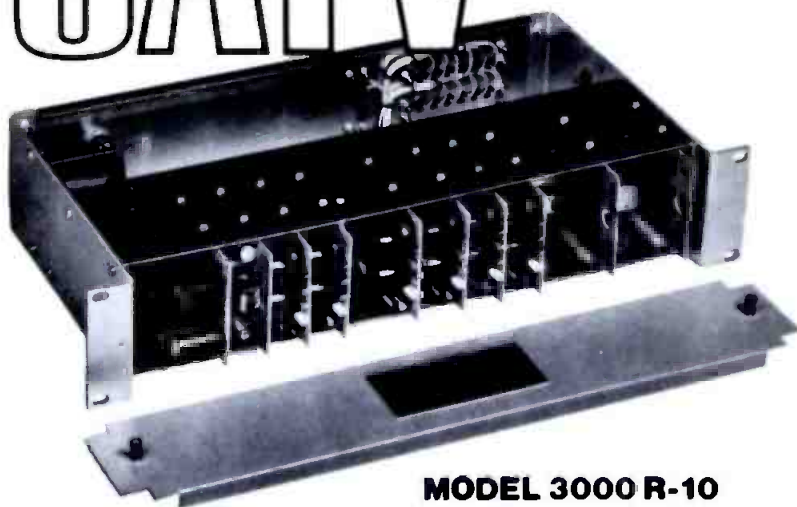
The output is high level (4 V) low impedance. A low impedance output of less than 300 ohms is used to preclude high-frequency attenuation of the composite signal by the coaxial output cable.

The frequency response is flat within 0.5 dB from 30 Hz to 15 KHz and offers stereo separation greater than 40 dB across the band. Total distortion left or right is better than 0.25% THD or 0.002 dB. The unit has built-in track pre-emphasis. Crosstalk from main to subchannel and subchannel to main channel across the operating band, 30 Hz to 15 KHz, is at least 46 dB and the suppression of the 38 KHz switching signal better than 55 dB with total noise output of -70 dB.

The Model 772 has special phase equalized 15 KHz low-pass input filters available with minimum phase relationships. This is done to ensure minimum crosstalk and low transient distortion at all frequencies.

The QEI Model 772 is made in a standard 19" rack mount, requiring only 3½" of rack space and is self-contained with its own power supply. The generator circuit is mounted on three circuit boards: stereo generator assembly; a filter and power supply assembly.

## CATV REMOTE CONTROL RECEIVER - SWITCHER



**MODEL 3000 R-10**

### DOES YOUR COMPUTER KNOW WHEN A BALL GAME IS GOING INTO OVERTIME?

If not, you need a system as shown above to permit your engineer to take control from his home or office. Switch programs from a dial-up telephone line and/or microwave or radio link.

Write for complete data:



**MONROE ELECTRONICS, INC.**

100 HOUSEL AVENUE, LYNDONVILLE, NEW YORK 14098

Area Code 716 765-2254

For More Details Circle (47) on Reply Card

regulator assembly. Terminals are provided to allow remote stereo switching.

power input is 115/230 V single phase, 50/60 Hz. All controls are located on the panel with input and output connections on the rear apron.

For More Details Circle (87) on Reply Card

## Power Drop-Off Alarm

**WATCHER® RF Power Drop/Alarm** series 3162, by Bird Electronic Corporation is designed to warn of power drop-off below a level to conform with FCC part 15 requirements. The unit is used for instance, at a Mobile terminal site to measure forward power, reflected power (with a dummy-load front-panel connection), and to obtain VSWR and SWR system data during routine maintenance. It is then left in place to feed back a signal in response to the transmitter being used indicating whether it is on and with sufficient power.

Versions under consideration will automatically switch over to back-up transmitter in case of malfunction or send tone-enclosed RF level information over cable pair.

Series 3162 is available for operation at all Telco communications frequencies and power levels (e.g. 2-512 MHz and 1-500 watts), and for 12 DC or 117 volt AC supply.

For More Details Circle (88) on Reply Card

## Audio-Video Routing Switcher

**Image Video Limited** of Toronto, Canada announces the introduction of a new line of audio/video routing switchers. These switchers feature ultra conservative design and extremely low crosstalk. This product has been well received in Canada by Television Broadcasters and particularly by the Canadian Broadcasting Corporation.

Image Video Switchers are marketed exclusively by Glentronix Limited, 160 Duncan Mill Road, Don Mills, Ontario, M3B 1Z5.

For More Details Circle (89) on Reply Card



# U's Sportscasters

Official  
Headset  
of the 1976  
Olympic Games

## Eliminate Off-Mike Problems With The Sportscaster Headset

Sportscaster headset with integral dynamic mike from Television Equipment Associates gives you complete freedom of movement and simultaneous monitoring of two sources.

### The headset has a

Dynamic boom microphone: 400 ohms, frequency range 50-15,000 Hz. Sensitivity 2mV (loaded) for close speech.

Double headphones: independently wired, 200 ohms each 50-15,000 Hz. Single 'phone version available.

Ventilated foam cushions eliminate perspiration and let you hear ambient sound and are interchangeable with ear-enveloping cushions.

Weight: 8 ounces. Practically unbreakable components. Optional cough switch.

**Television Equipment Associates, Inc.**

Box 260 • South Salem, N.Y. 10590  
(914) 763-8893

For More Details Circle (71) on Reply Card

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For More Details Circle (48) on Reply Card



## New Products

Continued from page 67

### Videotape Editing System

A new videotape editing system capable of performing more artistic special effects and storing edit decisions has been introduced by Ampex Corporation.

The Ampex EDM-1 editing system features a computer-controlled switcher with special effects and a floppy disc memory which can store

as many as 3200 edited scenes. It can interface with up to eight on-line or off-line video, audio, or disc recorders.

The EDM-1 was demonstrated for the first time at the National Association of Broadcasters convention in Chicago March 21-24.

Unlike present computer editing systems which store and recall scenes by digital time code address, the EDM-1 has an exclusive computer filing system that permits individual scenes to be identified by

both time code and real language.

This feature permits the operator to call up a particular scene by a real language tag without having to cross reference the scene designation with a set of numbers.

With the optional file management system, the EDM-1 can save time by reducing the amount of tape shuttling required when scenes are recorded in random order on master tapes.

The EDM-1 remembers the location of each scene is recorded on a master tape and calculates the most efficient way to assemble them. The least amount of shuttling required to transfer a scene is then transferred to the precise location required for sequential assembly.

The basic EDM-1 consists of a control unit with video and audio monitoring, an audio and video switcher with special effects, a display monitor, a convenient function calculator, a typewriter-style keyboard, special job-order selector keys, and a computer processing unit.

For More Details Circle (90) on Reply Card

### Automatic Telecine

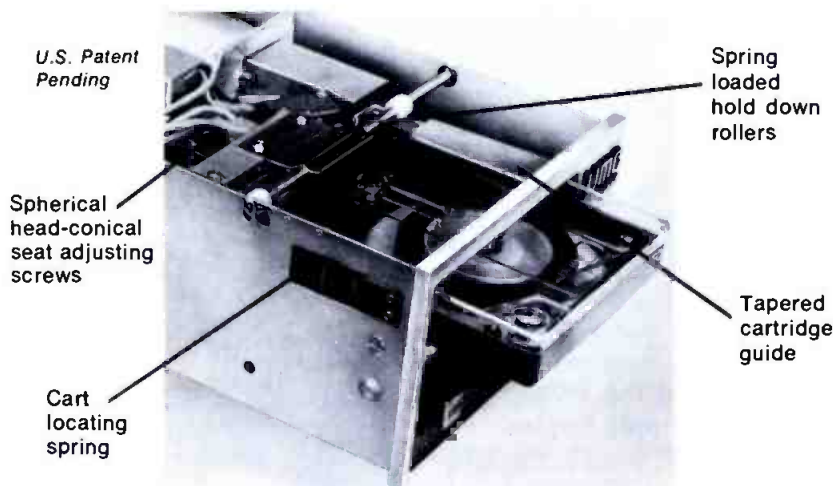
Cohu's CAT is a complete all-in-one-to-use-telecast telecine film machine with full NTSC color output. It can handle 35mm slides, Super 8 motion picture film plus has provisions for Super 8 film. The system features a color encoder/decoder, enhancer/auto balance, interlaced paint which provides the user with the capability to manually adjust levels of red, green, and blue color. Cohu's color comp which enables the user to individually adjust the hue and saturation of reds, yellows, greens, cyans, blues, and magentas in the picture.

For More Details Circle (91) on Reply Card

### FM Educational Antennas

In the FM educational equipment line, Phelps Dodge offers six models. Because of the normally low powers required in educational service, the new antennas are fabricated of 7/8 inch stainless steel tubing. The circularly polarized antenna is a 1 1/2 turn helix antenna.

# What's so special about Beaucart stereo machines?



## Everything.

Don't let anybody tell you that all stereo broadcast cart machines are the same. It just isn't so. Because we've built into our Beaucart stereo units proprietary cartridge locating features which enhance stereo phasing from cartridge to cartridge under long term, continuous service conditions.

Take a look at the photo. No other machine incorporates these features. Our spring-loaded rollers ensure repeatable location of each cart's left corner post. The tapered cartridge guide allows each cart to squarely contact the roller and feed smoothly into the machine. Our locating spring positions the cart against the right-hand guide every time, and our unique ad-

justing screws for which patents have been applied provide uniform, positive contact immune to movement from external forces.

Little things? Sure! There are a hundred little things that make full-featured Beaucart the stereo machine for you.

Let us tell you more. Write or call today for further details and pricing. You'll be glad you did!

# UMC

BEAUCART DIVISION  
UMC ELECTRONICS CO.

460 Sackett Point Rd. North Haven, CT 06473 (203) 288-7731

For More Details Circle (49) on Reply Card



horizontal element has a configuration. These antennas complete with matching harness type cables and are designed to mount on tower legs or support 1 1/4 inch to 2 3/4 inch diameter. The multi-element arrays are designed for an element spacing of 10 feet.

models, designated Catalog CFM-1, -2, -3, -4, -5 and -6 are available. Power rating in watts varies from 0.2 to 0.5. Gain ratings range from 0.43 to 2; field gain from 0.65 to 2 and, gain in dB from -3.66 to 23.5 at one mile, 1 kw, MV/M.

Incorporating the general design features of other Phelps Dodge Communications circularly polarized antennas, the new FM educational series is less susceptible to phase and assure phase coincidence in the centers of both vertical and horizontal components.

to be displayed will be two 1000 watt per bay circularly horizontally polarized FM antennas designed to fill

the void which currently exists between an educational series rated at 200 watts per bay and the standard antenna series rated at 5,000 watts per bay. Designated Catalog Nos. CP-1000 and HP-1000 the two new antennas are parallel fed so that a 2-bay antenna is rated at 2 kw, 3 bay at 3 kw, etc.

For More Details Circle (92) on Reply Card

### Video Delay Series Television Equipment Associates

is introducing a new video delay package from Matthey Printed Products which will accommodate any delay from 10 to 2,120 ns.

The product consists of a 5 1/4" Vero card frame which accepts eight cards and is supplied with BNC connectors in and out. A  $\pm 4$  ns. vernier is supplied on the front panel of each card.

Matthey equalized video delay PC modules can be fitted to the

Continued on page 70

## When accuracy Counts...Count on Belar for AM/FM/TV MONITORS



**BELAR** CALL ARNO MEYER (215) 687-5550  
**ELECTRONICS LABORATORY, INC.**  
LANCASTER AVENUE AT DORSET, DEVON, PA. 19333 • BOX 826 • (215) 687-5550

For More Details Circle (62) on Reply Card



# Jamieson No. 1 in TV!

Why is the Jamieson Processor No. 1 in TV?

The best answer is from someone who owns one.

Someone you know owns a Jamieson. Probably a lot of people you know. Why not ask them about it? The best way to get an unbiased appraisal of its performance.

Or ask us ... we'll be more than happy to tell you about the Jamieson Processors and give you references.

### JAMIESON'S ADVANCED DESIGN TECHNOLOGY FEATURES

- In advance virtually tension-free. The demand top-overdrive transport uses no clutches, floating rollers or film sprockets.
- Smaller machines take only half the floor space.
- Solution volumes reduced 15 times over open-tank designs.
- Temperature in primary solutions is controlled to an accuracy of a few hundredths of a degree.
- The elliptical shape of the tube protects the film and provides high induced turbulence.

**JAMIESON FILM COMPANY**  
a division of Kreonite, Inc.  
FOREST PARK ROAD • DALLAS, TEXAS 75235  
TELE 214-350-1283 • TELEX 73-0932

Please send information on Jamieson Processors and a list of some users.

Name \_\_\_\_\_ Title \_\_\_\_\_  
Firm \_\_\_\_\_ Phone \_\_\_\_\_  
Address \_\_\_\_\_ City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_ JAMIESON FILM COMPANY  
BE-8 6911 Forest Park Rd. Dallas, TX 75235

For More Details Circle (50) on Reply Card

www.americanradiohistory.com

Continued from page 69

card to accommodate any video delay from 10 to 2,120 ns. equalized to 5.5 MHz and padded to 3 dB.

For reasonably permanent installations, the cards are delivered with the final 150 ns. of delay unconnected for completion by the installer. For installations where reasonably frequent delay changes are anticipated, the card panels can be supplied with six switches and the  $\pm 4$  ns. vernier which would provide infinitely variable delay of 310 ns. in seven ranges from 10 to

2,120 ns. Cards for mounting pulse and blanking delays are also available.

The principal feature of the Matthey 5.25 series is the convenience of changing timing requirements by the addition and subtraction of Matthey delay modules on the cards.

For More Details Circle (93) on Reply Card

### Battery Sequences

Frezzolini Electronics Inc. introduces the Frezzolini Battery Sequencer with built-in charger for

use with their HL-33/35 1k Battery Packs for Electronic Gathering (ENG) portable cameras.

The Frezzolini Battery Sequencer automatically charges five or less the battery packs at one time. To use simply plug in one, two, four or five HL-33/35 Battery Packs, regardless of their state of charge, push the "Power" switch to "On" and leave alone.

The Frezzolini Battery Sequencer will bring each Battery Pack to its full-charge rate in ten hours or less, as necessary. When fully charged, each Battery Pack automatically goes to a trickle-charge rate. A lamp, when lighted, indicates "Ready". At this indication, disconnect one, or more of the Battery Packs, and use them.

The Frezzolini Battery Sequencer was field-tested, before going into production, by a TV network test Department. The Sequencer is designed for either mobile or station operation.

The company also manufactures individual FREZZI HL-1/3 Ikegami Battery Packs, individual FREZZI Chargers for the Battery Packs, other FREZZI SEQUENCER/CHARGERS, and Control Systems, plus other electronic products for O.E.M. applications. Call or write the Sales Manager for more information.

For More Details Circle (94) on Reply Card

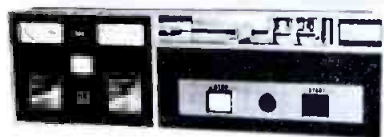
### Folding Cart

Gruber Products, manufacturer of the WHEELIT line of mobile carts, has developed a new folding cart for the broadcast and ENG markets. The Model ENG-1 is designed for transportation and use on portable television equipment. It is designed that it will accept any all portable VTR equipment, power supplies as well as any various back packs of some broadcast type cameras such as Ikegami HL-33 or HL-35, Fasco KCN-40, Philips LDK-11 or 390, etc.

With the addition of a Quip Model 7900 elevator column and choice of various heads, it becomes a mobile operating unit. The top of the cart becomes the base of the tripod.

For More Details Circle (95) on Reply Card

# it bench mark cartridge machines



## Measure all others against us

Other cartridge machines are copies of ITC's, but won't perform like ITC's. The differences are inside. Design innovations, master workmanship and superb customer services are ITC marks of leadership in quality cartridge equipment. We'll prove it with our famous 30-day guarantee of satisfaction. Write. Or phone us collect: 309-828-1381.



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Form 112-0006

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For More Details Circle (51) on Reply Card



# NEW FM AND TV FIELD STRENGTH METER FIM-71

- Accurate — Direct Reading — Volts or dB ■ 45 MHz to 225 MHz — Continuous Tuning ■ Peak or Averaging Detector (switch selectable) ■ Wide or Narrow IF Bandwidth (switch selectable) ■ 20 dB or 60 dB Meter Range (switch selectable) ■ AM or FM Demodulator (switch selectable) ■ Calibrated Dipole Antenna, Mounted on Case for Near-Ground Measurements or Removable for TASO Measurements ■ 140 dB Measurement Range (1  $\mu$ V to 10 V) ■ 4½-Inch, Mirrored Scale, Taut-Band Meter
- Front Panel Speaker
- Recorder Output
- Rugged, Portable Package ■ Calibrated Signal Generator, 45 MHz to 225 MHz
- Battery or External Power ■ Use as Signal Source/Selective Voltmeter for Insertion Loss Measurements of Filters, etc. ■ Measures FM Harmonics to -80 dB
- Price — \$2,500 complete with dipole antenna.



CONTACT US FOR DETAILS.

## Frequency Counter

Systron-Donner's new Model 6054B Counter provides coverage from 0.02 to 24 GHz in one band with one connector input. Eleven digits give displayed readings. Innovations of this new counter include (1) automatic microwave measurements to 24 GHz, (2) sensitivity of -20 dBm in the 18-24 GHz range, (3) ability to accept signals with high FM, (4) tracking of rapidly changing frequencies and (5) built-in warning and protection against high power inputs.

Optional features include remote programmability, data interchange per IEEE STD 488-1975, choice of three higher stability oscillators, rear input connectors, and IF offsets.

The counter also incorporates the new FLACTO (frequency locked automatic computing transfer oscillator) measuring technique. The 6054B is 3.5 inches high by 16.75 inches wide (8.9 x 42.5 cm); weight is 30 lbs. (13.6 kg.).

For More Details Circle (125) on Reply Card

Continued on page 72

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For More Details Circle (52) on Reply Card

## Cartridge Tape Reproducer

The large Type 20 audio cartridge tape reproducer recently introduced by the Beaucart Division of IMC Electronics Co. has been designed to accept all NAB standard A, B, and C-size cartridges. Type 20 machines, with their larger high x 10-1/8" wide x 13-1/8" dimensions, are available in mono and stereo versions and are commonly stacked one above the other in multiple configurations for rack or custom studio panel mounting.

Each cart reproducer is furnished with a primary (1 kHz) cue, with secondary (150 Hz) and tertiary (8 kHz) cue capabilities optionally available. Reproducer cue tone detectors utilize reliable L-C networks to provide relay contact output information. Front panel buttons indicate the presence of secondary and tertiary cue tones. Units are fully operative when partially or completely removed from their slide-out cases to facilitate maintenance and/or repair.

For More Details Circle (96) on Reply Card

# Just A Friendly Reminder



In case it happened to slip your mind and you are one of the few remaining directional stations yet to comply with paragraph 73.69 of the FCC Rules... you have until June 1, 1977 to have in operation a "Type Approved" antenna monitor.

## WE CAN HELP YOU

We have supplied over 90% of all "Type Approved" antenna monitors (both meter and digital readout) now in service.

We invite your questions concerning installation, operation, remote control, sampling systems, etc.

## YOU CAN HELP US

When the last deadline rolled around our order backlog resulted in an eight month delivery cycle. If you order now, you can avoid the last minute rush; we can deliver as required; and you will not risk missing the June deadline.

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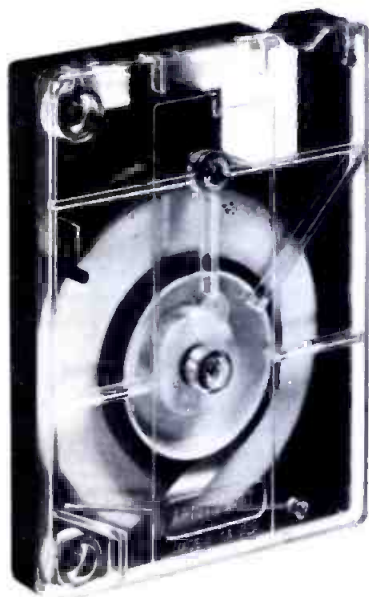
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For More Details Circle (55) on Reply Card

## New Products

Continued from page 71

### FM Exciter Model

QEI Corporation is now marketing their own FM Exciter Model 675 for use in the standard FM broadcast band. This state-of-the-art, all solid-state unit, equipped with silicon transistors, diodes and ICs, is unique in that it is the first totally synthesized FM exciter on the market. With a highly stable 8 MHz crystal as the reference, its divider circuits can produce any output frequency in hundred kHz increments in the FM band. Using a phase lock loop circuit, the frequency-modulated oscillator exhibits the same frequency stability as the 8 MHz crystal, supplying full MPX with no spurious responses.

An AFC locked lamp indicates when the FMO is locked to the reference xtal oscillator. If the FMO is not locked, sensing circuitry cuts off the locked lamp and it no longer indicates an in operation condition. The RF output of the exciter is also shut down.

The Model 675 operates with either mono or stereo input signals and can be pre-emphasized to a 75 usec or optional 50 usec time constant. The unit has an adjustable power output of 5 to over 20 watts and is virtually VSWR proof to ensure total protection for the output stages. The power amp can withstand any magnitude or phase of VSWR. The Model 675 can accept a 600-ohm balanced mono line. And by means of a front panel screwdriver adjustment, the Exciter can be tuned over a range of

approximately plus-minus 500

The Exciter circuitry is mounted on three circuit boards: an and phase lock assembly; an and PA assembly; and a supply regulator assembly. Z and SCRs are part of the supply voltage regulation system, maintaining DC output voltage at a high level of stability. The supplies are also overload protected.

With IM distortion typically less than 0.25%, FM noise better than -70 dB, and AM noise -55 dB, the Exciter gives a stereo separation better than 40 dB from 30 Hz to 15 kHz when used with the Model 772 Stereo Generator. It has an output impedance of 50 ohms.

The Exciter fits a standard 19" rack mount. With an optional meter panel the Model 675 can be used as a complete power transmitter. It operates on either the 105-125V or 210-240V, 60 Hz, single phase power line. Either line voltage input is possible by a simple jumper change.

For More Details Circle (97) on Reply Card

### Open Reel Recorder/Reproducer

International Tapetronics introduces a new open reel Recorder/Reproducer, the 750 series. The machine uses plug-in assemblies (heads, relays, circuit cards and more). The machine is constructed from several individual operating units.

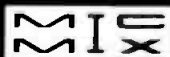
The list of features on the 750 Series includes: audio monitoring during either recording or playback; fixed tape guides for alignment; Play/Record Synchronization (PRS); "safe" mode

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BROADCAST ENGINE

accidental erasure of audio; status indicators for record and controls.

For More Details Circle (98) on Reply Card

### Broadcast Cart Machines

versions of the new UMC broadcast cartridge tape are available for rack desk-top mounting. For cartridges, the Type 10 with its 5 1/4" width may be in three-in-a-row rack configurations. Below, the Type 20 is clearly stacked one above the other in record/playback combination for processing A, B, and C cartridges.

For More Details Circle (99) on Reply Card

### Eraser/Splice Locator

National Tapetronics' ESL-100 Eraser/Splice Locator is a new innovation combining both erasing and locating the splice into one step. The completely automatic operation locates the splice and then automatically releases the

cartridge fully erased.

The direct-capstan motor provides acceleration to about four times normal playing speed, without undue stress on the tapes.

For More Details Circle (100) on Reply Card

### Tape Search Unit

The Tape Search Unit (TSU) is one of the new microprocessor-based systems introduced by Recortec to offer the broadcaster a range of tape controllers. The TSU works with any quad VTR equipped with Recortec's Reel-Servo Modification (R-MOD) or with any other buffered tape drive such as the Ampex AVR-1, IVC-9000 or the Video Memory VM-1000.

The microprocessor in the TSU automatically stores and recalls up to 10 cue points with frame accuracy. Cue points may be entered manually through use of the control panel lever switches or may be automatically inserted at the push of a button while the operator watches the scene material on the monitor.

The chief application of the TSU is for rapid, remote cueing of video taped material. Up to 10 cue points are stored in the TSU memory. A second application of the TSU is for selection and program integration of news material provided by network news services.

For More Details Circle (101) on Reply Card

### Add-On Microphone Mixer

Shure Brothers Inc., Evanston, Illinois, has announced a new add-on accessory microphone mixer that offers a way to add up to six additional low impedance, balanced microphone inputs (switchable to line level) to a sound system.

Named the Model M677, the new unit is designed as a "slave" mixer for Shure products such as the M67 and M68 series microphone mixers, the SE30 gated compressor/mixer, the M610 feedback controller, and the M63 audio master.

When used with the Shure M67 and M68, the new M677 provides a method of stacking mixers and

Continued on page 74

# New

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**LOCATION** WPBT Studio, North Miami, Florida

**COST** \$375. includes get-together cocktail/dinner and lunches.

**FOR MORE INFORMATION** Please call (212) 787-3050, or write Education Division, Imero Fiorentino Associates, Inc., 10 West 66th Street, New York, N.Y. 10023



gives two additional microphone line level inputs over those available when stacking two four-channel mixers.

By using an M677 with a SE30 Gated Compressor/Mixer operator can convert the input mixer system of the SE30 nine-input mixer for applications such as high quality sound reinforcement, radio or television broadcasting, and sound recording.

By combining an M677 with a Shure M63 Audio Master, the operator can have a six-channel microphone mixer (microphone or line level signals), a 600-ohm line output, a VU meter, and a headphone monitor. The M677 in combination with the M610 provides 6 inputs per octave graphic equalizer.

The new Shure M677 Mixer can be powered either from the nominal 28 to 30 Vdc output of the attached master mixer or from a Shure A67B Battery Power Supply.

For More Details Circle (102) on Reply Card

### **New Concept Automation**

**IGM/Northwestern Technical Inc.** of Bellingham, Washington will unveil a totally new concept in broadcast automation.

Designated the MARC V (Manual Assist Remote Control) the system is designed to provide electronic access and automatic sequencing of program elements in live studio or control room operations. This removes much of the pressure from the operator and allows him to pre-set switch instructions so that he may concentrate on the creative aspects of programming rather than the technical mechanics.

With its TV display and entry keyboard, the MARC V allows access to any of seven video sources, each with up to 16 sub-sources, and is designed to interface with and control video tape decks, cartridge machines, random access cartridge handling devices, such as IGM's Instant Go-Cart. The operator may sequence these devices in any order desired, up to 18 events in advance and may make changes, deletions or substitutions instantly at will.

The display screen projects



ent picture of events sched-  
and incorporates a digital  
as well. An external series of  
on monitor circuits may be  
ed also, appearing on the  
tor's screen as various alarm  
ges.

equipped with "Memory-Cue"  
capability. The disc recorder will  
respond to a start command from  
the commonly marketed automatic  
editing equipment, run to the exact  
field, and "freeze."

For More Details Circle (105) on Reply Card

For More Details Circle (103) on Reply Card

### Slow-Motion Disc Recorder

new versions of the color  
Motion Disc Recorder were  
roduced by **Eigen Video** at NAB  
Chicago. The new versions have 20  
and 10 second time capacities.

The discs record consecutive  
as alternate tracks in each  
ation to achieve continuous  
operation. Each track is  
before re-recording by dual-  
magnetic heads.

A versions of Eigen's Color  
Motion Disc Recorders are  
able to sports slow motion  
editing, and post production  
freeze frame, time-lapse, jump-  
and animation effects.

A Eigen Disc Recorders are

### ENG Camera Heads

A television camera head specifi-  
cally designed for ENG and studio  
cameras is now available from  
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The ITE-H5 Hydro Head utilizes  
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Continued on page 76

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Model SF-1 Splice Finder: \$370.00  
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The automatic cartridge tape splice finder is a real labor  
saver. It cuts handling time by up to 50%, allowing busy  
editors and DJ's to do other jobs at the same time. This  
finder for machine processes all NAB standard A, B, and C  
cartridges by locating tape splices and stopping the  
head within one inch beyond the capstan. The automatic  
finder eliminates the noise effect of recording over the  
splice which is especially annoying to broadcast advertis-  
ing. A handy bulk eraser is added to the Model SFE-1 splice  
finder to conveniently save additional studio space. Each  
finder is a trim 16½" x 6" x 10" rated at 15 IPS, 117 VAC,  
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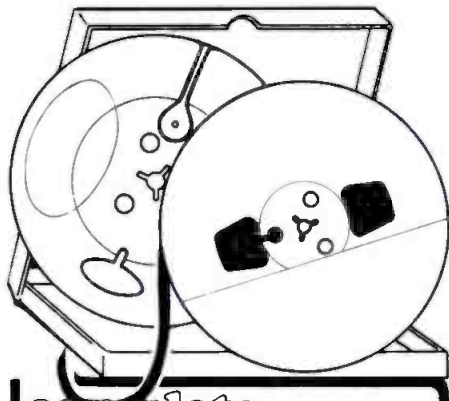
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## New Products

Continued from page 75

scopic control handle, right-hand zoom and control handles, wedge adaptor and wedge plate.

Cameras of up to 50 pounds can be mounted on the ITE-H5. Construction is of rugged, lightweight cast aluminum.

For More Details Circle (106) on Reply Card

### Rackmount Oscilloscope

A 17-inch-deep, 15 MHz rack-mount oscilloscope is being introduced by Tektronix as a new member of its T900 Series of oscilloscopes. The new T922R has specifications similar to the bench model T922.

The new rackmount has switchable inputs on the front and rear panels that provide mode change—from a general purpose test instrument to a monitoring oscilloscope. The T922R measures  $5\frac{1}{4} \times 19 \times 17$  inches and operates at 2 mV/cm sensitivity. Greater than 80 dB of isolation guards signal integrity. C5-A Camera operation has single sweep and graticule illumination.

The rackmount has ancillary rear panel inputs/outputs: external trigger out, gate out, sweep out, vertical signal out, Z-axis input. Outputs can be used to drive external recorders or other instrumentation.

The T922R has 12kV 8 x 10 display.

For More Details Circle (107) on Reply Card

### Portable 4-Channel Oscilloscope

Cold switching—internal remote control—combined with a highly-efficient, compact, versatile power supply inside a standard, lightweight frame are the keys to the realization of the world's first portable four-channel oscilloscope.

Philips has introduced a portable 50 MHz oscilloscope with 5 mV sensitivities and an 8 x 10 cm display, that weighs 9.5 kg, PM 3244. Up to six signals can be displayed simultaneously—the four input signals and two differential signals.

Triggering for the main timebase can be from any of the four input or composite signals, the incoming line supply, or externally. The delayed timebase can be triggered

from the four inputs, the composite signals and externally. The channels also provide X-Y positions, including dual-trace X-Y plays.

The direct conversion supply run from any AC supply between 90 and 270 V at 46 to 440 Hz any DC voltage between 100 and 200 V, without switching. The power consumption of the oscilloscope is a 29W, enabling five continuous operation on a Philips PM 8901 battery pack.

The PM 3244 is the latest in Philips' range of oscilloscopes and fits into the same universal mounting frame.

For More Details Circle (130) on Reply Card

### Slide Rule Calculator

Shure Brothers Inc., Evanston, Illinois is now offering a slide rule calculator which sound engineers can use to perform many computations involved in designing and installing indoor sound reinforcement systems.

Designated the Model SRC, this new Shure calculator provides means for calculating: (1) reverberation time and absorption coefficients; (2) microphone output voltage and sensitivity ratings and (3) attenuation resistance values.

Supplied with the Model SRC is a 16-page brochure containing operating instructions, appendix with charts and tables, and bibliography listing sources of additional information.

For More Details Circle (131) on Reply Card

## Earth Station To KC

Station KBMA-TV, the independent UHF station in Kansas City, will be operational with what is believed to be the first terrestrial receive earth station set up by the station, in time for the Republican Convention.

KBMA-TV has already filed for the earth station, which will be a joint venture by the Kansas City UHF and Transcommunications Corp., a multi-purpose communications firm located in Greenwich, Conn. Transcommunications will purchase the earth station and lease it back to KBMA-TV.



# Globecasting

Leading figures in the broadcasting industry will converge on the 1976 Biennial International Broadcasting Convention, Grosvenor House, London, September 2-12.

Recognized as one of the premier international events in the broadcast engineering field, IBC has grown continually since its inception in 1967. The sponsor is confident that this year's show will surpass IBC '74 which attracted more than 2,000 delegates from 44 countries.

New techniques and equipment covering the whole spectrum of the industry will be shown at the convention. All available exhibition space has already been allocated and more than 60 manufacturers will be present, along with the BBC and Independent Broadcast Association.

The technical program consists of more than 60 papers in 14 sessions. The broad aspect of conventional broadcasting is represented from studio techniques, recording, digital techniques and picture origination through transmitters and aerials. Session chairmen are drawn from the United States, Italy, France and Britain, among other countries, and the origins of the papers indicate the world-wide status of the event.

American experience is reflected in a range of papers which includes topics as diverse as "A Technical Review of Helical Recording", "Expanding PCM Video Response to the Nyquist Limit", "Design of a Completely Solid-State 1KW Broadcast Transmitter" and "Highly Polarized TV Broadcasting Aerials."

Sessions will concentrate on the areas of development in this rapidly developing and changing industry. Papers will be given on systems utilizing the domestic television receiver for information. Teletext systems including BBC CEEFAX and the IBA programs will be featured. There will also cover VIEWDATA, telephone network system de-

veloped by the British Post Office, and the experimental "text television."

Another area of rapid growth is electronic news gathering, utilizing hand held color TV cameras in conjunction with portable videotape recorders and lightweight microwave links. A special session will allow users and equipment manufacturers to air their problems and to display the latest available equipment.

The convention will be opened by Admiral of the Fleet, The Earl Mountbatten of Burma, Chairman of the National Electronics Council. The event is sponsored by the Electronic Engineering Association, Institution of Electrical Engineers, Institute of Electrical and Electronic Engineers, Institution of Electronic and Radio Engineers, Royal Television Society and Society of Motion Picture and Television Engineers.

For further information contact: Exhibition organizer: The Secretariat, International Broadcasting Convention, ISS, Savoy Place, London WC2R 0BL, England.

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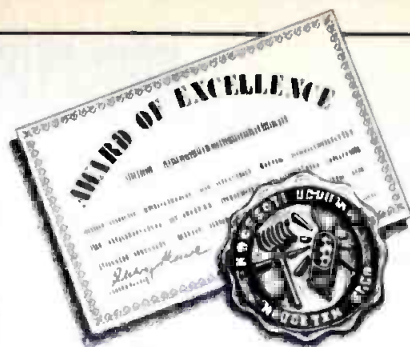
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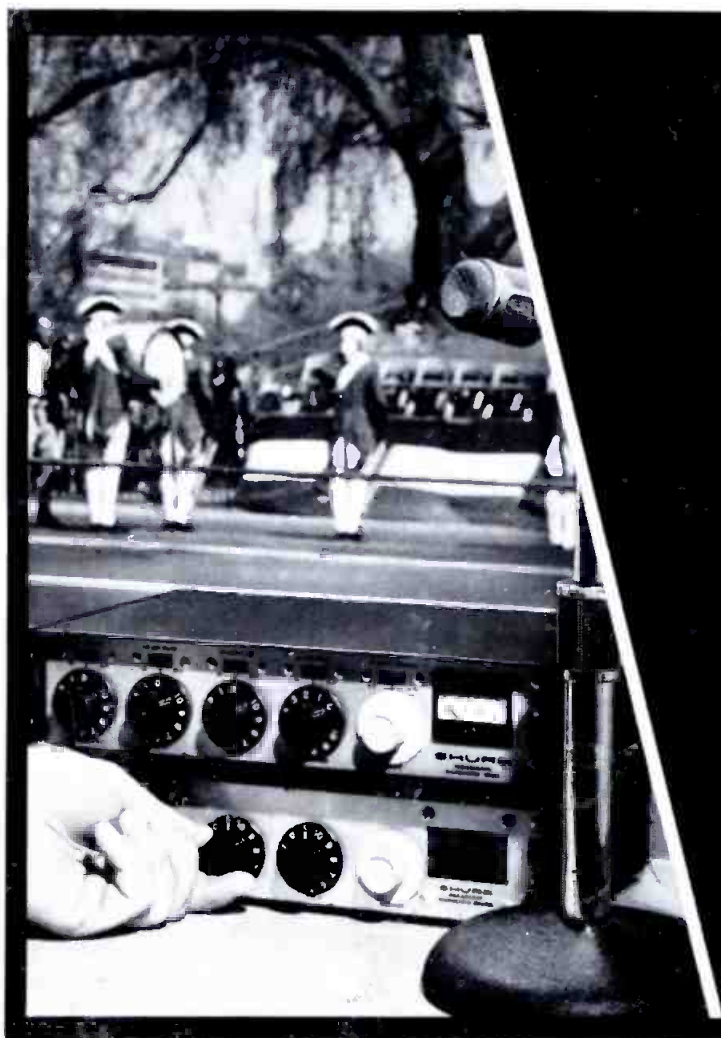
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