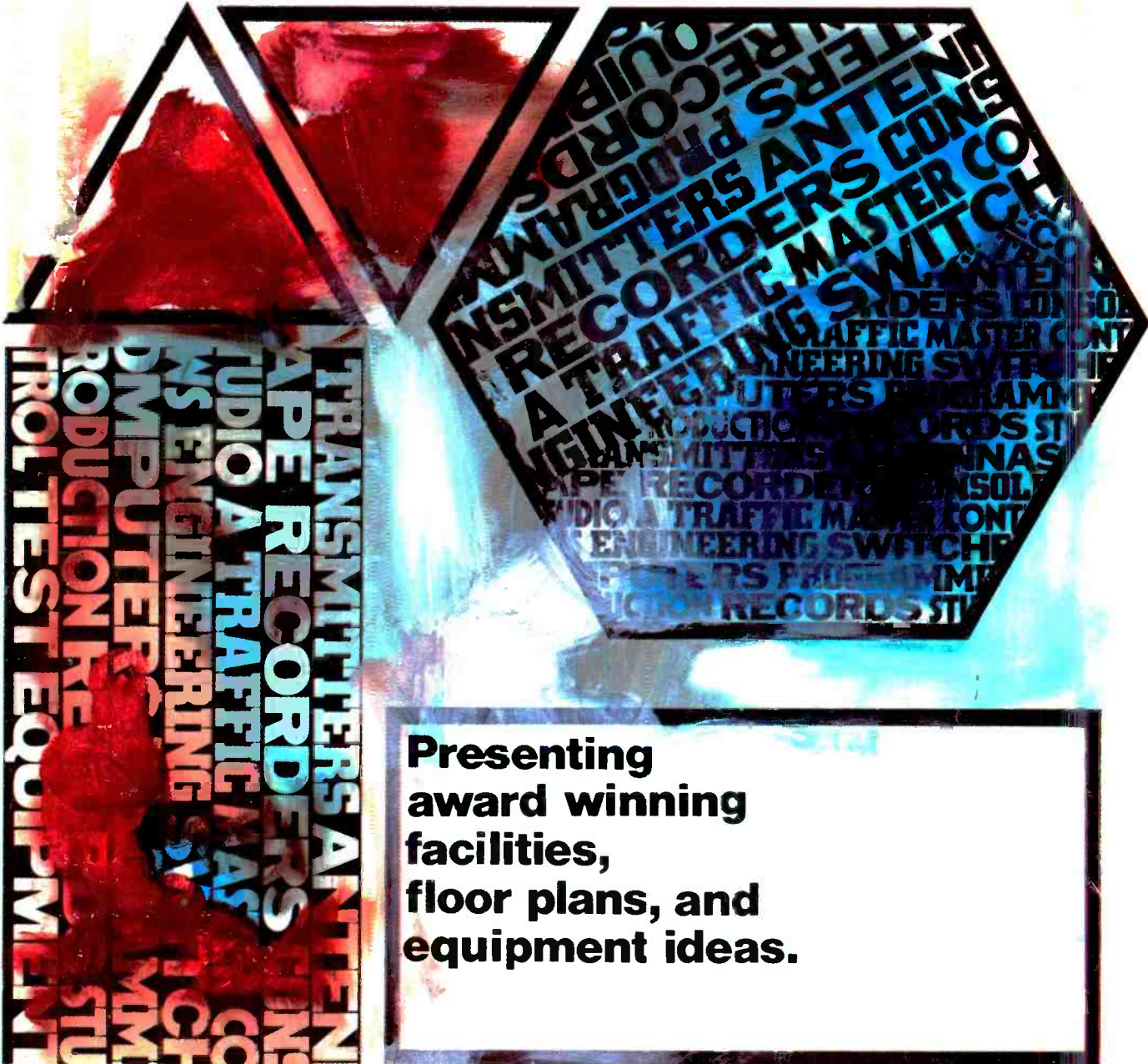


DECEMBER 1975

# BME

BROADCAST MANAGEMENT/ENGINEERING

WJUU8663  
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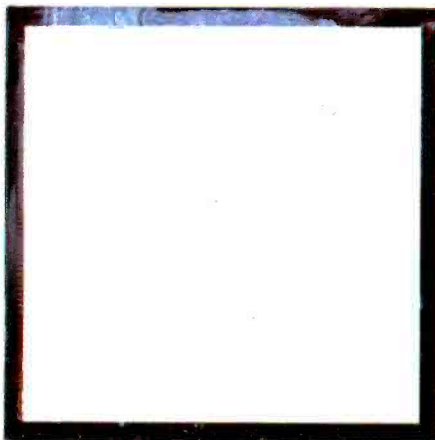


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Also:

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# This Trinicon® video camera makes it as easy to shoot color as black and white.

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This, remember, is a Trinicon camera. And Trinicon technology is already delivering demanding broadcast quality in hundreds of TV Stations.

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Oh, you might find some other NTSC camera with comparable quality, true.

But it will cost you 3 to 9 times more than the DXC-1200. It's only \$5000.

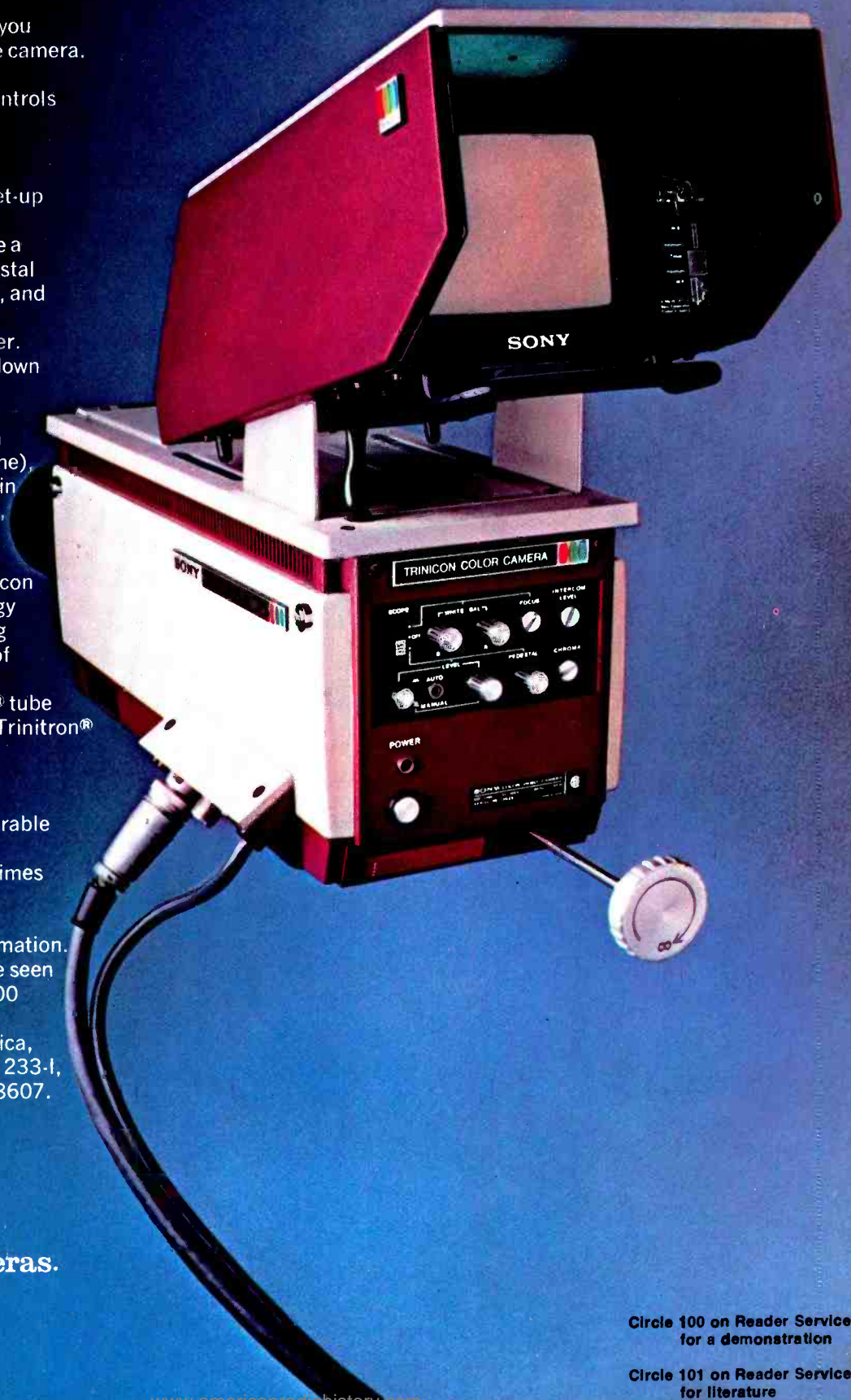
Write us for detailed information.

Better yet, now that you've seen its back, see the whole DXC-1200 demonstrated.

Sony Corporation of America, Video Information Center Dept. 233-I, P.O. Box 1594, Trenton, N.J. 08607.

Price shown is suggested retail and is subject to change.

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Trinicon® Color Cameras.



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station/company \_\_\_\_\_

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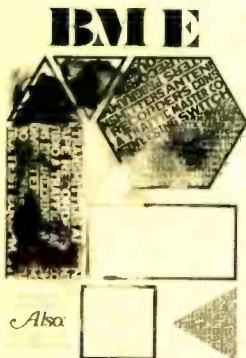
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Circle 102 on Reader Service Card



# BM/E

BROADCAST MANAGEMENT/ENGINEERING



Presenting the entries for the BM/E Best Station Award Contest for 1974. Help pick a winner. Turn to page 36 and vote.

**BROADBAND  
INFORMATION SERVICES, INC.**  
295 Madison Ave.  
New York, N.Y. 10017  
212-685-5320

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and Hennessey**

Publisher  
**Charles C. Lenz Jr.**

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## DECEMBER 1975/VOLUME 11/NUMBER 12

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### 6 Broadcast Industry News

*Radio chosen by public as morning news source; Another ENG entry*

### 17 Automation Equipment Featured At NRB

*Last month BM/E covered program highlights and EBS equipment at the National Radio Broadcasters Convention. This month we pick up on the convention floor.*

### 24 Interpreting FCC Rules & Regulations

*Equal Time Rule Eased*

### 30 Here Are The New EBS Two-Tone Systems; You Have To Buy One Before Next April 15th

*FCC-approved equipment for the new two-tone interstation signal of the EBS is now reaching the market, and BM/E lists here all models approved up to press time. The article also gives a quick review of the EBS operation as a whole, and of the part played in it by the interstation signal.*

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### 36 The Best Station Award Contest

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Making a student-run AM-FM production and control center do triple duty	36
High efficiency for a rock combo operator at moderate cost	38
Putting two AM stations 60 KHz apart on the same directional antenna array (saving a half-million in real estate alone)	39
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TV switching, monitoring, and layout for highest efficiency and quality (one operator in light periods, four in heavy)	57

### 62 Great Idea Contest

*This month 1975's final entries appear, coming up are the best of the year. Don't forget to vote!*

### 68 Broadcast Equipment

*New and significant products*

**BPA** BM/E, BROADCAST MANAGEMENT/ENGINEERING, is published monthly by Broadband Information Services, Inc. All notices pertaining to undeliverable mail or subscriptions should be addressed to 295 Madison Ave., New York, N.Y. 10017. BM/E is circulated without charge to those responsible for station operation and for specifying and authorizing the purchase of equipment used in broadcast facilities. These facilities include AM, FM, and TV broadcast stations; CATV systems; ETV stations; networks and studios; audio and video recording studios; consultants, etc. Subscription prices to others: \$15.00 one year, \$25.00 two years. Foreign: \$20.00 one year, \$35.00 two years. Foreign Air Mail: additional \$24.00. Copyright © 1975 by Broadband Information Services, Inc., New York City. Controlled circulation postage paid at East Stroudsburg, PA.

# Introducing the 3400 SERIES

Model 3402 distribution amplifier is the first product in a new series of video terminal equipment. Six outputs are provided in this versatile, high-performance, compact unit which represents the latest in the state of the art.

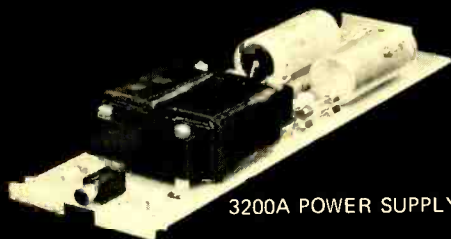
The 3402 gives exceptional performance in the areas of stability, distortion, and noise. Power consumption is only two watts per amplifier. It is an all-purpose

video amplifier, featuring switchable DC restorer, differential input, controlled time delay, selectable gain adjustment up to +11 dB, and provision for cable equalization.

A two-rack unit mounting tray, illustrated below, accommodates eight 3402 amplifiers and a 3200A power supply, with provision for a second optional supply for emergency protection. A one-rack unit, four-amplifier mounting tray is also available.



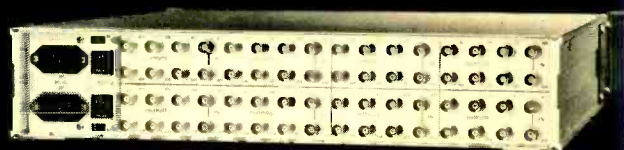
3402 DA



3200A POWER SUPPLY



FRONT VIEW (LESS COVER)



REAR VIEW

## TECHNICAL HIGHLIGHTS/MODEL 3402 AMPLIFIER

Frequency Response	±0.05 dB, 10 Hz to 5 MHz +0.05 dB, -0.1 dB, 5 to 8 MHz +0 dB, -0.3 dB, at 10 MHz	
Differential Distortion	1 V p-p	1.4 V p-p
Gain	< 0.15%	< 0.3%
Phase	< 0.1°	< 0.25°
T Pulse to Bar Response	±0.5%	
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Chrominance/Luminance Delay	< 10 nanosec.	
Output Noise (Independent of gain setting)	> 70 dB RMS below 1 V p-p 10 MHz band width	

FOR ADDITIONAL INFORMATION, CONTACT:

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# BROADCAST INDUSTRY NEWS

## Radio Chosen By Public As Morning News Source

A nationwide survey conducted last summer by the Opinion Research Corp. shows that 52% of all adult Americans turn on their radios instead of watching TV or reading a newspaper to get their first morning news. Radio has a better than two-to-one lead over each of the other two major medias with 21% choosing newspapers and 20% choosing TV.

ORC's survey was conducted among a nationwide sample of 2,164 adult (18+) men and women between July 11 and August 10 of 1975.

## Advanced Technology Calls For New TV Standards

The advance of TV technology, which changed the viewing habits of millions of Americans, has outmoded industrial standards set years ago, K. Blair Benson, vice president of Goldmark Communication Corp. recently stated.

Speaking at the annual conference of the Federal Communications Bar Association in Williamsburg, Va. last October 25th, Benson said many existing standards are depriving viewers of the full potential of such advancements as large-screen TV and special programming by satellite.

Benson, who is a member of the

governing board of the SMPTE, called for the immediate establishment of a technical standards committee representing the broadcast industry to close the gap through new standards for increasing viewer enjoyment.

Benson told the group that an orderly introduction in this country of a new, higher-quality TV system will be feasible by means of simultaneous dual-standard transmission, accomplished by inexpensive digital standards converters. Current standards for TV resolution in the U.S. are below those of European countries.

## "BBB Report" Carried By 51 MBS Radio Stations

The "Better Business Bureau Report," a five day a week radio program carried by the Mutual Broadcasting System, has expanded its coverage to 51 stations since its June 30, 1975 debut.

The half-hour program which gives consumers information on buying practices is heard as far east as Connecticut, south to Florida, north to Wisconsin and as far west as California.

## Television News Inc. Discontinues Services

Television News Inc. has discontinued its news service to TV stations as of October 31, 1975. The news service

began in May 1973 and was used by some 80 stations throughout the U.S. and Canada when it ceased services.

Mr. Jack G. Wilson, president of TVN, said that the revenues generated never came close to the high costs of producing and distributing the news service.

## Growth Rate Of ENG Is High

Delivering what was termed a third report on Electronic News Gathering, Joseph A. Flaherty, CBS Television Network, told the attendees of the 117th SMPTE Technical Conference that the growth rate of ENG has been remarkable. By the end of 1975 he said 132 independent TV stations would be using ENG. All of CBS's owned-and-operated stations use ENG. Currently 33 CBS affiliates have at least one system and by the end of the year this number will be increased to 52 stations.

Flaherty said CBS was still a big user of film and will continue to be so. He said he didn't know what the final mix of ENG vs. film might be. But ENG is on the rise because of its immediacy, productivity and economy. ENG offers immediacy because it means live on-the-air coverage. Productivity means more stories and better follow up for any given day.

continued on page 8

## Another ENG Camera Entry

At the 117th SMPTE Technical Conference, Los Angeles, yet another ENG camera was offered to U.S. electronic journalists. The new three-tube back-packless camera priced at about \$10,000 was developed jointly by the Nippon Television National Corp. (NTV) and Toshiba. In a paper at the conference, Hajime Fukuyama described the camera as a RBG type using  $\frac{3}{8}$ -in. Chalnicon tubes. Known as model CK-38, it can pick up objects at 20 to 30 ft. candles and weighs only 14 $\frac{3}{4}$  lbs. with lens and viewfinder.

Still another interesting camera was unveiled at Video Expo '75 in New York a week later. Hitachi showed a small 6.6 lb. hand portable camera with amazing color fidelity. Secret of good colorimetry of the FP-3030 is a new Hitachi tri-electrode tube. While not claimed to be "broadcast quality," the camera's performance matches or exceeds that of other one-tube cameras now used by smaller stations for news.



Film editors have long enjoyed a substantial professional advantage over video editors with the availability of film edge numbers.

Video editors, until now, have had only SMPTE time code data which, as useful as it has proved, provided only the equivalent of a film sprocket hole counter.

TRI has solved that problem with the SUN family of time code products. What's more, no audio or cue tracks are used and if you happen to be working with a helical VTR, you can still frame a picture with the SUN Time Code data displayed in the still framed image.

So what's the SUN Family of Products? Well, it's a total of five products that TRI Engineers see right now!

#### **SUN-I**

This is the grandfather box. It includes an encoder, a decoder, an SMPTE generator, a character generator and an LED display. It has the capability of

making the SUN SMPTE Time Code display appear in the CRT or not (it is not burned in the video).

#### **SUN-II**

This is what we call Porta-SUN. It is a little box about the size of an audio cassette recorder that encodes SUN data at the point of acquisition and it's battery operated, of course. It lets you lay down time code information in the field while you are shooting. Whether it is back-pack VTR's or microwave, Porta-SUN gives you time code data when and where you want it.

#### **SUN-III**

This is an inexpensive reader which includes a SUN decoder, a character generator, and the facility to filter out the SUN pulse. The characters may be displayed on a CRT in two sizes and at the top or bottom of the picture.

#### **SUN IV and SUN V**

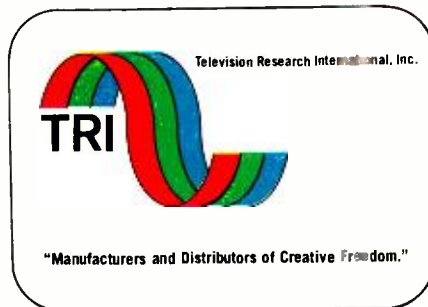
You'll have to wait until after Christmas to hear about these in detail, but they round out the Family permitting a capa-

bility in video tape editing never before possible including High-Speed search and Auto Code Load.

SUN-I, SUN-II and SUN-III are available now, so for a "live" demo, or more information, contact the best distributor in your area.

Chances are he's our distributor

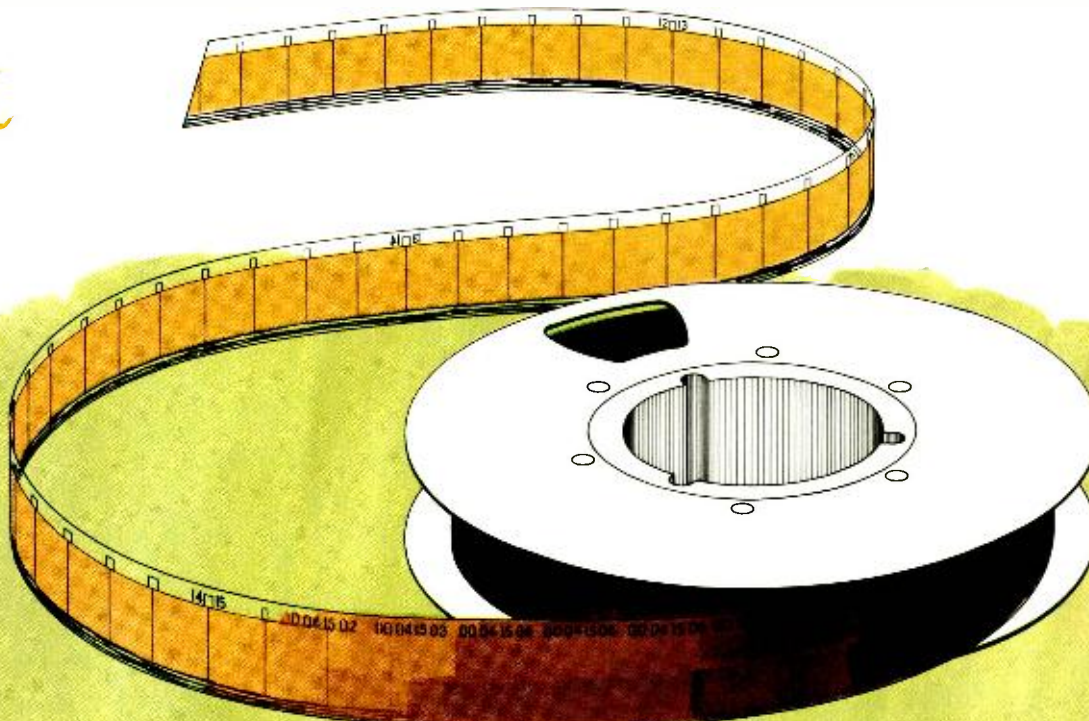
**Television Research International, Inc.**  
1003 Elwell Court  
Palo Alto, California 94303  
415/961-7475



## **Film edge numbers on video tape?**

### **Why not?**

## **TRI introduces SUN - an extraordinary family of video time code products**





## NEWS

In comparing the cost of a two-man ENG crew with a two-man film crew, Flaherty showed considerable savings for all electronic systems. Assuming a station would need three such crews, his calculations gave ENG a \$113,288 advantage annually.

The capital costs of ENG are higher: \$220,400 for ENG compared to only \$87,000 for film. (Capital cost in addition to cameras included film processors, and editors in the case of film

and helical VTRs, time code generators, editors and TBCs for ENG. The cost of station wagons and mobile communications equipment was also included but it was the same for both.)

But labor costs for ENG are lower because of the cost of manning processors for film, editing it, and assembling the final product. A three crew system gave ENG a \$53,750 annual advantage (\$234,804 film minus \$181,054 ENG). But the major saving comes from lesser operating expenses for ENG. Film operations cost annually, in Flaherty's example, \$114,754

compared to \$32,936 for ENG. Raw film stock alone costs \$83,200 compared to \$5,982 for tape. Looking at cost on a per hour basis, film costs \$285.90 per hour compared to \$28.76 for tape, assuming single use only.

Depreciating the equipment over a five year period, and adding labor costs and operating expenses brings the annual cost of film to \$366,958 compared to \$253,670 for ENG for the \$113,288 savings. (These figures do not include a microwave system for comparability.)

A good case for continued use of film was made by Steve Zieve, NBC News, Burbank, Calif. Zieve says versatile cameras, such as the Cinema Products CP16 with quick change lenses can fulfill 95% of a station's newsfilm coverage needs. (Zieve has 15 CP16s; does single system filming but edits double system usually.) Extra wide 5.7mm lenses and a Zoomar night vision scope allows wide angle filming, and starlight filming on a single system camera. Long telephoto shots go without saying. The availability of rental lenses is a plus for film, Zieve said.

NBC is impressed with the fast Fuji RT 400 film (400 ASA) which it stocks along with Kodak 7241 and 7242. The latter are routinely force processed for faster speed. Zieve intends to convert to Kodak 7240 and the VNF-process shortly. These new films help news-filming compete with ENG, Zieve said.

Nonetheless, the cost of film—\$117.72 for 20 minutes for raw stock and processing at NBC—means that electronic journalism will grow if for no other reason than cost savings alone. Add to that the competitive advantage of live pictures and the conversion of TV news to all electronic systems is only a matter of time, said Zieve.

### Equipment Manufacturers Announce Price Increases

Two major broadcast equipment manufacturers recently announced price increases.

RCA Broadcast Systems announced an average price increase of 6% on RCA-manufactured products in its line of radio and TV broadcast equipment. The new prices went into effect Nov. 15, 1975.

Harris Corp., Broadcast Products Division, announced a price increase on all Harris Manufactured Radio and TV Broadcast Products averaging about 6½% effective as of Oct. 15, 1975 on all new quotes.

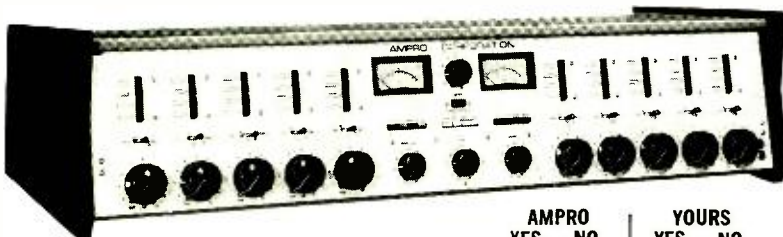
### Specialized Commercial TV Comes To Greater NY

WBTB-TV, Channel 68, UHF, Newark/New York, began telecasting on Sunday, Sept. 28, 1975 with a wide

continued on page 11

## CHECK... COMPARE... CONSIDER...

does your audio console, or the one you're talking about purchasing, have all these standard features:



	AMPRO		YOURS	
	YES	NO	YES	NO
Every input channel equipped with preamp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 transformer coupled inputs per channel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Remote start contacts on all high level inputs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Modular plug-in amplifiers	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 location cue/intercom system with remote talkback	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 selectable monitor inputs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 programmable speaker muting outputs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step type faders with cue on all channels	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15 watt rms protected monitor amp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 selectable headphone inputs plus stereo cue	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
+ 18dBm transformer coupled outputs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Telephone grade lever keys	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shielded PC board mixing bus for extra RF immunity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Engraved panel markings	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extra cost hidden options	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High purchase price	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Ampro audio consoles are available in 6, 8, 10 and 12 channel rotary or slide fader versions in mono, dual mono, stereo or dual stereo/simulcast configurations. Priced from \$1,995.00 to \$5,275.00.

Ampro also produces a comprehensive line of broadcast tape cartridge equipment. For complete details, call collect today or write.



## AMPRO CORPORATION

850 PENNSYLVANIA BLVD., FEASTERVILLE, PA 19047 • (215) 322-5100  
Professional Equipment for Broadcasting Professionals

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# Our customers get results from the 1440 Automatic Video Corrector.



The 1440 Automatic Video Corrector takes the work and worry out of video signal quality control . . . with fully automatic correction of overall video gain, black level, color saturation, burst phase and gain, and sync level. *You can take our customers' word for it.*

**"A must for every video installation."**

"The most remarkable device for video control to appear on the market in the last decade is, without challenge, the TEKTRONIX 1440 Automatic Video Corrector.

"Together with all of its bonus features, this instrument is a must for every transmitter installation."

*William Vandermay,  
Chief Engineer  
KATU Channel 2,  
Portland OR*



**"A most convenient way to automate modulation levels and signal parameters."**

"We have found that a most convenient way to automate modulation levels and signal parameters is to use a TEKTRONIX 1440 Automatic Video Corrector in a closed loop mode around a transmitter such as an RCA TT-30FL or TT-50H."

*T. M. Gulyas, Staff Engineer  
RCA Broadcast News, Oct. 74*

**"The 1440 has revolutionized our transmitter operation."**

"To be able to adjust power with no apparent sync or video level changes is something I am not used to yet.

"Our Hartford transmitting operation has become precise and nearly automatic. The power output stability exceeds FCC standards by a factor of ten to one. The VIR operated signal corrector is the major reason."

*John Kean, Vice President  
Connecticut Educational  
Television Corporation*

**"Our transmitter is about nineteen years old. The TEKTRONIX 1440 automatic color corrector has stabilized our output signal to a degree never before attainable."**

"The one most noticeable improvement is the maintenance of proper sync-video ratio during line voltage variations and changes in transmitter excitation.

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"Our transmitter has some differential phase, but having the 1440 match burst to VIR phase results in a very acceptable picture. In fact, a comparison of transmitter output and microwave receiver output does not indicate any difference in the two pictures.

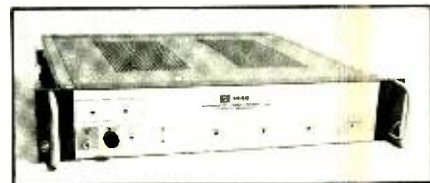
"When the show on VTR is a network playback, the VIR will control the six parameters available. The most impressive thing here is that the VTR operator can vary the color phase control on the VTR with no noticeable change of color phase being observed on the air picture.

*John Hitt, Chief Engineer  
KSLA-TV, Shreveport LA*

**"I just wanted to let you know how pleased we are with the 1440 Automatic Video Corrector."**

"This unit will be the key to allowing us to have automatic power control of our UHF transmitter. As we automatically control the 110 KW output with a computer control system, the 1440 will maintain the correct percentage of modulation."

*Robert F. Schlieman,  
Engineering Manager  
KMHT-TV, Schenectady NY*



Call your Tektronix Television Field Engineer for a special packet of information about automatic video correction. He can demonstrate how the 1440 and other correction products will work for you at incoming network feed, remote feeds, master switcher output, transmitter input, and other key points. Tektronix, Inc., Box 500-A, Beaverton, Oregon 97077.



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committed to  
technical excellence

Input-output configurations are virtually unlimited with this modular, building-block, solid-state, video switch. And . . . this flexibility comes at reduced cost.

Starting with a single 14-inch by 19-inch rack frame assembly, the user can build to a 20-input by 20-output configuration by selecting plug-in switching and amplifier modules. Using the appropriate modules, configurations such as 10-in by 5-out, 20-in by 10-out or other configurations can be assembled. Greater capacities can also be accommodated . . . just add.

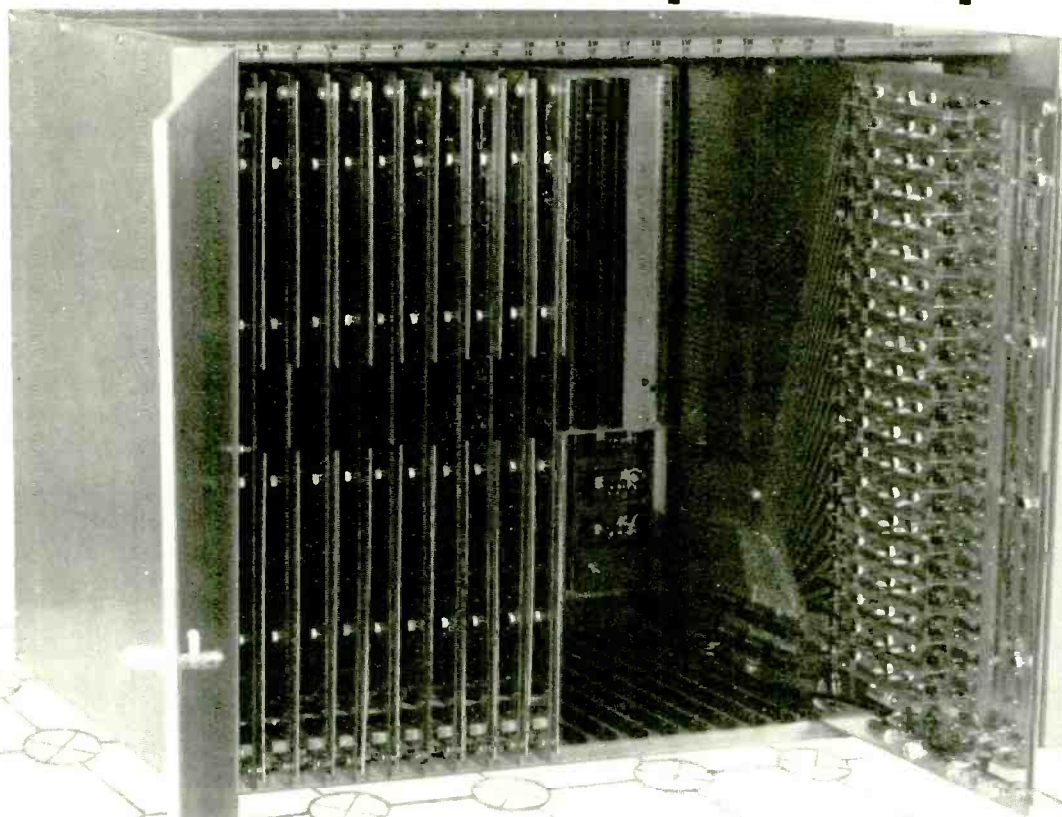
Control? . . . DYNAIR has it all, from push-buttons to computers. The 1400 Series plug-in switch modules accept control from 15 to 25 VDC or 5-volt negative logic steady state levels. With optional plug-in circuitry, encoded logic level signals can provide the control. A complete line of

control hardware is available from us.

Performance is state-of-the-art. Using field effect transistor circuitry, the 1400 Series frequency response is flat within  $\pm 0.1$  dB to 8 MHz ( $\pm 0.5$  dB to 12 MHz). Differential phase is less than 0.1 degree, and it is DC coupled. Top color performance for NTSC and PAL systems.

Best of all, users will really appreciate the economy. By specifying the initial and future capacity for the system, the buyer purchases only the hardware needed now without being penalized later. High reliability solid-state video switching costs can be cut below \$30.00 per crosspoint . . . less than competitive switching systems. Compatible with our Series 8100 Solid-State Audio Switching Equipment, the new 1400 Series offers, spec for spec, the lowest cost quality switching equipment available today!

## **Broadcast quality video switching NOW under \$30 per crosspoint.**



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PHONE: (714) 582-9211; TWX: (910) 335-2040

**DYNAIR**

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## NEWS

range of programming designed exclusively for special audiences.

General Manager Gene Inger indicated that programs will be aimed at identified audience groups including: business and financial communities, sports enthusiasts, multi-ethnic communities, various religious communities, the educational community, and children and youth.

The station broadcasts with 2 million watts, making it available to almost 6 million TV households within a 60-mile radius that includes most of New Jersey, key areas of New York (the 5 boroughs, Nassau, Rockland and Westchester) and the southern tip of Connecticut. Channel 68 will also be carried by over 50 CATV companies within its operating radius.

### Collegians Most Exposed To Magazines And Radio

Magazines and radio are the advertising media with the most exposure among college students, a national study of college students' buying patterns and attitudes revealed.

The study also showed that college students base a large percentage of their purchasing decisions on product trial, are remarkably responsive to "special offers" and increasingly important purchasers of big-ticket items like automobiles and audio equipment.

Yankelovich, Skelly & White, Inc. conducted the survey for the Student Value Pack Program which is co-sponsored by Publishers Clearing House (Port Washington, NY) and the National Assoc. of College Stores (Oberlin, Ohio).

### Satellite/CATV/Microwave Interlinks Working Well

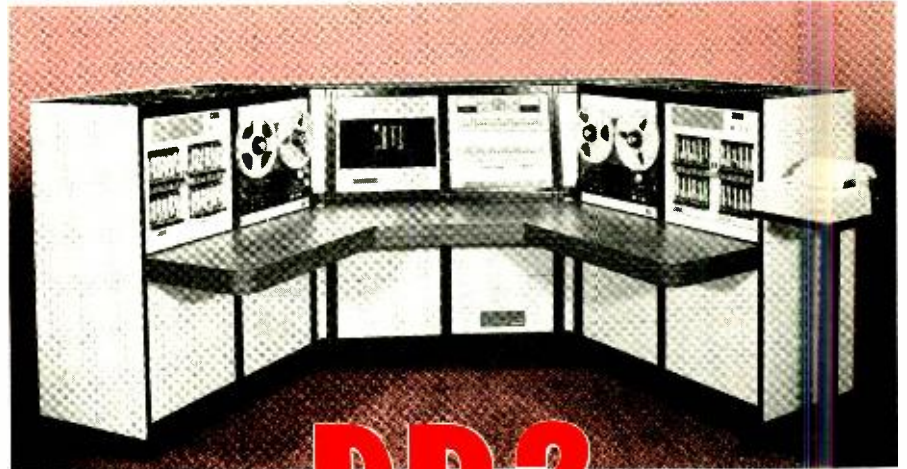
Many modes of communications in addition to the satellite are involved in the delivery of Home Box Office pay-cable programs to cable systems around the country. Links involve one or two satellites, microwave (common carrier, CARS and sometimes AML and MDS) as well as cable systems. Always in the HBO link is Manhattan Cable TV. Telephone interconnections of various kinds may also be involved. Its all working amazingly well according to HBO spokesmen. The combinations portend more sports for pay-cable and more sports and news for broadcasters, according to Hughes Television Network.

The history-making date for the first satellite/pay-cable transmission was the Muhammed Ali-Joe Frazier heavyweight championship fight broadcast live from Manila, Sept. 30.

On that date the cable industry's first permanently-installed receiving station (made by Scientific Atlanta for UA-Columbia Cablevision) became operational. The signal received in Ft. Pierce, Fla. did indeed come via a Westar satellite (leased by RCA Globecom) but this was only one hop of many. From ringside, the signal was fed by land lines to the Intelsat up-terminal and thence across the Pacific. At California the signal was picked up on the ground and sent across the country via AT&T to lower Manhattan. It then was routed via Manhattan Cable

TV to an RCA microwave circuit to Valley Forge where it was uplinked to Westar and to Ft. Pierce. Before being distributed to cable homes, the signal went for awhile on Theta-Com's AML microwave. To get from Ft. Pierce to Jackson, Miss., CARS microwave was involved. The New York to Ft. Pierce to Jackson link has been in operation every day since Sept. 30.

A satellite/cable TV link involving MDS was used in a demonstration in early October. The route was from Los Angeles to New York's Gulf and West- continued on page 12



all new automation system from 

It's here! The all-new DP-2. Microprocessor controlled, it offers more custom features than any other unit available today... features such as 8,000 event capacity; built-in external function control; automatic record of network; automatic transmitter logging option; mag tape, paper tape and solid state storage facilities; interfacing to business computers; sub-routines in any size; video readouts and programming; and up to forty audio channels.

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

Get all the facts on the new DP-2 system for yourself. Return the attached coupon today for more information.



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**YES** I want to know more about DP-2. Send complete information and have your Representative call me.

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Station

Address

Zip  Phone (area code)

75-105

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## NEWS

ern building. MDS relayed the signal to Madison Square Garden directly and Manhattan Cable served as an alternate back-up.

In late October, Western Union (satellite), Collins Radio (microwave), and Hughes Television Network (video imaging) demonstrated to broadcasters how Hughes air-transportable "Mod Pod" gear could be coupled via portable microwave to satellite sending stations.

On November 7, a Milwaukee Bucks-Boston Celtics basketball game was carried to the East coast via Midwest Relay microwave to Chicago and then via satellite to New York. This signal then took the path of the Ali-Frazier fight to HBO satellite customers in Florida and Mississippi. Later in November, such HBO programming began to serve Tulsa, Okla., Ft. Smith, Ark., and Laredo, Texas all by satellite and microwave.

According to a recent Frost and Sullivan survey, the world-market for communications satellites, earth sta-

tions, and peripheral equipment will reach \$4 billion by the early 1980's.

## Sarnoff Resigns From RCA

On Nov. 5, 1975 Robert W. Sarnoff submitted his resignation to the RCA Board of Directors, effective Dec. 31, 1975, as Chairman and a member of the Board of Directors of the RCA Corp.

In accepting Sarnoff's resignation, the Board designated Anthony L. Conrad, President and Chief Operating Officer of RCA, to become President and Chief Executive Officer, effective Nov. 5.

As this is written, Sarnoff's future plans are not known. There is much speculation that his resignation came about because of palace unrest within the top management.

## FCC Briefs

The broadcast industry's dislike for the FCC's **pay-cable** and **pay-TV** rules of March 20th, will apparently get a hearing in the Court of Appeals, as a result of a suit jointly filed by ABC, CBS and the NAB seeking to upset the rules . . . . The FCC announced procedures designed to bring its record keeping into conformity with the **Privacy Act of 1974**, which establishes controls on access to many kinds of government records to protect individual privacy.

The FCC has reminded **Cable Television Relay Service (CARS)** licensees that all such licenses expire February 1st, 1976, and that renewal applications must be filed before that date . . . . A petition filed in U.S. Court of Appeals by the National Black Media Coalition and the Philadelphia Community Cable Coalition attacks the FCC's cancellation of its **March 31, 1977 deadline on reconstruction of major market cable systems.**

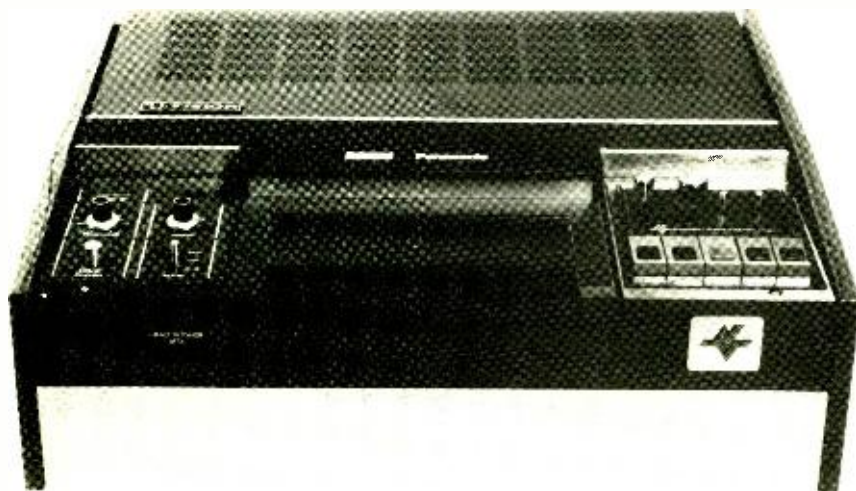
## Dates Set For Montreux 1977

The Montreux International Television Symposium has announced that the 10th Symposium and the technical exhibition for 1977 will be held from Friday the 3rd to Thursday the 9th of June. The date is slightly later than in 1975 to avoid the Whitsun bank holiday. New plans for the Symposium are now being prepared and the planning committee will release them in spring 1976.

## More Meetings . . . .

The 8th Annual International Conference of the **International Industrial Television Assoc. (ITVA)** will be held from March 26th through March 29th, 1976, at the Sheraton-Anaheim Hotel, continued on page 15

# THE BROADCASTERS CASSETTE™



## ON-THE-AIR DIRECT FROM 3/4-INCH CASSETTES FOR LESS THAN \$3000!

National Video has designed special video cassette players and recorders to work with the present state of the art time base correctors for broadcasting, duplicating or as editing source machines.

These capstan servo machines feature switchable external/internal 3.58 MHz operation allowing chroma correction in either direct or heterodyne modes. The capstan can be locked by advanced composite sync or by a one volt video signal. Variable speed slow motion is a standard feature and provides a range from still frame to near normal speed. All machine functions, including slow motion, can be remote controlled.

The BROADCASTERS' CASSETTE recorder SCR-1053\* and player SCP-1052\* are part of the PROFESSIONAL CASSETTE™ series of high performance editing and origination equipment from National Video. For more information contact us. For a demonstration see us in Booth 116 at the S.M.P.T.E. Conference Sept. 29—Oct. 2.

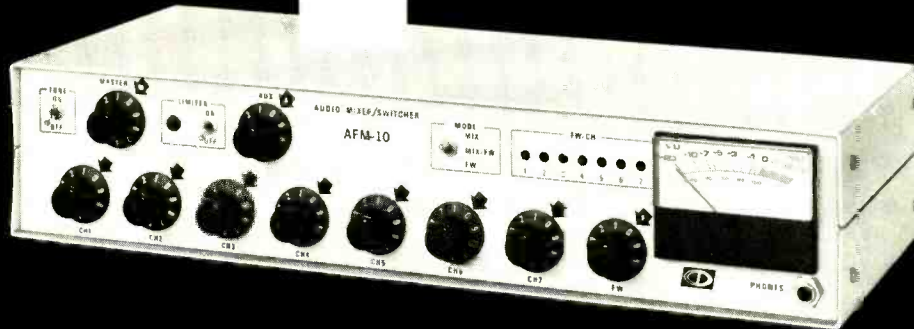
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840 West Glenoaks Boulevard, Glendale, California 91202

\*Patents Pending

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# Super!



## That's the word for CDL's New AFM-10 Broadcast Quality, Audio Mixer/Switcher... all in one package.

The AFM-10 is the NEW "teammate" for CDL's VS-10 and VS-14 video switchers . . . or any other video switcher designed for Mobile, Studio, Master Control or Post Production applications.

Sure it can be used as an Audio Mixer . . . but what sets it apart from all others is its "teammate" power and flexibility to *automatically* operate as an Audio Follow or an Audio Mix/Follow Switcher . . . Plus its "hands-off" automatic gain riding Compressor/Limiter.

### Consider what that really means!

**In the Follow Mode**, the AFM-10 becomes an *automatic* remote controlled switcher. A pushbutton or tally contact feeds one or more audio inputs via the Follow gain control and Comp/Lim to the Line outputs. LED's identify active status.

**In the Mix/Follow Mode**, the AFM-10 beautifully performs a "voice over", manually or automatically. For remotes . . . the Comp/Lim *automatically* maintains Telco Line levels.

**As an Audio Mixer**, the AFM-10 handles many jobs with its 7 inputs with individual channel gain pots, independent Master and Auxiliary Line level outputs, and Comp/Lim that can be switched IN or OUT.

### And you also get all these important features:

- Individual pots adjust line input sensitivity as required for Broadcast, CCTV and Hi Fi equipment.
- Bridging or matching inputs (all equipped with XLR's) and low impedance outputs.
- All 7 inputs are Line or Mic switchable.
- Test oscillator (1 KHz) built-in . . . and with separate input.
- Headphone jack on front panel.
- Cermet pots for gain control.
- Audio crosspoints . . . solid state.

**Frequency Response:**  $\pm 0.5\text{dB}$ , 30Hz-20KHz

**Distortion:**  $< 0.5\%$ , 30Hz-20KHz (Limiter off)

**Noise:** -116dBm equiv. input noise

**Input Levels:** (Max) 100mV p-p Mic; +18dBm Line

**Output Levels:** (Max) +18dBm into 600 ohms

**Power:** 110/220 VAC, 50/60 Hz (switchable)

**Dimensions:** 2 RU's x 7" deep; Desk or Rack Mount

**Availability:** We're in production now!

**Price:** Economical? . . . and how . . . because CDL's unique Audio Mixer/Switcher is like getting 2 for the price of 1.

Find out why . . . call or write for our AFM-10 brochure.

Remember . . . the CDL Brand Name on the AFM-10 is your assurance of Quality, Reliability, Performance and the latest solid-state technology.



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It's our revolutionary "two-way" cardioid dynamic microphone. Only AKG has it.

Before our refoow dna reteewt development, whenever one end of the frequency range was expanded, the other end lost. And there was often trouble in-between.

The solution our people came up with was so simple it was beautiful. And patentable. U.S. Patent #3,204,031 to be exact. Build two microphone elements in the same housing. One for highs. One for lows. Phase them together

with an integral crossover network and you've expanded your range without any strain anywhere. Sound familiar? It's the same principle of a modern

speaker system. A "tweeter and woofer"—only backwards.

In the studio, on stage or on location, you have the range you need. Plus a completely flat response over the entire audio spectrum and natural reproduction up to 90° off the microphone axis. Plus no "booming" proximity effect and virtually no feedback problems.

There are AKG "two-way" microphones available for all professional purposes. See the AKG D-224E. The studio version of the "two-way" principle that duplicates the more desirable characteristics of condenser microphones. Or the highly versatile AKG D-202E that works wonders on live and cinema sound stages. And the all-purpose AKG D-200E "two-way" microphone that adds new dimension to P.A., radio-journalism and recording. Speak to your professional equipment supplier. Or write to us for complete details.

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PHILIPS AUDIO VIDEO SYSTEMS CORP.  
AUDIO DIVISION  
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A North American Philips Company



**Refoow dna reteewt.**

(Our secret sound ingredient.)

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## NEWS

Anaheim, Calif. Persons wishing to be placed on the conference mailing list should contact the ITVA International Office, P.O. Box 297, Summit, N.J. 07901 . . . . A two-day **CATV Reliability Seminar** will be held by IEEE/SCTE at the Holiday Inn, Philadelphia, Pa. February 5-6, 1976. For further information contact James Herman 215-674-4800 . . . . **Comsonics Inc.**, the CATV technical services firm, has scheduled several Technical Seminars to be held in Harrisonburg, Va. They are: Large Scale System Transport Methods, Dec. 11-13, 1975; Advanced System Testing Technology, Jan. 15-17, 1976; Local Origination, Feb. 19-21, 1976; Construction Practices, Mar. 18-20, 1976. Seminars cost from \$150 to \$185 and additional information can be obtained from Bill Edmunson 703-434-5965 . . . . **SMPTE's** 10th Annual Winter TV Conference is set for the Sheraton-Southfield Hotel in Detroit, Jan. 23-24, 1976. TV Newsgathering and Digital Video are the subjects. For more information contact SMPTE, 862 Scarsdale Ave., Scarsdale, NY 10583; 914-472-6606.

## Business Briefs

**RCA** has received an \$8.4 million contract to design and build a new communications system for the U.S. Navy's Trident ballistic missile submarine. The contract calls for RCA to supply two prototypes of the Integrated Radio Room, a new concept to allow for the control of shipboard communications from a single console . . . . **Ampex Corp.** has announced a contract for \$6.2 million, the largest single transaction for color TV broadcast equipment in its history, to the Republic of Indonesia. Under the agreement, Ampex will deliver more than 40 professional videotape recorders and related equipment to the Indonesian Ministry of Information beginning January 1976 . . . . In a major expansion of its color TV operations, Radio TV Bandeirantes, an independent Brazilian broadcaster in Sao Paulo, has ordered **RCA** color TV broadcast equipment valued at approximately \$1.6 million.

**Ampex Corp.** has installed its first of a new generation of random access instructional systems at the Deutsches Institute fur Fernstudien in Tubingen, West Germany. The contract for the system is in excess of \$1 million. Ampex also announced a lease contract for equipment valued at \$600,000 with Pennsylvania Public TV Network . . . . **Cablevision Construction Corp.** of Houston has recently signed contracts with **Scientific Atlanta**, **TelePrompTer** and **U.A. Columbia**

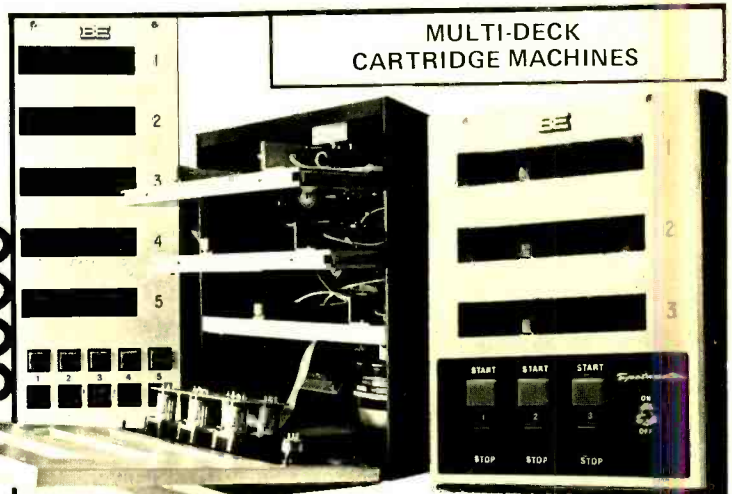
**Cablevision** for construction valued in excess of \$650,000.

**Continental Electronics Mfg. Co.**, Dallas, Tex. recently delivered the first half of a 2,000,000 watt broadcaster transmitter built for Radiotelevizija Beograd, Yugoslavia. The company believes that this transmitter is the most powerful in existence and full power operation of the system is planned for the early part of 1976 . . . . **CCA Electronics** has received an order for a 50,000 watt AM broadcast transmitter and related equipment to be installed in Kuwait.

**Xit Rod Co.**, Covina, Calif. and **SPIG S/A Engenharia Industria** of Sao Paulo, Brazil have completed a technology transfer agreement covering the manufacture and sale of Xit Rods for South America under patents licensing . . . . The **CATV Equipment & Installation Operation of GTE Sylvania Inc.** is constructing a 200-mile addition to a CATV system in Morris and Sussex Counties, N.J. . . . **Heller-Oak Cable Finance Corp.** has signed a multi-million dollar financial agreement with **Athena Cablevision** of  
continued on page 17

SERIES 5000

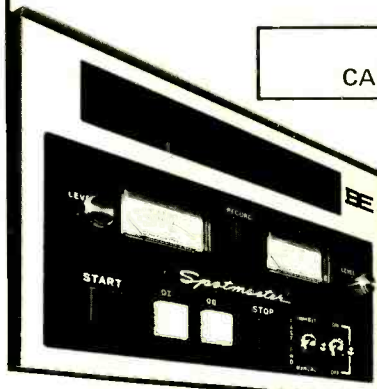
Spotmaster®



Versatile, accessible and reliable describes the new 5000 Series multi-deck cartridge reproducer from SPOTMASTER. Versatility in design lets you choose from a three or five deck model in either mono or stereo, with or without cue tones, record and other options. Accessibility from fold down front panel and slide out deck plates for easy cleaning and adjustment of the PHASE LOK III head bracket, plus a completely removable electronics package with modular components and easy trouble shooting with LED indicators of front panel functions. Reliability means the use of the best switches and components available including ribbon cable to replace bulky multiple wire harnesses, massive machined deck plates that won't warp, a direct drive hysteresis synchronous motor and a super silent air-damped solenoid.

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SINGLE DECK CARTRIDGE MACHINES



SERIES 3000 CART MACHINES

FULL RANGE OF MODELS - available in mono and stereo, record and playback, all cartridge sizes, desk and rack mounting.

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The new generation of professional STUDER tape recorders is designed for the use in broadcasting, television and recording studios as well as theatres and scientific laboratories. The low-cost STUDER A67 includes a wide range of modern features:

3 servo controlled AC motors – Crystal controlled capstan servo – Variable tape speed (2½" . . . 22½") with external frequency – Tape tension control during all operating modes – Control logic with memory – Illuminated push buttons – Remote control of all tape transport operating modes – Automatics for continuous program – Mechanical counter, indicating Min & Sec – AC-Mains supply 50 or 60 Hz, 110 . . . 250 Volts – Opto electronic end of tape sensor – Head block with aluminium die-cast frame – Tape lifter, may also be operated manually – Long life heads – Audio electronics module with plug-in cards in front of tape

deck – Playback, record and bias amplifier boards have all necessary adjustments accessible from the front of the recorder – Switchable for equalization CCIR or NAB – Optional: VU-Meter/panel with peak indication (LED) – Head phone jacks – Available with or without VU-panel, as portable or console version or as chassis for 19" rack mounting – ½-inch, 4 track version in preparation

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Two crystal controlled A.M. channels • A decoder for two tone and carrier break alerting • Internal speaker and alarm relay • Carrier level indicator • Line and speaker level out • And even an unnecessary 2 year warranty.

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Gives you Direct crystal control of each tone by using two crystals • "Loop-thru" for two program lines & internal audio switching • Abort control • Sequence indicators • Remote control • Test provisions and test output for connection to your EBS receiver. **\$275**

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DECEMBER, 1975—BM/E

## NEWS

Corpus Christi to provide improvement and expansion of the Corpus Christi CATV franchise.

Nashville's WSM-TV has established itself as the first U.S. independent (October) to apply the new frame synchronizing concept to satellite transmissions with a **Telemation**-supplied Nippon Electric Co. (NEC) FS-10B Frame Synchronizer . . . . **Central Communications TV, Inc.** of Denver City, Tex. has purchased three West Texas cable systems from Commco, Inc. of Austin, Tex. They are Seminole, Seagraves and Van Horn.

### New Switching Company

Robert F. Richardson and James F. Duca, formerly of Computer Image Corp., have formed Duca-Richardson Inc., P.O. Box 2469 Evergreen, Colo. 80439—to design, manufacture and market a new generation of production master control editing and routing switchers for all segments of the TV industry.

### Entr'acte Announces Plans

Entr'acte Recording Society, Chicago, Ill., has announced plans to release a minimum of three albums annually. Only music by classic film composers will be issued, with new releases as well as some reissues of out-of-print albums through contracts negotiated with major labels. The society plans to record their albums in Europe, each disc containing approximately 20 minutes of sound per side. New pressings will be made via Sansui QS encoding.

### Automation Equipment Featured at NRB

Last month *BM/E* covered program highlights and EBS equipment at the National Radio Broadcaster's Convention, Atlanta. The following picks up on the convention floor.

Most notable new equipment at Atlanta was new automation equipment of new sources for automation equipment. Systems Marketing Corp., nearest the entrance door, caught visitors attention immediately with a new DP-2 system. The DP-1 features flexibility in programming—made possible by a state-of-the-art micro-processor. Read out memory took up only seven inches of rack space. A 1000-step subroutine memory was a major feature of the DP-2.

The value of this feature is that if there is a sequence of events that must be repeated more than once, it can be written a single time and stored in the subroutine memory. At such point in

continued on page 19

## RCA TK-76: the TV camera with film camera freedom.



# NEW FROM ALL ANGLES.

An adjustable viewfinder lets you shoot news, sports or documentary action from shoulder, hip, ground, or overhead.

The TK-76 is new from the convenience angle. It's self-contained and weighs just 19 pounds, plus a 6-pound, waist-worn battery pack. So one person can do the job of a whole crew.

There are more desirable features in the TK-76 than you can find in any comparable camera. They include sync generator with gen-lock, automatic iris and white balance, horizontal and vertical aperture correction, sealed shock-mounted prism optics, 12 v. DC operation.

The TK-76 angle on value is new, too: under \$35,000.

Place your order now for 1976 delivery. Write RCA Camera, Building 2-2A, Dept. A-4, Camden, N.J. 08102.



# RCA

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# ANTENNA IMPEDANCE MEASUREMENTS WITH INTERFERENCE IMMUNITY

## The Model SD-31 Synthesizer/Detector

Is...

**NEW**

... designed for antenna impedance measurements in presence of strong interference ■ High-level oscillator compatible with General Radio 916 Series, 1606 Series, and Delta OIB-1 Impedance Bridges ■ Special coherent detector circuit rejects interfering signals during measurements ■ Crystal controlled frequency, variable in 500 Hz steps from 100.0 kHz to 1999.5 kHz ■ Receiver for detector can be external or optional built-in RX-31 ■ Powered by rechargeable batteries ■ Self-contained portable package ■ Field proven ■ Versatile — can use as an RF signal generator for troubleshooting antenna systems; as a variable frequency oscillator for antenna site survey; or other applications requiring a precise frequency source ■ Price: \$1250 complete with RX-31 Receiver — \$995 without Receiver.



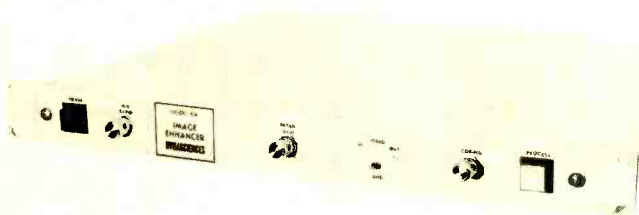
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# image enhancer

- Up to 175% enhancement with adjustable H/V balance
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- Comb filter provides optimum enhancement without chroma distortion or noise addition
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## NEWS

Some fresh concepts in automation were shown by yet another company, Audio Services Inc. This young company, billing itself as "the innovators" showed how it could truly integrate computer control concepts into the daily operation of a radio station.

A sleeper in automation was Ampro. This company introduced a new cartridge player at the NAB show in April. The equipment was on display at Atlanta but not prominently featured since delivery is not ready. The new cart player is in production, however, according to Ampro.

Although still an unproven source for automation equipment, Ampro showed itself to be a growing force in other studio equipment. Its booth was filled with a variety of consoles ranging from a 16-input four-channel mono unit to a 48-input 12-channel dual stereo unit (for simulcast).

Ampro distinguished itself as a leader by showing the first Dolbyized tape cartridge player. This unit drew considerable interest from broadcasters who are striving to put out a signal with less noise or hiss.

On the subject of tape cartridge equipment, we hasten to call attention to something else new—the 5000 multi-deck series from Broadcast Electronics.

This completely new design from BE features the utmost in accessible design. The front panel is hinged so that decks may be slid out—for easy access to the head bucket for alignment. The electronics package is completely removable but operable for testing by virtue of an interconnected ribbon cable. Various subassemblies and components are mounted on sockets for easy, fast replacement.

For the stereo FM broadcaster who wants to be sure, ITC offered an electronically controlled head alignment system. For the broadcaster with limited space, Rapid Q offered the compact Elite tape cart player. Two cart manufacturers were present: Capital Magnetics and Fidelipac. The latter brought along hundreds of off-the-production-line carts and a phase tester to show that all of its new Master Carts are within 60 degrees of zero phase at 12.5 kHz for good mono reception.

Before leaving the subject of cartridge players—for individual or automatic play—we should mention another class of player at Atlanta. Telex showed a background music cartridge player system that could handle a number of carts and it also showed a tape cartridge transport system, the Model 36. This unit could be used in automatic or semi-automatic modes



## NEWS

because of a remote start-stop feature.

We noted nothing brand new in console equipment except for some attractive portable gear from Micro-Trak. Micro-Trak showed an entire transportable studio set-up—turntable, consoles, etc.—composed of units housed in smart-looking fashion colored containers yet durable enough for rough handling. A new piece of equipment from Micro-Trak is the 6440 Audio Control unit. This self-contained unit is self-powered and can handle stereo accepting seven inputs.

Shown at Las Vegas but seen for the first time by many was the McMartin RPU unit for remote pickup and broadcast. The system contains a 40 watt FM transmitter and a quality receiver to promote truly high performance equipment.

In the ever continuing effort to produce better FM, Orban/Broadcasting showed a new FM limiter (described in BM/E, October) and Thomson-CSF unveiled its new "high performance" automatic peak controller, the Volumax 4101/4111. The new unit overcomes the problem of a 75  $\mu$ sec-ond pre-emphasis curve (which limits high frequency modulation) by incorporating a multi-band design for separate control of low-, middle- and high-frequency bands. Distortion is less than 0.5% except for lowest frequencies. Result is a substantial increase in average modulation and a clean sound at the same time.

The foregoing is not a complete run-down of equipment shown, but a selective report on the new. There were plenty of transmitters, antennas, consoles and tape recorders on hand. The reader is referred to the BM/E May issue for more information on the following:

**Transmitters:** AEL, CCA, CSI, Collins, Harris, McMartin, RCA, Sintronics and Sparta.

**Antennas:** CCA, Collins, Harris, Jampro, Phelps Dodge and RCA.

**Consoles:** Broadcast Electronics, CCA, Collins, CSI, Harris, LPB, McCurdy and McMartin.

**Tape Recorders:** Electro Sound, Elpa, ITC, Pacific Recorders and Engineering, Telex and U.S. Pioneer.

In other categories Belar showed monitors and AM stereo techniques, Dolby showed Dolby FM processors, FaxNet showed a new low-cost system of facsimile over SCA, Johnson showed SCA equipment converters and Moseley showed remote control equipment. Orange County and Roh showed audio components, Stanton showed a pickup cartridge. CCA and U.S. Pioneer showed turntables made by them.

BM/E

## RCA TK-76: the TV camera with film camera freedom.



## ONE-MAN NEWS.

Even a one-man crew can get news fast with a TK-76 portable color camera. Aim-and-shoot automatic features deliver film camera quality even in low light. Instant warm-up puts you on-air or on tape just seconds after you're on the scene.

There's no cumbersome backpack or control unit to hold your reporter back from the action. The 19-pound, self-contained TK-76 is powered by a 6-pound battery belt or a car's 12v. DC cigarette lighter.

The TK-76 is great for documentaries and profitable local spot commercials, for specialized sports and studio assignments, too.

Best of all, it's all yours for less than \$35,000.

The list of orders is growing, so place yours now and be way ahead in '76.

See your RCA Representative, or write RCA Camera, Building 2-2, Dept. A4, Camden, NJ 08102.



# RCA

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## VIDEO IV CHARACTER GENERATOR OFFERS MANY PRODUCTION IDEAS.

### A favorite at WREG-TV.

WREG-TV, Memphis, likes the versatility of their RCA Video IV Character Generator. Cal Crowell, WREG Production Manager, uses the system for program and commercial production.

Any created material can be stored



on a floppy disc memory for repeat use on demand. For example, WREG repeats a weather graph, with information updated daily.

### The logo maker.

Video IV is a complete TV graphic production system, offering a variety of type fonts, multiple colors, keyboard and camera compose—even automation, and transfer of logotypes from art work.

RCA has a demonstration tape showing exactly how the Video IV makes and stores logos and graphic designs. Please ask your RCA Representative for a showing.

## TCP-1624 PLUS TK-28 EQUALS THE SUPER AUTOMATIC FILM MACHINE.

### The uniplex concept.

Put a TCP-1624 and a TK-28 together in a uniplex configuration. You get film in, video out, the finest film pictures on air—all without an operator. We call this uniplex configuration the Super Automatic Film Machine, or more correctly The TCP-1624/TK-28 Cartridge Telecine Projection System.

Here are the advantages:

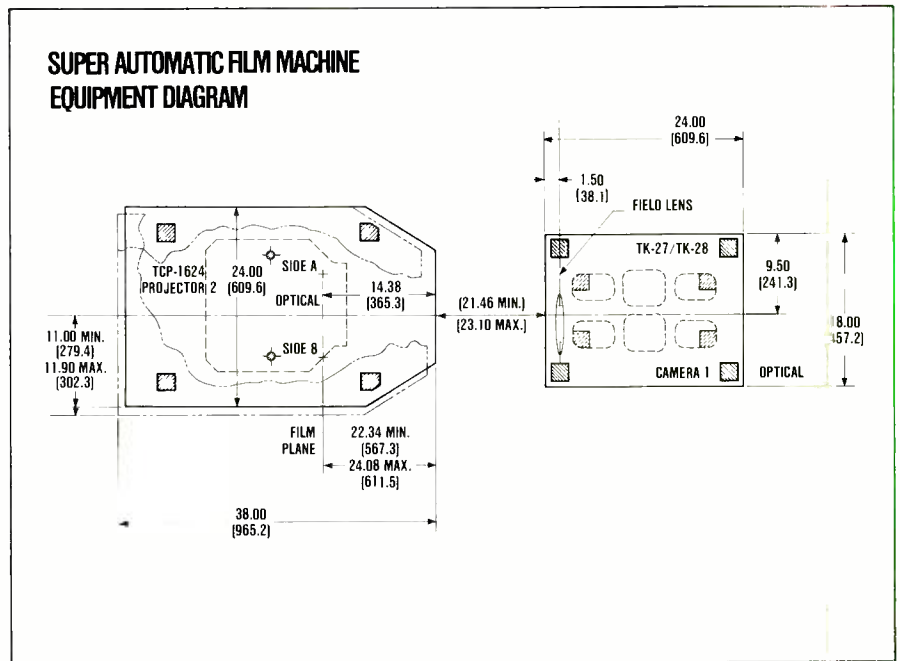
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# RCA

# INTERPRETING THE **FCC** RULES & REGULATIONS

## Equal Time Rule Eased

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

The equal time provisions of the Communications Act of 1934, as amended, have been relaxed by a recent Commission Declaratory Order<sup>1</sup>. The Order was in response to petitions for clarification filed by Aspen Institute and CBS, Inc.

In easing the previously strict equal time rule, the Commission overruled several longstanding decisions<sup>2</sup> that effectively stifled the broadcast of political debates and press conferences by political candidates.

### History

Section 315 of the Communications Act was absolute in its wording: Competing political candidates have absolute equality in the "use" of broadcast facilities. The Commission interpreted Section 315 to mean that the equal time requirements were automatically triggered even if a candidate appeared on a regularly scheduled news program. This position upset nearly everyone and precipitated an enormous outcry. Opponents criticized the equal time rule, as applied, because it (1) violated the public's right to be informed through the broadcast of political events, (2) limited broadcaster discretion to control program content, and (3) raised the spectre of Commission program content control (abhorant to the very premises of the Communications Act).

In response, Congress amended Section 315 in 1959, and added the following four exceptions to the equal time provisions:

- (1) bona fide newscasts,
- (2) bona fide news interviews,
- (3) bona fide news documentaries, and
- (4) on-the-spot coverage of bona fide news events.

In each case the candidate's presence had to be "incidental to the broadcast."

In spite of the apparent rationale behind the amendment, the Commission continued to construe the equal time rules narrowly. The Commission still refused to hold that political press conferences qualified under the exception for "on-the-spot coverage of bona fide news

events." Neither were debates construed as coming within that same exemption. The Commission's rationale was that such an exception would completely swallow the rule.

### Political Debates

Last Spring, Aspen sought a Commission Ruling that the Sec. 315(a) (4) exemption (for on-the-spot coverage of bona fide news events) from the Communications Act's equal time provisions be given "its proper broad remedial construction." The Commission made several rulings<sup>3</sup> during the early 1960's which had significantly narrowed the Section 315(a) (4) exemption. To come under the exemption, a political candidate's appearance in a debate would have to be "incidental to" the coverage of a separate news event. This construction effectively eliminated the exemption (and, in practicality, the broadcaster's desire to provide air time) for political debates. The candidates, obviously, are the center of attention in any such debate.

The Commission rejected this narrow construction of the Section 315(a) (4) exemption, blaming it on past erroneous reliance upon Congressional legislative history. The Commission placed some reliance upon the legislative history of a proposed Bill that never passed both Houses of Congress. The 1959 Section 315(a) (4) amendment that was enacted did *not*, in reality, limit the exemption to candidate appearances that were "incidental to" other news.

Henceforth, the Commission will give effect to the correct Congressional intent that an unduly restrictive policy discouraging news coverage of political candidate activities must not be maintained. The administrative task of the Commission is to determine whether the broadcaster has made a "reasonable *news judgement*" as to the newsworthiness of (1) particular *events* and (2) individual *candidacies*—regardless of whether the candidate is "central to" or "incidental to" other news in the program.

The Commission recognized that an unscrupulous broadcaster will theoretically have the opportunity to characterize *any* event as "newsworthy" (so long as it is

continued on page 26

<sup>1</sup>*Political Debates and Press Conferences*, 35 RR 2d 49 (1975).

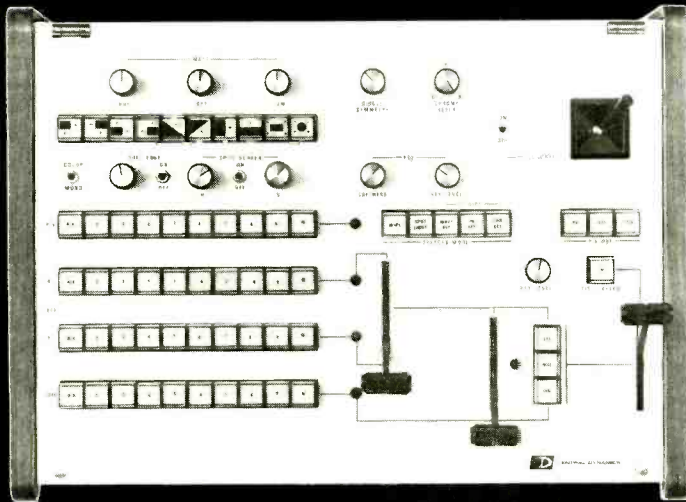
<sup>2</sup>*The Goodwill Station, Inc.*, 24 RR 413 (1972); *National Broadcasting Co., Inc.*, 24 RR 401 (1962).

<sup>3</sup>E.g., *The Goodwill Station, Inc.*, *supra*.



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## FCC RULES & REGS

covered (1) live and (2) on the spot) if he is determined to give partisan aid to a particular candidate. The likelihood of abuse in prominent national and other political contests, according to the Commission, is remote. Potential abuse on the local level was brushed aside because "... the absence of abuse in the past 15 years of a broadcast news exemption fails to support the doom-sayers' thesis..." Others, besides the Commission, are not so sure.

### Press Conferences

As with debates, press conferences may now come within the Section 325(a) (4) exemption to the equal time rule even if the candidate is central (versus incidental) to the news event. Again, the Commission affirms that it defers to broadcasters' exercise of "good faith news judgements" so long as such are maintained within the parameters of "reasonableness."

Broadcasters are warned that *newsworthiness* is not the only test that the Commission will use to review invocation of the exemption. Another test is whether or not the broadcaster *intended* to benefit a particular candidate by press coverage.

A CBS contention that presidential news conferences constituted "bona fide news interviews" and, hence, were exempt from the equal time rule pursuant to Section 315(a) (2), was rejected in the Commission's Declaratory Order. CBS reasoned that the subsection's

legislative history indicated that a "bona fide news interview" must be "a regularly scheduled program." Since presidential news conferences are "recurrent in the normal and usual course of events," argued CBS, they should come within the Section 315(a) (2) exception, *even if* they fail to come within the Section 315(a) (4) exception due to lack of actual "newsworthiness." "No," said the Commission. The Section 315(a) (2) exception applies *only* to news interviews whose *scheduling* is at the *sole discretion* of the broadcaster, or network (e.g., "Meet the Press"). For example, presidential news conferences may recur regularly, but specific scheduling is at the whim of the President.

Furthermore, the broadcaster must also exercise *sole* "control over *content* and *format*" for a news interview to come within the Section 315(a) (2) exemption.

### The 1976 Elections

The Democratic National Committee roundly attacked any easing of the equal time rule, saying that "irreparable harm" will result to any presidential candidate (specifically the DNC's 1976 candidate) who opposes an incumbent president. The DNC predicted that an incumbent's press conferences will mutate into campaign speeches thinly veiled as "newsworthy" presidential messages to the Nation.

The Commission conceded that this is a danger, but concluded that the overwhelmingly more important fundamental right of "the public to be informed through broadcasts of political events" militated against DNC's arguments.

The Commission also shied away from making a distinction between a press conference called by an incumbent (1) in his/her official capacity and (2) in furtherance of his/her candidacy. To do so would put the Commission dangerously close to "control of program content"—a situation (as virtually all will agree) to be avoided at all costs.

### Conclusion

For the first time in nearly 15 years, the Commission has relaxed its equal time rules. Political debates involving candidates for public office may be exempt from the equal time rules if the debates are (1) broadcast live, and (2) constitute bona fide news events (i.e., are truly "newsworthy"). Press conferences by incumbent candidates may likewise be exempted from the equal time rules. In either case, the exemption is not lost if the candidate is the central figure in the news event.

The equal time rule question is by no means settled. While attempts to stay the Commission's interpretation of Section 315 have failed at the U.S. Court of Appeals level, outright appeal from the Commission's new interpretation is probable. Congressional action also remains a possibility. The House Communications Subcommittee may hold hearings on the matter. Several different bills have been introduced proposing, among other things: (1) a Section 315 exemption for presidential and vice presidential candidates, (2) a Section 315 exemption for candidate-reporter question and answer programs and (3) outright repeal of Section 315.

Controversy swirls around the equal time rule because its very codification resulted in a mechanical doctrine that, in reality, demanded a flexible fairness doctrine. The rule may be amended, yet again, in an attempt to achieve a greater measure of fairness. **BM/E**

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# Kodak salutes the NPPA "Newsfilm Station of the Year"



Left to right: Ernie Schultz, Information Director and anchorman for the noon news, Gene Allen, Assignment Editor, Jack Ogle, News Director and anchorman 6 P.M. news, and George Tomek, anchorman 10 P.M. news.

## This is the heart of WKY-TV.

For the second time in seven years, WKY-TV's newsfilm department has broken the bank. Oklahoma City's Channel 4 was again named "Newsfilm Station of the Year" at the National Press Photographer's Association (NPPA). This time, for 1975.

Featuring locally originated film from all over Oklahoma, the station broadcasts three half-hour news reports a day, with three 5-minute news breaks as well. When that news is gathered, the camera crews come out shooting, with four

CP-16 cameras. And Kodak Ektachrome EF film 7242 (tungsten).

## And this is the backbone.



Darrell Barton, chief photographer.

Without good people like this, Channel 4 could be just another spot on the dial. Take Darrell Barton, 1974's "Newsfilm Cameraman of the Year." Or Director of Information Ernie Schultz.

"We have a strong commitment to telling local stories in depth on film," says Schultz. "We'd rather tell four good stories than have eight talking heads." This philosophy pays off. WKY-TV News won six out of nine Associated Press awards for superior reporting this year. All of them are trained to originate newsfilm, and most of them carry portable cameras.

Where do they stand on ENG?

"There are some real benefits in seeing appropriate stories as they are happening," says Schultz. "But we think the audience would become bored quickly if we tried to give that kind of urgency to most stories."

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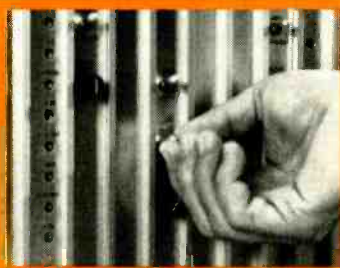


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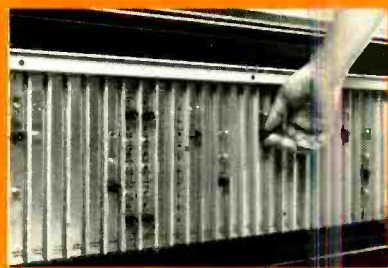
## Setup Controls



Instant visibility, accessibility, changeability. Maintenance is a cinch on AVR-2 because everything is clearly marked and accessible. There are no confusing, unmarked boards or flashing lights.



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—or open the door and quickly switch into variable operation to adjust for any unusual condition. Switches are locking type toggles, so a knee-bump can't change their position. And don't worry about air circulation, either. AVR-2 is air-cooled whether the door is open or not.

Circle 122 on Reader Service Card

# Here Are The New EBS Two-Tone Systems: You Have To Buy One Before Next April 15th.

FCC-approved equipment for the new two-tone interstation signal of the EBS is now reaching the market, and BM/E lists here all models approved up to press time. The article also gives a quick review of the EBS operation as a whole, and of the part played in it by the interstation signal.

By April 15, 1976, every broadcast station in the United States must re-equip in order to handle a new interstation signal for the Emergency Broadcast System.

The Federal Communications Commission has established a new kind of signal, consisting of two audio tones simultaneously broadcast, and this requires a total changeover in both generation and detection equipment. The whole industry is locked in with about a dozen intrepid hardware makers who have elected to go along on what is largely a one-shot marketing operation.

With a little more than four months to go (after this first appears in print) the broadcaster needs to learn pronto what's available and what his options are. In the table accompanying this article we list all the EBS two-tone equipment that the respective makers had announced as ready for the market when we went to press.

But no manufacturer will sell you his EBS units unless they have been approved by the FCC—type acceptance for the encoder, certification for the decoder. We have

put an asterisk opposite each model that had the FCC go ahead' at the time this issue went to press. In the January, February, March and April issues we will update the table, indicating all those that have FCC approval up to press time for each issue.

The broadcaster in a hurry can get up-to-the-day information by calling the FCC on 301-953-9850, or writing the FCC Laboratory at Box 40, Laurel MD 20810.

## What is the two-tone signal?

In the box directly below we summarize the characteristics of the new two-tone signalling system established by FCC order, as amended August 1, 1975. The original order came in December, 1974, setting up the new signal, with a deadline of January 15, 1976 for its implementation. Several manufacturers developed equipment for the system (some shown at the NAB in April, as BM/E reported), with the understanding that it could be bought only after "approval by the FCC" for each

## The Characteristics Of The Two-Tone Signal System, As Specified By The FCC

The specifications shown here were established by the FCC in an amendment to the Regulations adopted August 1, 1975, and released August 14, 1975. The earlier description of the EBS two-tone interstation signal, issued in December 1974, was superseded.

### Encoder

**Function:** To give an alert by demuting a monitoring receiver at the station receiving the signal. The monitor is continuously tuned to the sending station for EBS information.

**Signal:** Two simultaneous audio frequencies, 853 Hz and 960 Hz, each  $\pm 0.5$  Hz.

**Harmonic Distortion:** Not to exceed 5% of each tone at encoder output.

**Minimum Level:** Each tone must be capable of modulating the transmitter to not less than 40%, with all equipment ordinarily used in the audio line between the encoder and transmitter. To assure this, the specification further says that the output at each audio tone shall be at least +8 dBm into a 600-ohm load. The unit shall allow calibration of each tone separately.

**Time Period:** On activation, the two tones shall be generated for not less than 20 seconds nor more than 25 seconds.

**Operating Temperature:** All foregoing specs maintained in ambient temperature 0° to 50°C.

**Humidity:** All specs must be maintained up to 95% relative humidity.

**Supply Voltage Variation:** Operation must be within tolerances with supply voltage from 85% to 115% of the rated value.

**Testing Conditions:** Must maintain the frequency, distortion, and time period specs in a minimum RF field of 10 v/M at a frequency in the AM broadcast band, and with a minimum RF field of 0.5 v/M in either the FM or TV frequency band.

**Indicator Device:** A visual and/or aural indicator must show clearly that the device has been activated.

**Switch Guard:** The activation switch must have protection which will prevent accidental operation; this must include remote-control switches.

### Decoder

The decoder must be activated only on *simultaneous detection* of the two audio tones, 853 Hz and 960 Hz. This simultaneous reception must demute the monitoring receiver. The additional capability of activating an external alarm is not *required*, but has obvious value.

To prevent falsing, the decoder must have: a time delay not less than 8 seconds, and not more than 16 seconds; must have bandwidth such that there is no response to tones that vary more than  $\pm 5$  Hz from each of the frequencies, 853 Hz and 960 Hz.

The decoder must have a reset switch, for returning the receiver to a muted state after activation.

The decoder must maintain all the foregoing specifications in ambient temperature from 0° to 50° C.



model.

However, the FCC for a considerable period was concerned with developing the approval and certification procedures. In addition, there was a strong current of comment from the industry that the frequency tolerance of  $\pm 2.4$  Hz for the decoder would require very costly design, and was well in excess of what was necessary to control falsing, which had been one of the main difficulties of the earlier system (see below on that).

The FCC finally pulled it all together in the amendment of August 1st, 1975. This spelled out the required frequency characteristics with tolerances deemed tight enough to reduce falsing to negligible levels, when added to time delay in the decoder and other specified characteristics. The order also set the installation deadline at April 15th, 1976. The description of the two-tone system shown in the box accompanying this article is that of the August 1st, 1975 amendment and all earlier specifications can be ignored.

### Why a new signal?

The EBS has been in existence since the early 1960's, and has included an interstation signal: the sequence of two five-second interruptions of the station carrier, with a five-second interval between, then immediately a 15-second 1000-Hz tone. This system will be strictly maintained as part of EBS until April 15, 1976, when the new two-tone signal takes over. The industry has been using this signal, with a majority of stations participating in the EBS, for a decade or more.

The main trouble with the old signal has been a high susceptibility to falsing. The decoder could be activated by accidental carrier interruptions, and this was especially true with certain makes of equipment which were designed, for "economy," to trigger on only *one* event, the interruption *or* the tone, although the FCC intention had been for a two-event, or "and" trigger.

A number of station staffs, according to the FCC, eliminated the annoyance of repeated false alarms by simply turning the monitoring receivers off, and thus seriously impairing the EBS operation. The two-tone system is aimed at eliminating this inefficiency, and is based on nearly a decade of discussion between the FCC and elements of the industry.

### How does the signal fit into the EBS?

The operation of the EBS, although it is 15 years old, is still clouded with confusion in the minds of many station staffs. BM/E believes that a fast review of the whole operation may be welcomed by a number of readers.

In addition, the operation has gone through much refinement over the years. In particular, there is being created right now the framework for state and local EBS nets which will give many broadcasters new and fruitful opportunities for local service—we will describe that in more detail below.

EBS evolved from Conelrad, the war-time and post-war system for warning people of impending air attack, and for turning off broadcast carriers that might function as navigation aids for enemy bombers. In the early 1960's it became clear that Conelrad was obsolete. Ballistic missiles don't need help from broadcast signals in the target territory: there was no longer any sense in turning broadcasters off.

In addition, when the *emergency information* function

was set up separate from the *warning* function, the functions of the various alerts were altered. *Warning* is now the responsibility of the Defense Civil Preparedness Agency, which maintains a network of landlines to about 2000 points, plus a system of sirens to warn the public.

EBS is for delivering *emergency information* quickly to the entire country—we will learn through it where to go, what to do, what's happening. The broadcaster's participation in *information* transmittal is voluntary: about 95% of broadcasters have elected to join. But broadcasting the *interstation alert* is mandatory; every station must do it.

The message will go by wire to stations that are on any of the major networks, or that have AP or UPI wire connections. Other participating stations must get it by off-air monitoring of a station on one of the nets, and will rebroadcast the message from the monitor—the one case, the FCC noted to BM/E, in which a broadcast station can rebroadcast material picked up from another station off the air without special FCC authorization.

Those that will broadcast the emergency message are called "primary stations;" another group, the "alternate stations," will tell their listeners that an emergency message is coming, advise them where to pick it up, and then go off the air. The designations of stations into primary and alternate, their assignment to an "operation area," and the stations they must monitor in an emergency, have all been planned by the FCC.

Any station management that has misplaced either the EBS Operational Map (which shows station monitoring assignments for the station's area), or the EBS Check List, telling how to handle an EBS alert, should ask the FCC for new copies immediately.

Non-EBS stations, as noted, also send out the two-tone signal, tell listeners to tune to a primary, go off the air; but they don't stand by, as alternates do (see below).

### President-to-broadcaster-to-citizen: down the EBS line

To see what the two-tone interstation signal has to do with all this, we can follow through in more detail a **hypothetical** activation of EBS.

Americans are in a panic from dozens of reports that an armada of Soviet submarines is tightening an underwater noose around the country, operating a few miles off every ocean coast. People are beginning to take off from their homes along the coasts of California, Texas, Florida, New England, etc, and stopping this movement before it jams the whole coastal countryside is one of the government's top-priority objectives. To catch the panic before it becomes unmanageable the President must reach the whole country in 15 to 30 minutes (the estimated time for full message delivery by EBS). He orders an alert signal sent to either ADCON (Air Defense Continental Command) or USICA (United States Army Interagency Communications Agency), through one or the other of which the message will go. Then:

ADCON or USICA sends an alerting message to the headquarters of the major networks, to AT&T, and to the two national wire services, AP and UPI.

AT&T structures the networks according to a pre-arranged plan for one-source national coverage; AP and UPI similarly prepare for a national priority message.

With all the lines ready, an "Emergency Action Notification" (EAN) goes to all stations on the networks and on the AP or UPI wire lines, by voice on the network, by



## EBS TWO-TONE SYSTEMS

teletype on the wire lines. The teletype EAN will start with a full row of "X's" and 10 bells, and end the same way. The message starts "This is an Emergency Action Notification requested by the White House," gives an "authenticator word" (previously sent to all relevant stations), and tells the station to follow the procedures on the EBS Check list.

Every station getting the EAN by network or wire announces "We interrupt this program: this is a national emergency"—TV stations, in addition, show an EBS slide on video.

*Every station getting the EAN by network or wire then pushes the start button on the two-tone interstation signal encoder, and proceeds according to whether its a primary, an alternate, or non-EBS (see below).*

Stations not on a net or on the AP or UPI wire will get the alert over the air, either by receiving the two-tone signal, or by hearing the EAN, or usually by both, both being broadcast from the monitored station. The station will then push the start button on its two-tone encoder, and proceed, like the on-net stations, according to whether it is a *primary*, an *alternate*, or non-EBS.

Primary stations make an announcement, set out in detail in the EBS Check List, which begins: "This is an Emergency Action Notification. All stations shall broadcast the Emergency Action Notification Message. This station has interrupted its regular program at the request of the White House to participate in the Emergency Broadcast System. . . ." The *prescribed* announcement then goes on to tell listeners that some stations (including the one in question) will stay on the air with the emergency information; to be sure to listen to a station in their own area; not to use the telephone; that the EBS has been activated to keep citizens informed. This is repeated as often as needed to fill time to the actual message.

Note that no word is given that information on the submarine scare is coming through; even though everyone, broadcaster and listener alike, will naturally assume that the message has something to do with that emergency, the lead-in or stand-by announcements must never try to anticipate the President's message or provide speculation about it: the forms for those announcements, as noted, are *strictly prescribed*.

The *primary* station, after beginning the lead-in announcements, must continue to monitor another station or stations, according to its EBS assignment. For this purpose the EBS receiver-decoder system can be put in the "listen" mode that most provide (see the list of equipment).

The *alternate* station, after sending out the two-tone signal, proceeds with announcements in the same vein as those for the primary station (they too are spelled out in the EBS Check List), except that listeners are told that the station will go off the air, and that they must tune to one or another designated EBS primary station in their area. After one or two repeats, the alternate station *does* remove its carrier from the air, but stands by in operational readiness, ready to put the emergency message on the air if called on. This station, too, must continue to monitor its assigned primary or primaries.

Educational FM 10-watters are a special case: they do not send out the two-tone signal. They are *not* required to have the encoder. But they *must* have the *receiver-de-*

*coder* equipment, must monitor an assigned station, and must instantly interrupt their program on receipt of the two-tone signal or on hearing an EAN. Then they proceed according to whether they have been designated a primary, an alternate, or non-EBS. They were relieved of the cost of *sending* the two-tone signal because their limited coverage was judged not worth it.

Hopefully, getting this all put together will take only a little longer than it takes to describe it here, and in 20 minutes or so, some very large proportion of Americans will be listening to the President when he speaks the following highly reassuring words:

"Fellow citizens: return to your homes! As a result of negotiation with the Soviet government at the highest level, the submarines near our coasts are withdrawing immediately. Full details on the negotiations will be transmitted to the country at a later date. Meanwhile, all danger to our coasts has ended!"

All stations are required to record the whole course of their involvement in EBS, including the actual messages. They must continue to stand by on the system until termination messages come through, as described in the EBS Check List.

### The two-tone signal is a back-up that EBS must have

As the foregoing indicates, the function of the two-tone signal is to reinforce the activation procedures received via network or over the air; to catch stations that may miss the activation from other sources due to lapse in attention to the monitoring; to go down lines of communication domino fashion, making sure *everybody* is alerted, picking up stations that are stragglers for any reason. The designers of the system see it as an essential fill-in: a redundant alert for some parts of the operation, but a necessary element of other parts. The fact that every station in the country (except FM 10-watters, as noted) will *send* the signal as well as *receive* it gives the system designers much higher confidence in the effectiveness of the EBS than they would have without such a station-to-station alert.

### Coming up: state and local EBS, for enlarged community service

As a spokesman for EBS said to BM/E, we all hope we are right in our feeling that an emergency requiring national activation of the system is a remote possibility at the present time. The 95% of American broadcasters who have joined up for this voluntary service to their country may never be called on in a real national crisis. But every American will feel better from knowing they have prepared themselves.

Moreover, many stations are likely to get an ongoing chance for community service through *state* and *local* EBS operational plans. Commissioner Charlotte Reid of the FCC acts as Defense Commissioner. Under her, the Emergency Communications Division is actively aiding in the formation of state and local EBS operational plans, which could be called on by state and local officials for a hurricane, a flood, a forest fire, or any other event that makes it crucial to reach all the people in the area quickly with information.

To function in a state or local net, the broadcaster does not need national EBS authorization. Station managements who would welcome EBS activity should ask the relevant officials how the community stands on EBS:

continued on page 34



# GUARANTEED FOR 15 SECONDS

Two relays.  
495.00

FCC Type Accepted and Certified



When that real emergency happens, the 25 second EBS alert signal can be the most important air time in your operating history. FCC has now strengthened the EBS Alert Signaling Requirements starting April 16, 1976. To help you meet this requirement, TFT has built its new Model 760 EBS system as failsafe and versatile as humanly

possible . . . and priced it within easy reach of every broadcaster. Write or call for full facts and features.\*

Outside of California call toll free  
800-538-6884

\*System price starts at \$140.00

**EBS 760 - READY WHEN IT COUNTS**

**TFT** TIME AND FREQUENCY TECHNOLOGY, INC.  
3000 OLCOTT STREET, SANTA CLARA, CA 95051 (408) 246-6365 TWX No. 910-338-0584  
Circle 123 on Reader Service Card

## EBS TWO-TONE SYSTEMS

every broadcaster's help is certain to be important.

### A free plan for your state EBS

The Defense office of the FCC has drawn up a model

## A List of Available EBS Two-Tone Signal Equipment

Each of the listed models is rated by the manufacturer to meet, or better, the FCC's required specifications as shown in box accompanying this article. Each decoder is designed to mute the attached monitoring receiver and to demute it on receipt of the two-tone signal. Each decoder has the reset provision specified by the FCC. Other facilities of each model are shown in the listing. **Note: an asterisk in front of model designation indicates FCC approval received.**

Maker	Model	Price
Audio Eng. Co., Gary, Indiana	*TE-606/TD-707	\$295.00

Integrated encoder/decoder sold only as a unit. Tone produced by CMOS dividers from two crystal oscillators. Encoder: 600-ohm output, to high-level input on console; activation lights panel LED, and operates a relay for external switching, if wanted; panel switch provides internal test of whole unit. Decoder: establishes band centers based on encoder tones, with pass band set by digital circuitry; signal received must be at least 100 mV, into 10,000 ohm bridging transformer input. Receiver level can be set in "listen" mode. In demute, LED flashes on peaks, to show proper audio being received. A two-tone alert lights a panel LED, demutes receiver, operates a 1-amp SPST relay.

Audio Services Co., Detroit, Mich.	EBS-1, Encoder	\$250.00
	EBS-1, Decoder	\$125.00

Momentary depression of "Transmit" button interrupts normal program and sends tones for required period. A "by-pass" mode sends tones to auxiliary output only, for test; "level set" mode allows level setting during use. Decoder: has built-in loudspeaker; optional plug-in relay assembly is operated on receipt of alert; an additional LED indicator circuit, also with optional plug-in relay, is operated if the audio falls below adequate level in the demuted mode. Closed circuit test mode allows test with EBS-1 encoder.

Bramco, Div. of Ledex, Piqua, Ohio	*EBS-1226	\$349.00
---------------------------------------	-----------	----------

Combined encoder-decoder. Encoder automatically resets after 22-second transmit. Output: 600 ohms transformer isolated, automatically disconnected when not transmitting. Decoder: lights indicator, operates external relay, as well as demuting receiver. Closed-circuit test mode allows encoder-to-decoder test, isolated from audio line. Test points for both on front panel.

Elcom Engineering Co., Santa Ana, Calif.	*EBG-1, Encoder	\$275.00
	*EBS-10, Decoder/ Rec'r	\$225.00

Encoder: output 150/160 ohms, transformer, balanced or unbalanced; independent tone level and timing controls; control and indicator for abort. Internal relay and circuits for automatic program control, loop-through. Closed circuit test mode, when connected to decoder. Decoder/receiver: includes a two-channel AM receiver; can be used for present MHz signal, convertible to two-tone by removing two jumpers. Internal speaker; carrier level indicator for checking operation during demute; responder can operate with another receiver (AM or FM), with minimum output of 30 mV. External relay operates on alert.

Gorman-Redlich Mfg. Co., Athens, Ohio	*CEB (Encoder- Decoder Units	\$195.00
	*CE (Encoder Only)	\$145.00

Encoder: 600-ohm output, transformer; front panel abort switch; automatic substitution of signal on audio lines on activation; front panel test jacks. Decoder: Minimum input, 100 mV each tone; input, 6 ohms for activation from monitor receiver output transformer; removal of 6-ohm resistor leaves input of 4700 ohms in series with .05 mf. Relay for external alarm, 2 amp.

EBS plan which can be used in all states, with amendments. Copies will be sent to any state that wants to get involved in the plan. Call or write the Defense office of the FCC and ask for the plan.

Harris Corp. (Mfg. by  
Neff Electronics)  
Quincy, Ill.

\*EBS Aler  
Encoder  
\*EBS Aler  
Decoder

Encoder: automatic removal of program audio and tones, on activation (if desired); audio loop-through, balanced output. Time period adjustable, 20 to 25 seconds. Stability, 4 ppm/year. Decoder: input, 100 mV to 7.5 V, balanced or unbalanced. Source impedance, 2 ohms, balanced or unbalanced. Time delay adjustable, 5 to 13 seconds. SPDT, for external alarms, operated on receipt of signal.

International Nuclear  
Corp.  
Nashville, Tenn.

\*NIAC, Encoder

Output, 600 ohms balanced or unbalanced. Automatic reset after activation. Remote operation on control and abort. Front panel test switches.

McMartin Industries, Inc.  
Omaha, Neb.

\*TG-2/EBS, Encoder \$225.00  
\*EBS-2, Decoder \$99.50  
AMR-1, AM Rec'r \$99.50  
FMR-1, FM Rec'r \$99.50  
(Note: FCC approval  
not required for  
receivers.)



Encoder: has both manual or auto timing, with a "continuous output pushbutton" and a "timed output." Remote controls can be used for all functions. Decoder: required input, 100 mV; can be used with McMartin receivers, or with others that have proper output level; has listen mode, reset switch, internal loudspeaker, relay for external alarm, provision for remote reset. Two receivers can be connected simultaneously; circuitry for carrier failure alarm is included.

Monroe Electronics  
Lyndonville, NY

Model 920 (Decoder  
only) \$298.00

Input, 10 mV to 2 V rms; tones may differ in amplitude by 10 dB. Input Impedance, 20,000 ohms; will operate in the presence of noise equal in amplitude to larger signal tone. Audible alarm plus relay closure, SPDT, 1 amp at 120 vac.

Time & Frequency  
Technology  
Santa Clara, Calif.

\*760-04, Encoder \$195.00  
(module)  
\*760-03, Decoder \$100.00  
(module)  
760: Cabinet \$40.00  
assembly (must be  
used, holds up to  
three modules)  
760-01: AM synthe- \$135.00  
sized receiver  
(module)  
760-02: FM fixed- \$100.00  
tune receiver  
(module)



Entire system, including receiver, encoder, and decoder, can be put in one cabinet. Alternatively, encoder can be put in one cabinet (for installation near transmitter, for example), and receiver and decoder in another cabinet.

Encoder: two front panel COMMAND switches, must be operated together, to prevent accidental activation. On start, program audio is removed, tones inserted, and emergency program audio (monitored signal) connected. COMMAND and RESET can be remoted.

Decoder: can be used with the modular receivers, 760-01 and 760-02, or with any receiver having at least 100 mV of audio output. Amplifier and loudspeaker are built in. AM receiver: continuously tunable, using frequency synthesized local oscillator, tunable in 10 kHz steps with thumb wheel. Carrier light is on when station is received. Rear panel connections for carrier-off alarm circuitry. FM receiver: two channels, selected by push-button; crystals for each channel factory installed; carrier light on when station is received, connections for carrier-off alarm circuitry.

Approved by state and local governments, on application of local conditions. Official, or broadcaster, who is needed for local conditions. Office at...



# HOW TO GET A SECOND CAMERA WITHOUT PAYING FOR IT.

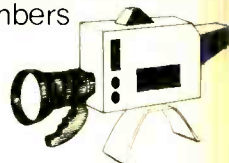
Economic realities being what they are, improving your camera setup often boils down to a battle of program quality versus pocketbook: For some assignments, you want the mobility and compactness of a hand-held camera. For others, the long focal length and high zoom ratio of a first-rate mobile. And sometimes, of course, the virtues of both. But what can you do on a one-camera budget?

Logical question. For which we have a logical—and economical—answer: Canon Versatility Packages. A family of two-lens systems which give you both capabilities, plus a quick, positive attach/detach system that's the closest thing to two cameras for the price of one.

Take our Plumbicon\* Package, for instance. When you need compactness and high mobility, there's the PV10x12B—the world's most popular electronic news gathering lens. Featuring an 18" minimum object distance and a 55.4° wide angle, it's the lightest professional 10:1 around. One of the smallest of its type, the PV10x12B features remote CCU iris control with manual override, and fully-motorized variable-speed zoom.



Where applications require a longer focal length, there's the other half of the Package: our PV34x24B-DZ for 25mm and the P34x32 for 30mm. A mouthful of numbers which add up to the most versatile remote lenses available today. The basic lens is a 24-400mm automatic iris f/1.8 with built-in double zoom that yields a long, long 800mm. Thanks to its continuous, stepless magnification, you can operate at maximum light efficiency while tailoring the focal length precisely to your needs. Vary field of view from 29.8° to 0.9° controlled by the cameraman on the air, with no blanking periods or cumbersome supplementary lens insertions. And work to a minimum object distance of just 1.8 meters. Mounted on a rugged, lightweight camera base plate with a universal head fitting, either lens is easily attached and detached from the camera.



The Canon Plumbicon Versatility Package comes complete with all controls, accessories, and protective cases. Like the other Versatility Packages we offer for other formats, it's a great way to keep your cameramen happy. Without upsetting your controller. For more information, please write or call.

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Circle 124 on Reader Service Card

# BEST STATION AWARD CONTEST

We are delighted to present here nominations for BM/E's 1975 Best Station Award, submitted in response to our August-September announcement. In the nine entries that follow you'll find some very impressive thinking, dollar-conscious thinking. You be the judge and vote for the effort or job done that most impresses you. Vote for the type of thinking that impresses you—try not to be swayed by the overall elaborateness of the plant. We want to reward the response to the challenge—not the size of the challenge. Vote by simply picking the letter entry that most impresses you and circle that letter on Reader Service Card. We have combined the FM and AM categories earlier announced into a Radio category because of so many combination stations. The two entries garnering the most votes will receive a Best Station Award plaque. The one entry in TV receiving the most votes will receive a plaque.

## Making A Student-Run AM-FM Production And Control Center Do Triple Duty

### BEST STATION AWARD CONTEST RADIO ENTRY A

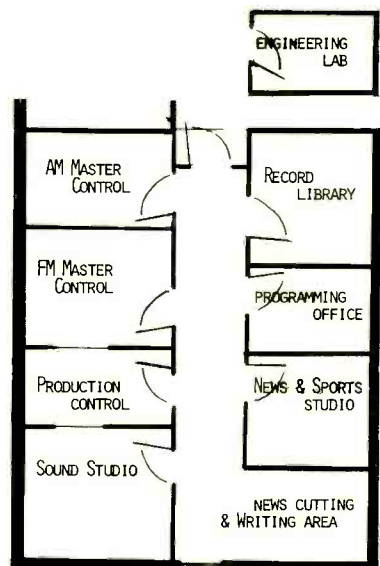
*Submitted by John McNeill, Program Director, WIDR, Western Michigan University, Kalamazoo, Mich.*

We faced an extremely unusual situation when we designed our FM station. WIDR has been the student carrier-current station at Western Michigan University for 25 years. When we added our non-commercial FM, a studio and control system had to be devised that would serve the two very different programming needs.

In addition to the broadcasting role, we provide a training laboratory for media students. Our studios had to be designed to withstand the abuse meted out by untrained operators, and still meet the complex and varied requirements of both stations.

As in any installation, the design had to provide flexibility and accessibility for optimum cost-efficient operation; and in our case, on a budget a student organization can afford. Getting the right design would seem to be all the more difficult since it had to be produced by a student. This is how the job was accomplished within our strict limits of space and money.

Our low power license meant we had to take 10 watts and push it as far as it would go. Using a four bay antenna and a 3/8-in. pressurized line we are actually able to get 40 watts E.R.P. From an antenna height of



Layout of WIDR

*Four bay antenna develops 40 watts E.R.P.*







*FM Master Control showing Telco blocks*



*AM Master Control*



*Production Control Room (seen from FM Master Control)*



*Tracing connections on back of production control studio*

154-ft., we can cover the large Kalamazoo metropolitan area (approximately 14 miles in diameter) with a good stereo signal. This is quite a bit better than what is usually referred to as "down-the-block-broadcasting."

We are not required to have remote monitoring of transmitter functions because of our low power, but plans are underway to get them anyway to insure a quality signal and to avoid maintenance problems. We do have remote control of basic on-off transmitter functions from our main studio, as well as direct communication by closed-circuit phone, through systems of our own design.

The studios were designed to insure simple operation, accessibility and versatile applications, with the human factor a main consideration. There are no announcer/engineers more prone to mistakes than beginners, which made ease-of-operation first on the list of priorities.

The FM programming is largely progressive rock, almost entirely from disc recordings, but with a good mixture of news, community programs, psa's, university activities notices. The McMartin control board has 27 inputs which take care of the several turntables, the two reel-to-reel Revox tape recorders, live mikes in sound studio, news room, announce mikes, and cart machine—we play about one cart per hour. The layout of the FM studio follows the best commercial practice for highest efficiency. The board can be operated from a standing or sitting position, with all control functions

within easy reach of the operator. All copy, clocks, and weather gauges are visible from the microphone position. Adequate work areas for logs, LP covers and tapes are also integrated into the design.

To meet the demands of our two different stations, the production center has to provide both on-the-air and recording studio capabilities. It is used in the average day to record public affairs programs, live music, commercial production and serve as back-up studio for both the AM & FM stations. It is a flexible installation.

The center includes a main production control room and a connected sound studio. Because our second priority is to provide training, the production control console is set-up identically to the main FM console. This will give a trainee several hours of practice before he even steps into the FM Control Room and gives FM operators instant familiarity with the production control.

The twin Dolbyized Revox recorders teamed with the 27-input McMartin stereo console provide more than adequate room for innovation and experimentation. The room also has delay capability for live talk shows.

The sound studio is furnished like a living room to put nervous guests in a comfortable setting. We can handle both stereo and monophonic programs with anything from small groups to large choirs.

We also have two monophonic studios, one for news control and one for AM master control. The news and sports is simulcast over both stations from the news



studio. This saves time and duplication hassles and gives the news department their own actuality production center.

The AM (carrier-current) programming is Top 40. The choice is based on, first, the audience, which is predominantly the younger audience in the university dormitories; and secondly, on the rigorous training a Top 40 format supplies student operators. The fast flow of short tunes, DJ chatter, announcements require a high rate of switching and control operations that prepares the students for working under high pressure.

The AM studio, like the FM, follows the best commercial layout practice for high efficiency, with automated and remote control features appropriate to the operation. It is completely integrated into the station patching system described later.

There is also a full-track Ampex recorder mounted in a rollaround cabinet that can be used wherever it is needed. It can be used to edit tapes anywhere there is an AC outlet. This is important because amateurs might tie up studios for hours just splicing tapes.

Because we do have limited space, it had to be used efficiently. The station has a comfortable and deceptively roomy feel, which further relaxes our staff. It is also important that the engineering staff be able to work comfortably and easily.

All equipment and termination points are located for ease of alteration and repair. Most maintenance can be done from a standing or sitting position. When not under scrutiny, terminations disappear behind access panels. All equipment racks are located centrally within the studios to provide both back and front entry.

All audio equipment, including mixers, recorders, monitors, amplifiers, audio processors and telephone line inputs are routed through patch bays in the studios and the master patch system in the engineering lab. This gives both operators and engineers access to anything in the station, from any point. The engineer can test almost every piece of equipment and never leave the lab.

All connections terminate on Telco type connector blocks. It shortened construction time by days because there was no need to strip and then solder the connections. The terminal points clamp right through the insulation to make contact. This makes access to any connection quick and alterations possible with just a pair of pliers.

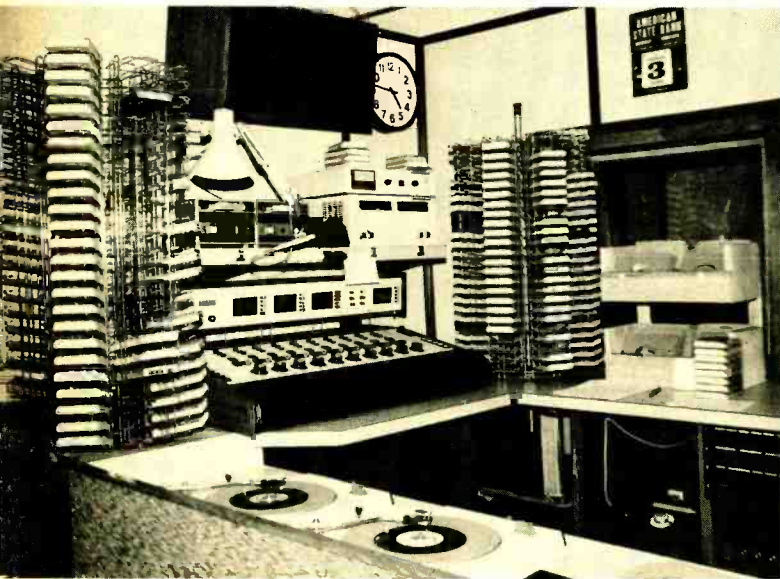
The best and most important aspect of the design is that it works. We began 24 hour operation on July 7th, 1975, and have put the engineering and design to every test. It has come through with tremendous results. We are sure we have the finest student operation in the Mid-West and we are proud of it.

## High Efficiency For A Rock Combo Operator At Moderate Cost

### BEST STATION AWARD CONTEST RADIO ENTRY B

*Submitted by Steven Terhaar, Chief Engineer,  
KVOX AM, Moorhead, Minn.*

KVOX is a 24-hour rock station in the Fargo-Moorhead market. Since changing owners and format within the last year, KVOX has improved its market image.



*Control Room of KVOX for stand-up operation*

As part of that changeover the control room shown was put into operation in April 1975; planning and construction started in January 1975. In the design, careful consideration was given to the reach of the operator and ease of future engineering work. The studio is a stand-up operation with bar stool provided.

Console wiring and jack panels are terminated on the phone connector blocks on the left side of the cabinet. This way, wiring changes can be made without interfering with the operations of the combo person.

The cart machines were placed on a shelf above the board so that the operator can easily see the cart. The carts can be started either by turning on the corresponding mixer, or by pushing the start button on the cart machine, which also turns on the mixer. After the cart cues up, the mixer shuts off by itself.

Push-button switches were added along each side of the Sparta Centurion I console for some remote control over the FM automation. Also put there are indicators for some other alert systems around the station, and a special telephone system that allows the operator to use the studio mike to talk to contestants when KVOX runs contests on the air. During this use the line is disabled so that it does not come up on any phone in the plant. No telephone instrument is used to limit quality here and a compressor was placed in the circuit to supply AGC on the phone.

Turntables are turned on and off by the corresponding mixers as are tape recorders, etc. The console has three mono channels: one is used for program; one for the special telephone system so anything can be on the telephone during contests; and the third channel goes into both a record cart machine and a tape recorder (not pictured). Lights were placed on the edge of the cart



machine shelf to indicate telephone use.

Acoustics were also taken into consideration in the design of this control room to improve isolation from adjoining studios.

Operations in this control room have been highly efficient, and new operators remark on the ease with which they can learn to operate the control studio.

# Putting Two AM Stations 60 KHz Apart On The Same Directional Antenna Array (Saving A Half-Million In Real Estate Alone)

## BEST STATION AWARD CONTEST RADIO ENTRY C

Submitted by Alexander Velleman, Director of Engineering, CHWO, Oakville, Ontario

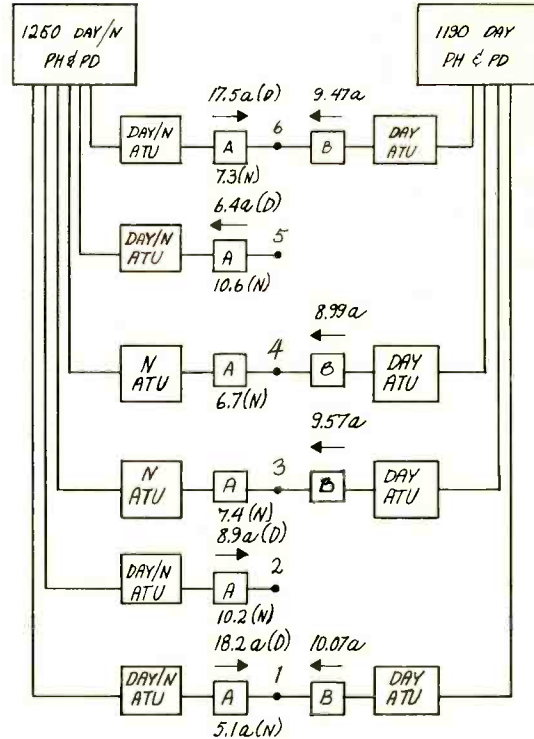
CHWO Engineering was given the task by management of setting up a "Sister Station" 60 kHz off the CHWO frequency, to cover an adjacent broadcast area. As both stations were to be in a major market area, property values were critical to the planning.

The consultant engineering firm agreed that the existing CHWO array, six towers in a parallelogram, could be used for either CHWO or the new proposed station, but expressed doubts about using filters for adequate isolation on a simultaneous two-pattern arrangement, especially on two frequencies only 60 kHz apart. Both stations were to run at 10 kW.

But CHWO Engineering was confident it could be done. Moreover, management had faith, so the consultant agreed to submit a brief. A Canadian Radio and Television Commission hearing resulted, and after being assured that at least 30 dB of isolation would be obtained, the CRTC granted a license to build.

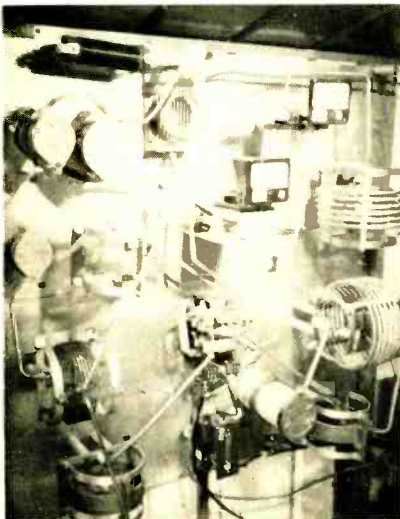
In January 1974 ground was broken to run power co-ax and sampling lines to four of the existing six towers of CHWO/1250 kHz/DA11/10kW. CHWO remained "On Air" throughout the installation, except for the few midnight trips it took to install and align the isolation networks in all the six tower huts.

Final installation resulted in the CHWO Day Pattern

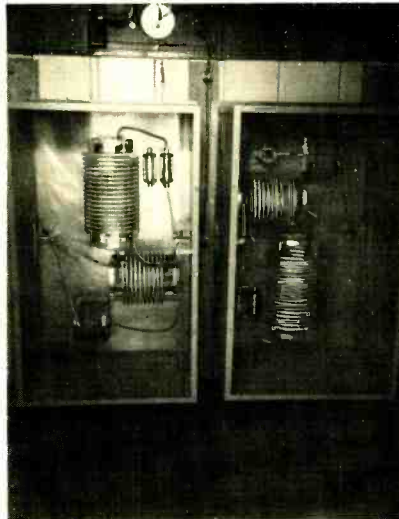


A—series resonant 1250 kHz, parallel resonant 1190 kHz.  
B—series resonant 1190 kHz, parallel resonant 1250 kHz.

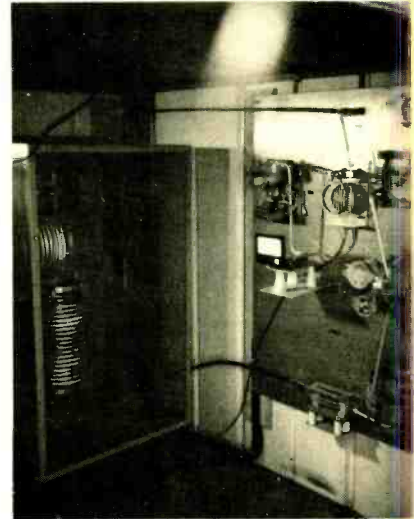
appearing on towers 1, 2, 5 and 6. The new sister station CJMR/1190 kHz/DA11/10 kW, appeared on 1, 3, 4 and 6. CHWO night/5 kW/ appeared on 1, 2, 3, 4, 5 and 6. Interaction proved to be less than was anticipated, actually about 45-50 dB. Complete proof of performance



Antenna tuning unit No. 1 tower CHWO, day/night



Filters for CHWO, left, and CJMR, right



CJMR filter on the left; CJMR No. 1 antenna tuning unit on the right

was submitted in early June 1974 and commercial broadcasting started on June 17th, 1974.

Actual cost of the new station was only for normal studio gear: there were great savings at the transmitter site. We did not have to buy another 10-15 acres of prime land in a package that, if possible to obtain at all, would have involved an expenditure in our highly developed area of nearly half a million dollars. There was no cost for the four towers that might easily have been six or even eight in another location; no cost for the burying of a radial system, for the building of a transmitter hut and tower huts, for the installation of power lines, power facilities, or audio lines: the latter was already "on site," as were spares for control lines, etc.

The costs of the 10 filters needed was minimal, compared with the savings noted already, not to mention that

as similar CCA AM 10,000 D transmitters were used, no spares were needed here either. Identical remote controls were used. The same phase monitor, modulation monitor, frequency counter and other test gear were used.

The filters were designed by the consultant firm, George Mather and Associates of Mississauga, and built by Geleco Electronics of Toronto. Exact specs were followed, and the filters ran at about \$700.00 each. Effectiveness was really surprising.

Summary: Using one site, one set of towers, one set of huts, one ground plane, one TX Building, one set of spares and one set of test gear, two stations are "On Air" with directional patterns, at considerable savings to management. Our express appreciation is extended to the designers and builders of the equipment, and to the consultants who tuned the networks so effectively.

## Small Market Radio Invests For Growth

### BEST STATION AWARD CONTEST RADIO ENTRY D

*Submitted by Joe Herold, Partner,  
Herold Broadcasting Co., Sonora, Calif.*

Sonora, California, is a small market (pop. 3800) in the foothills of the Sierras but similar to many other California towns, is growing rapidly. Last year the owners of KVML-AM and KROG-FM, Herold Broadcasting Co., decided to invest the capital required to build a first class broadcasting facility with expansion possibilities to match the anticipated growth of the community.

The new plant, through the more efficient antenna and ground system, has increased the population covered by the AM station from 40,000 to 78,560. The FM station, due to its height (2600 ft.) above the heavily-populated San Joaquin Valley covers an area in which over a million people reside.

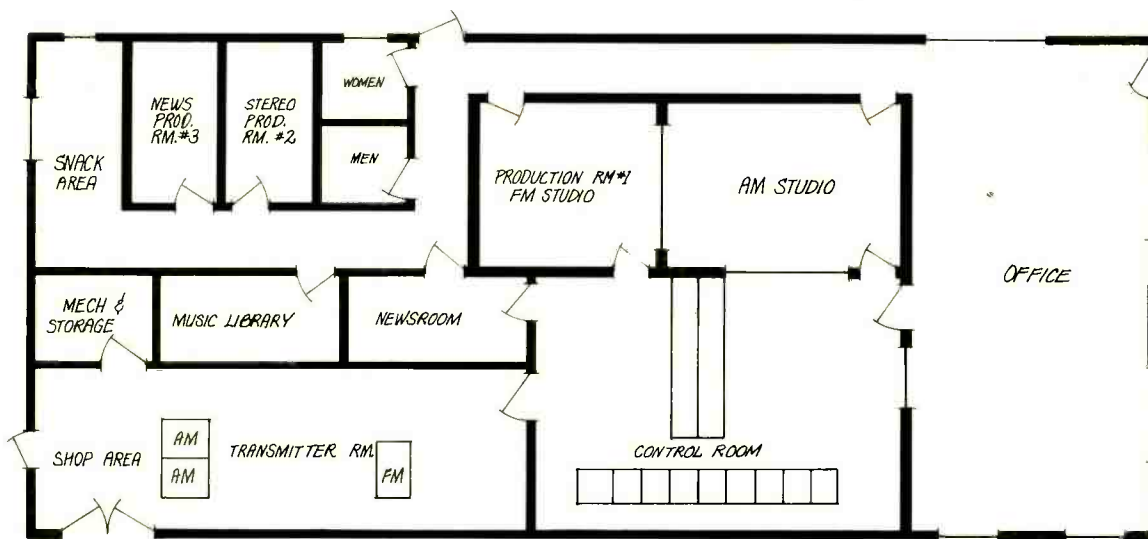
The first step in building the new facility was the purchase of a suitable site. There were very few good parcels available in the area. Fortunately a historic site

became available—an old race track, one of the first in California, used by pioneer gold miners. There, miners and prospectors wagered large quantities of gold dust on their favorite horses. The eight-acre parcel included two small lakes, ideal for inclusion in the station ground system. The area was adequate for the installation of a directional antenna system and future building expansion, if required.

Due to the extremely poor soil conductivity in the Sierras, it was decided that a 5/8ths wavelength antenna would be used for the AM station with the FM and communications antennas mounted on the side of the tower. The tower also supports an inter-city relay receiving reflector through which we receive network and special programs from Modesto, about 40 miles distant.

The tower is insulated, 405 ft. tall, guyed, and manufactured and erected by the Utility Tower Co.

To facilitate the move and to improve the quality of both AM and FM signals new equipment was purchased. Our biggest investment was in a new RCA FM transmitter. We retained our old Bauer for AM transmission. New remote pickup equipment and inter-city relay equipment came from Marti. New consoles were purchased from RCA and Broadcast Electronics (Spotmas-



Floor plan of KVML-AM and KROG-FM

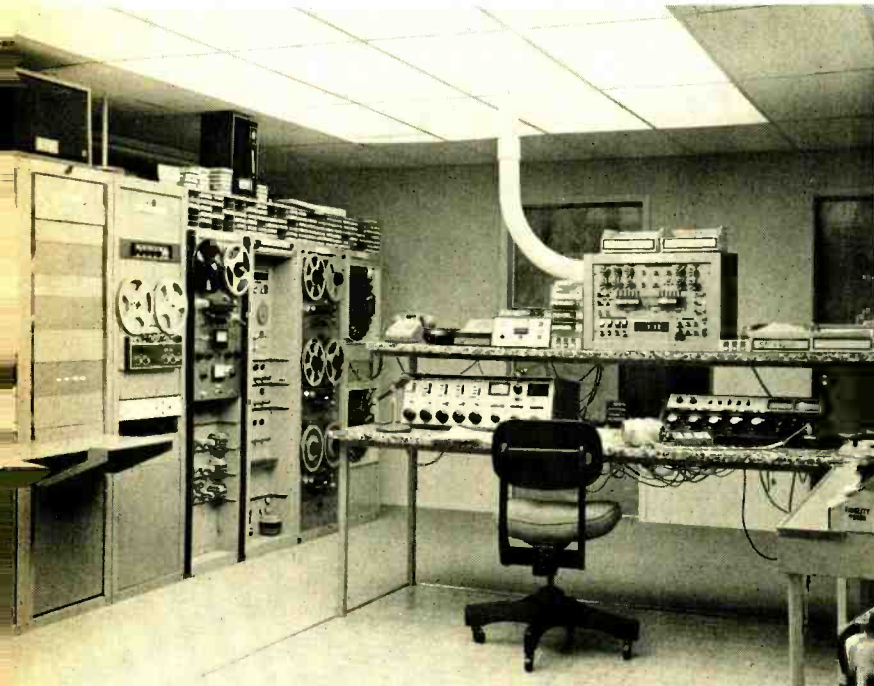




*The park-like setting impresses visitors.*



*Master control room for the station.*



*One of three production rooms.*



*FM transmitter in foreground. AM at rear.*

ter). We retained our Schafer automation system used both for AM and FM simulcast.

To insure maximum coverage and best sound quality an Audio Processor and AGC-Peak Limiter was purchased from Dorrough Electronics, Burbank, California. This limiter divides the audio spectrum in three bands and, through AGC and limiting, continuously equalizes and limits to provide maximum modulation and a crisper overall sound.

We have three production rooms: one is for stereo and another is exclusively for news. A master control switcher allows the feeding of a program source to either AM or FM or to simulcast (KVML/KROG is affiliated with ABC, Associated Press, Mutual and Oakland A's, baseball and '49er football). The FM automation system includes a network joiner, and clock control of recorders for delayed network recording.

Our new home is unusual in its park-like setting that is a delight to employees and visitors alike. Special fea-

tures of the installation include location of the tower immediately adjacent to the building to eliminate long transmission line runs, circulation of the heat output of the transmitters through the building air ducts in winter and to the outside in summer.

The second floor includes administrative offices (accounting, etc.). Not the least feature is the availability of half of the second floor for a two-bedroom apartment which my wife and I intend to enjoy shortly.

Our format, heavy on community news and participation in community affairs and MOR music, has given us an audience share of over 70%! The quality of our sound transmissions has also contributed greatly to listener loyalty. All of this, I must add, gives immense pleasure to an old-time broadcaster who started his career in broadcasting 40 years ago as technical supervisor of WOW, Omaha. After the rat race and competition of big city markets in both TV and radio, owning and operating this small market radio is both satisfying and rewarding.

# Converted Armory Becomes Radio Station and Community Center

## BEST STATION AWARD CONTEST RADIO ENTRY E

*Submitted by Tunney Associates, architects and designers Hastings on Hudson, NY for radio station WALL*



*State armory before conversion to radio station WALL.*

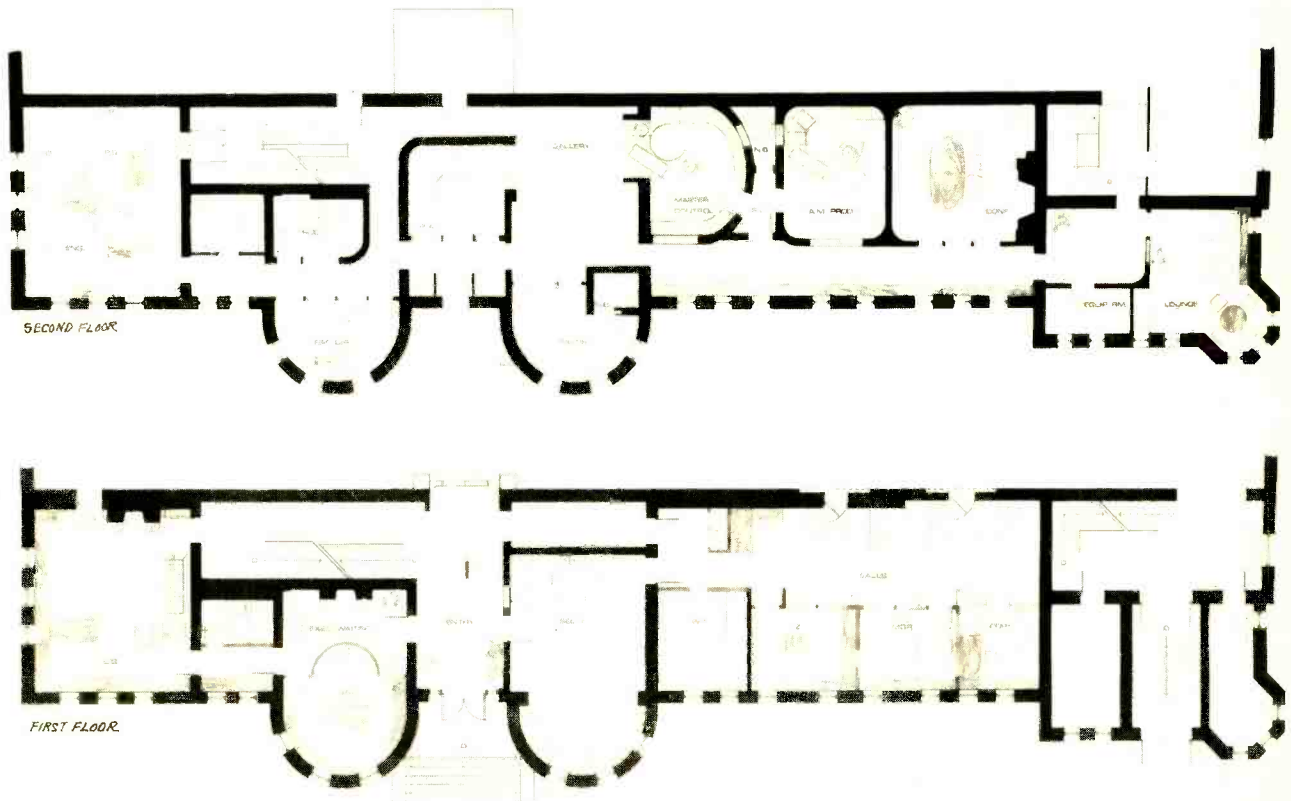
The New York State Armory in Middletown came up at auction last year and no one wanted it—no one except a farsighted broadcast organization called Castle Communications—owners of radio station WALL. As the only bidder they became owners of this enormous historical landmark for the price of a one family house—\$50,000 to be exact.

James O'Grady, president and general manager, envisioned use of the front of the Armory for the studios and offices leaving the large gymnasium-sized room (the drill field) on the first floor available for civic uses. O'Grady then engaged the services of Tunney Associates, architects and designers, who with their background in broadcast facilities design, proceeded to develop renovation plans as shown here.

Tunney's design team's prime concern was to create a budget-minded facility while preserving the historical presence and integrity of this building. Care was taken to work within the discipline of the existing structure. The dominant circular form of the existing turrets lent itself to the development of unusual but efficient broadcast space. Existing oak trim, doors and wainscoting is stripped and refinished naturally. Warm oak cabinetry in offices and studios is consistent with the character of the building. Supergraphics were added for fun.

The first floor of the building, originally officers' quarters, is being transformed into executive and sales offices. One enters into a newly designed vaulted ceiling space reflecting the turrets on the exterior. To the left are

*continued on page 44*



*Floor plan of front showing turrets converted to offices and production facilities.*



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ident and comptroller. To the right of the bookkeeping and sales areas. The sales managers offices have a pass key system for easy interoffice communication. The offices create a visual link with the second floor, a short corridor leads to every space. Groups or individuals can follow the operations of a radio station, a telephone and dialing either a radio station or the on-air programming. The DJ perform his tasks at a donut table—sole—which allows him easy access to all the equipment. They can gaze into the newsroom with its electronics or they can see public affairs programming in progress. A few short steps away is the FM turret open for viewing. Then it is back down the stairs and the tour is over.

The layout is extremely convenient for employees on the second floor. The newsroom contains a news booth for prerecording cartridges. Ten steps away is the on-the-air news booth with direct visual communication to Master Control and AM production (used also as a back-up emergency Master Control). The public affairs studio also has visual control of the second floor entry for security purposes. Remote equipment racks allow more efficient use of studio space. These control racks allow easy access maintenance without interfering with production. An employee's lounge doubles as a service area for large meetings in the conference room.

The record library is combined with open office work stations for the DJ, program director, news director and engineer. This allows each man to have relative privacy in a space normally used for two private offices.

The gym, a space 125-ft. by 175-ft. and three stories high is reserved for future use. Athletic events, community affairs and shows can be held there and broadcast from the balcony on the second floor making this a useful cultural community center serving Orange County—and creating goodwill for Castle Communications.

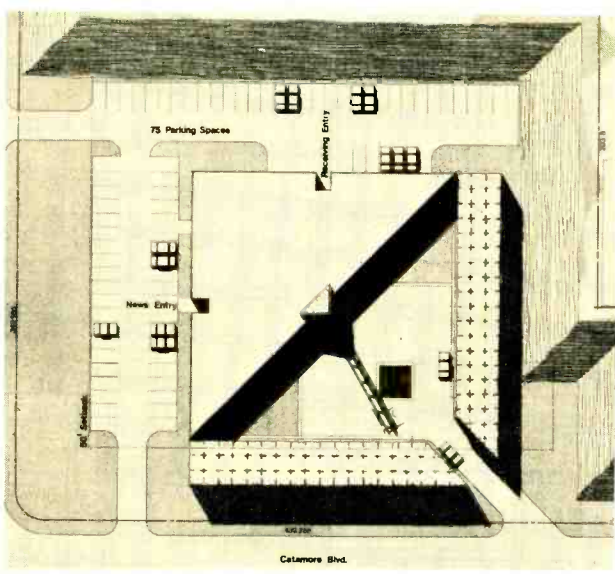
Some of the possible uses O'Grady envisions are a Boy's Club or other youth activities, senior citizen center, art gallery and rehearsal hall for the Middletown Arts Council. Prior to the armory closing it was the site for automobile shows, fund-raising balls and other celebrations. He expects all this and more to come back. He's willing to see the local CATV system cablecast events taking place at the armory. He dreams of the place becoming a regional video production center.

The cost of saving this great old building and recycling it is estimated to be about \$200,000. That is, the renovations will cost about \$150,000, exclusive of any new equipment that will be purchased. Considering the cost of constructing new facilities (WALL is in overcrowded rented space), the armory purchase has turned out to be a good move, financially, not counting the community good will that will accrue to the station. Now that the planning has been done, the station eagerly awaits completion of the renovation. It intends a gigantic open house celebration July 4, 1976.

## Triangular Structure Fits Site; Satisfies WPRI's Operating Needs

### BEST STATION AWARD CONTEST TELEVISION ENTRY F

Submitted by William Kessler and Associates, Inc., architects, on behalf of WPRI-TV, Providence, R.I.



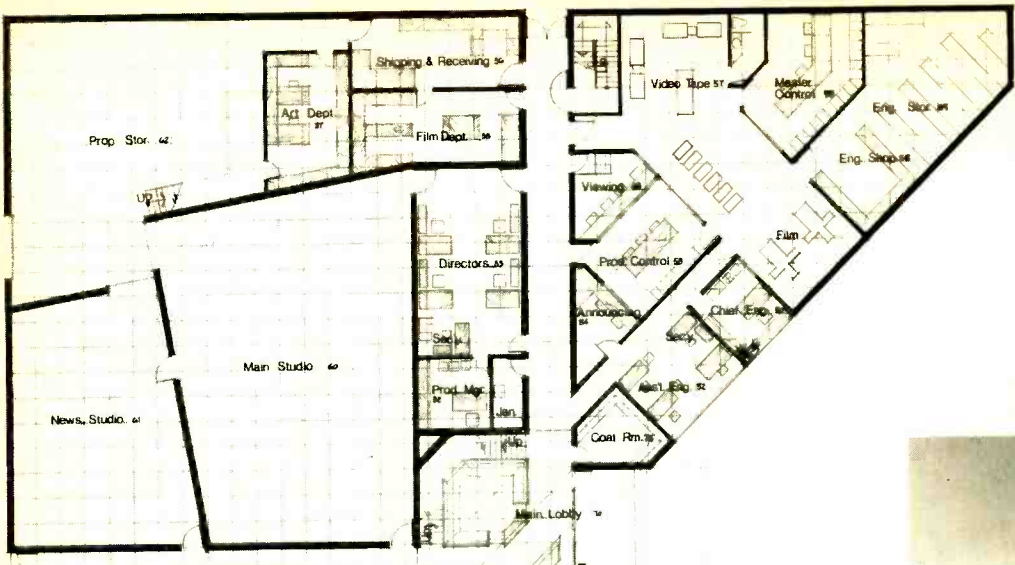
Overall site plan of WPRI-TV

If you have a leveled 3½ acre site in a newly established industrial park you don't have much in the way of visual assets from which to start a design. This didn't prevent William Kessler and Associates, architects from Grosse Pointe, Mich., from creating for WPRI-TV, Providence, R.I., an aesthetically pleasing building which is functionally sound.

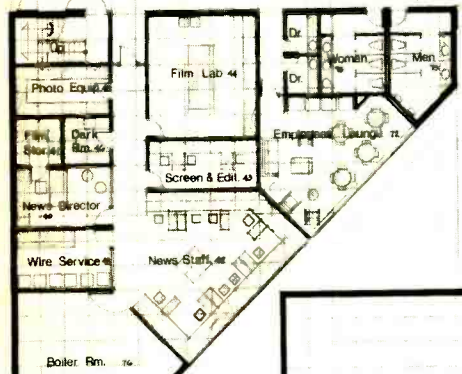
Kessler refers to the design scheme as "somewhat introverted based on the axis of the main entrance." What this translates into is a triangular building sitting diagonally on the site as viewed from the entrance compound. A 100-ft. tall microwave relay tower rises up directly in front of the all glass lobby, revealing at once to the visitor what the building is all about. The triangular tower structure is painted brightly with red, orange and yellow colors. The STL dish, the whip mobile antenna, and four-side mounted receiving antennas (covering the emergency band and off-air monitoring) convey the excitement of a communications facility. The agglomeration of transmitting and receiving antennas is felt to be an honest expression of the work of a broadcaster and not something to be hidden.

The resulting building design evolved from detailed discussions with Arthur Bone, vice president & chief engineer and Edwin Pfeiffer, general manager at Providence, plus the close involvement of Poole Broadcasting Corp.'s chairman John B. Poole and president Albert J. Gillen from corporate headquarters at WJRT-TV, Flint.



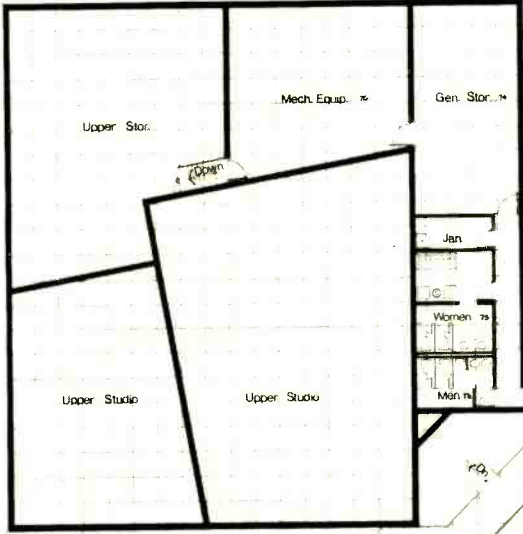


Triangular shapes and structures are apparent everywhere.

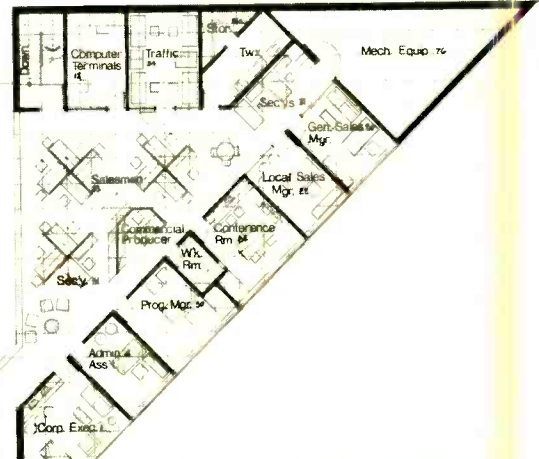


Antenna tower is integral part of the building design.

# 1ST FLOOR



First floor has three pods: studio rooms, engineering and news.



Second floor pods are studios, sales and management.

# 2ND FLOOR



Back side of Master Control cabinets form maintenance room wall.



ation on station operating needs, and traffic patterns—and without preconceived notions—the architect designed the structure as his solution. Divided into two-story high corridors, the layout is a mix of the basic program elements: production rooms, the news and engineering offices on the second floor, and the main lobby on the first floor. The implementation of building access has been recognized as a key element of the news department and its integration with parking and news studio areas. This design achieves some unusual but quite functional facility arrangements, resulting in an extremely effective utilization of available space—approximately 27,000 square feet. Efficiency was not compromised for aesthetic reasons. General Manager Ed Pfeiffer overheard one TV-12 staffer sum up the situation effectively with the statement, “Working here is great because this is a ‘people’ place.”

Just as the antenna tower was hidden, the control and engineering sections have been placed as close as possible to the lobby in order for visitors to conveniently observe the process of communications production and transmission. From the spacious lobby/reception area, the TV-12 visitor is easily directed upstairs to the administration/sales office, or down one of the two corridors—one leading to the News Department, the other to the Engineering and Production areas.

#### **Technical area accessible, but traffic limited**

Engineering areas are accessible from inside or outside of the corridor. The inside access is through the Engineering Offices. From the corridor, Production Control and the Tape/Telecine spaces are entered through separate doors, which limits unnecessary traffic. Two other doors on this side of the corridor provide entry into a Client Viewing Room and Audio Production Room. The Client Viewing Room is glassed in, but provides direct line of sight to both Production Control and the Tape/Telecine area. The room is equipped with a color TV monitor. Clients can observe the production operation without entering Production Control or disturbing the operating personnel.

#### **Production Control separated from studios**

Production Control is a generous-sized room, with the usual wall of monitors for displaying available video sources. The work area includes separate positions for director, TD, and audio operator, with a small seating space at the rear to accommodate several more people. Most frequently, the director also functions as the TD, handling machine control and video switching.

Next to the switcher (Grass Valley 1600) is the character generator keyboard. This system, mostly used for production, is controllable from Master Control as well as from Production Control. The audio console, a 16-input system (Visual Electronics) with four submasters, will accept any combination of high or low level sources. It has switchable equalizers, with foldback and switchable fixed attenuators. The high level is selectable into eight inputs, with cross-fading between any combination.

The physical separation of Production Control from

the studios is a break with tradition. The arrangement has improved the proficiency of the production operation.

The Audio Production Room adjoins Production Control and has a glassed-in view of this room. It is used as a one-man audio production facility, making carts for background music, sound effects or—most frequently—audio tapes for use with news film. Corridor entrance to the announce booth is convenient for the announcers coming from the News Department on the opposite side of the building.

#### **“Wrap-around” video tape center**

The Tape/Telecine area can be entered from the corridor; through a door from Production Control, or through the Engineering Administration area. Access is controlled, with easiest access to those directly involved with the technical operation.

For the new WPRI-TV facility there was no skimping of space in the Tape/Telecine area. The two film islands (RCA TK-27s) are positioned to allow ample room for the operator to maneuver in loading and unloading projectors.

The video tape operation is set up in a “wrap-around” arrangement with a Video Control/Editing console in the center. Equipment includes one RCA TR-70/TCR 100 combo and two other TR-70s.

The Video Tape Control center includes an editor (RCA), switching and monitoring facilities in a double console mounting. The input of each tape machine goes to a 12 × 1 routing switcher at the console. A “Tech Preview” auxiliary bus from the Master Control Switcher is also available—ahead of the tape machine inputs—for handling post-production needs. Also available at the console are remote controls for the film systems, which helps expedite post-production editing assignments involving film for slide inserts.

An added feature incorporated in the tape area is a special clock timing system (TFT) which is used primarily in conjunction with taping network programs for delayed broadcast. Since the tape operator may be involved in dubbing or handling a production job, the clock system provides an advance alert for him to be sure the assigned machine is loaded and ready to roll for taping the network show.

#### **Master Control**

Master Control is located behind the Tape and Telecine Room, isolated from the traffic pattern so the master control operator can function with a minimum of distraction. In addition to on-air switching, the operator also monitors and logs the transmitter remote control readings and shades cameras for live shows. An interesting design feature of the Master Control room is that two of the walls are formed by equipment racks—which face into Master Control and back on the engineering repair shop directly outside Master Control. This arrangement conserves space, concentrates terminal, distribution and control equipment, and more importantly, makes it very accessible for maintenance from the engineering shop.

#### **Engineering innovations and TV-12 operation**

Master Control operations are helped by the use of a digital time clock which is wired to the Master Control switcher (Central Dynamics). The clock “zeroes” when

continued on page 48



# IVC BROADCAST UPDATE

Here is the first in a series of reports highlighting IVC's worldwide broadcast and teleproduction activities. Over the months, we'll be bringing you new applications and installations along with current product information—we're making a lot happen and we'd like you to know.

**9000's ON THE MOVE**—Recognition of the IVC-9000 as THE production VTR seems to be the order of the day—seven 9000's did the production and mastering at the Pan American Games in Mexico City—exceptional technical performance and operating costs being the deciding factor in their selection. 9000's for teleproduction are now in place at TAV, Videotape Associates, Rombex, EMCOM, Rank Video, Dolphin, WDCA-TV, Advanced Systems, Image West and others... with more to come.



WDCA-TV

**NORTH CAROLINA COTTONS TO 7000 CAMERAS**—Joe Morgan, one of our sales engineers in the Southern Region, is in love with our 7000 cameras. And two of our customers in North Carolina know it. Winning in a "shoot-out" against top-line cameras, six IVC-7000 studio cameras have been ordered and installed at WUNC-TV in Chapel Hill. And WGHP-TV in High Point has taken delivery of two.



IVC-7000

**TWO NEW VANS**—IVC's TV Systems Department, which has designed, built and installed large and small studio systems over the years including complete television studio facilities on over a hundred U.S. Navy ships, has delivered another full production van—this one to KVIE-TV in Sacramento complete with IVC-7000 cameras... IVC-Canada has built and delivered a production van to CKND-TV in Winnipeg including 7000 cameras and IVC one-inch gear.



KVIE-TV MOBILE VAN

**IVC-7000P PORTABLE VERSION** of the IVC-7000 studio camera looks like a winner with a growing backlog and deliveries to begin in early '76... the latest order coming from Britain's prestigious Thames Television.



IVC-7000P

KJEO-TV



**THE PROGRAMMED BROADCAST RECORDER (PBR)** that we showed at last NAB—a six-deck, automated 1-inch system—is catching on with installations already in at CKOS-TV, Yorkton, Saskatchewan; KJEO-TV, Fresno; WCLY-TV, St. Petersburg; CKSH-TV, Sherbrooke, Quebec; with KDBC-TV in El Paso awaiting delivery.

**ONE-INCH IN BROADCAST**—Continuing to make their mark in broadcast are IVC one-inch recorders coupled with our TBC-2000 signal processors. Latest example is KVVU-TV, Las Vegas, which uses IVC-800 Series VTR's with a TBC, *dubbing commercials from quad* for simplicity, economy, yet quality of playback. Also KUTV, Salt Lake City and KGGM-TV in Albuquerque are among those using IVC one-inch VTR's for network delay. Why IVC for broadcast professionals? It's the quality that comes from full broadcast bandwidth *direct color*, not possible on lesser formats.

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each event is started so the operator knows the exact elapsed time from the start of the event on-air. When he hits the "Take" or "Roll" button, the clock re-sets to zero. The clock makes the following program log even easier, while minimizing errors.

An entry alarm system gives the Master Control Operator a visual indication of any building doors which are opened after normal working hours. A building fire alarm system also has a display panel in Master Control, as well as being directly tied in with the Fire Department.

Computer flooring was rejected in the planning stage in favor of overhead cable ladders. This has proved to be a wise decision, since the cabline is more accessible overhead than in the floor.

**Two centrally located studios**

The Production Department offices are located directly across the corridor from the technical area. In fact, they separate the technical area from the studio area. This layout is somewhat unusual, but functional, since production is most involved with both the studio and the control areas.

Next to the Production offices and directly across from the Tape/Telecine area is the Film Department. Several screening and editing booths are in this area, as is the storage for spot commercials and films other than News.

Since the bulk of outgoing and incoming shipments involve film and tape, the Film Department handles shipping and receiving functions. A rear door permits bringing material into or from the building without traveling through corridors or disturbing operations.

WPRI-TV's two studios are located off one side of a corridor from the lobby, while the News Department is strategically positioned across the corridor from the News Studio. The studio location, down the corridor from the lobby, gives visitors and talent access to the studios, the lounge area and dressing rooms, without need to pass through the Production or technical operating spaces. In addition, as a security measure, two sliding gates near the entrance reception area seal off the steps to the second floor after hours—when the front doors are locked, and entrance is limited to key people through a News Department door or the rear doors. The doors are tied to an alarm system which sounds an alert in Master Control, identifying which door is open.

The main studio is 40' x 60', and the second studio (30' x 40') is used primarily for News. For improved acoustics, the wall separating the two studios is set at an angle, and the roof above the studio area is poured concrete for additional sound isolation. A 10' x 14' roll-up door permits bringing cars, boats, props or oversized materials into the studio. Prop storage and a carpenter shop are located behind the studios.

**Emergency power system**

In the corner of the building adjoining the News Department is the Electrical Distribution Room and the Emergency Generator. The generator is a 75kW Kohler unit which operates on natural gas, which eliminates the need for on site storage of fuel. The system is set up to handle all of the key areas in the building: Technical services, News Department, Wire Services, Telephone and 2-way radio equipment, Emergency lighting, Computer operation and Emergency exhaust fans. The generator starts automatically and is up to speed in 15



seconds. After commercial power has been restored for 15 minutes, power is transferred to normal distribution, and the generator shuts off. The emergency generator automatically starts once a week for a 30-minute exercise period, operating into a load bank.

#### Air-conditioning and structural

The air-conditioning at WPRI-TV is unusual for a television facility, in that it uses a steam absorption system for air-conditioning and humidity control. Oversized air handlers for the studios keep them quiet and cool, while a high efficiency air filtering system keeps the air clean. The structural system is basically wall bear-

ing with pre-cast concrete roof for the studio area. Poured in place pan concrete construction was used for the two triangles and exterior walls are 8 x 8 masonry units in a dark brown color. The aluminum curtain wall is bronze in color as is the insulating glass.

The combination of a new building; increased and more efficient production capability, and a competent, enthusiastic staff has attracted new advertisers to WPRI-TV and increased its revenue potential. Commercial production is up. The new facility has also made it possible to do more public service shows. There is no doubt about it that the new building has made an impact on the community.

## TV Station Gains Greater Lighting Flexibility With Less Manpower

### BEST STATION AWARD CONTEST TELEVISION ENTRY G

Submitted on behalf of WBEN-TV, Buffalo, by Don Kader, Kader/Bingham/Scully, Los Angeles, Ca.

There have been a lot of jokes about Buffalo. But most people stopped laughing when O.J. Simpson started breaking tackles. And the city is now big league in more ways than one. For example, how many communities boast television stations that originate 10 local programs?

In Buffalo, this distinction belongs to WBEN-TV, a CBS affiliate. Frank Maser, Director of Engineering for the independently-owned station notes that the proliferation of locally originated shows initially strained its technical facilities.

"I joined the station in 1967," he recalls, "and practically all of our equipment and systems were in need of modernization.

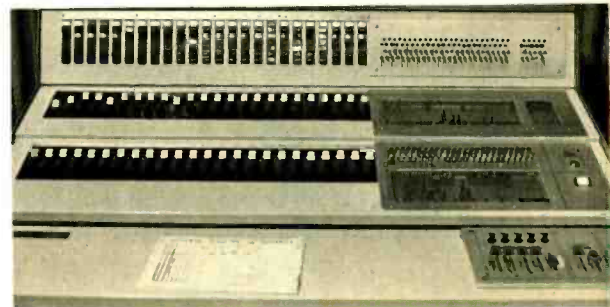
"The color cameras required a tremendous amount of light, so upwards of 50 quartz-iodine fixtures were used to illuminate sets for the station's cooking programs, game shows, talk shows and audience participation programs," Maser states.

The electronic gear was eventually replaced, but, for the next few years, lighting remained a particular sore point at the station.

"We were among the first to adopt the Berkey Colortran quartz-iodine lights for our color studios, and they worked extremely well," Maser explains. "They were reliable, reasonably priced and as easy to adjust as any light on the market.

"Our problem was that we were spending too much time adjusting lights because of all the programs we originated. For various shows in studio F, our commercial studio, we were constantly swinging lights back and forth, changing them for every show. With the newer color camera equipment we didn't need all of the lights that we had before, but we still found ourselves adjusting them three and four times a day."

Maser says light adjusting was a particular problem in the smaller studio D, which is used for newscasts. A front-projection system provided background visuals behind the news- and sportscasting talent. Set lighting



This control board permits setting up as many as five lighting arrangements simultaneously, and can be controlled from a number of remote locations.



Sets can be lit in any of a combination of ways, using a wide variety of quartz-iodine lights.

was extremely critical, as any spillover onto the front projection screen could wash out the slides.

"We tried standardizing the lighting setup for the news set, but still found people making changes during the day," he says. "We just couldn't afford to make critical adjustments in news set lighting day after day. Our labor overhead was way too high."

Because of this, a decision was made to modernize the lighting system in both studios. Studio D had a rheostat dimming system at the time, while studio F had a somewhat more modern electronic dimming system. Still, even in studio F, only 12 circuits could be dimmed at one time.

#### Patching Replaced With Control System

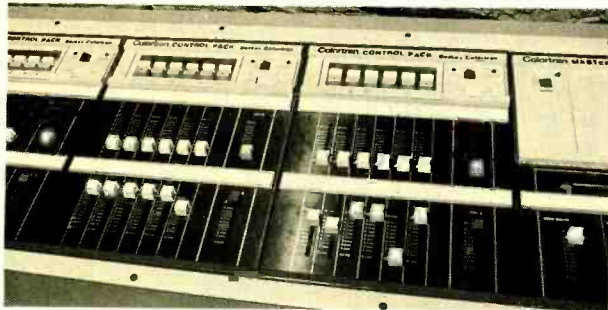
WBEN decided to eliminate patching entirely, by going to a low-voltage, electronically-controlled lighting system produced by Berkey Colortran. The Colortran

continued on page 50





Ed Steeb checks out one of seventeen Colortran Dimmer Packs which control 102 lights, and are balanced for phase.



The 32 lights for the WBEN news program are controlled by 24 dimmers.

quartz lights in the studios—more than 70 in studio F and 32 in studio D—had proved their dependability, and only one Colortran dimmer had developed a small problem in the nine years of use, he explains.

In studio F, the lighting pattern was upgraded to 102 units, including single and double Broads, Varibeams, Tru Broads, and 8-inch Fresnels. However, it was the new control system that made lighting flexibility a reality.

Edgar Steeb, assistant director of engineering in charge of operations, explains:

“With this new control board, we can pre-set our lighting patterns from arrangements of fixed lights, according to a lighting plan found in a notebook we keep

for each show.”

The 10 shows produced regularly in studio F include “Academic,” a quiz show, and “Contact” and “We the People,” both talk shows. Steeb says that the shows use similar lighting setups; usually simple broad lighting arrangements with some fill, and a certain amount of back-lighting. In special cases, sidelighting and special effects lighting is also used.

The 102 lighting fixtures are arranged to provide these lighting setups at two ends of the studio. A simpler, direct lighting system is used along the side, where the audience sits.

By consulting the notebook prepared for each show, lighting technicians can punch up the effects needed quickly, without the need for adjusting lights. The level of sophistication possible with the new board is impressive, Steeb says.

“Two rows of switches are numbered from 1 to 102, which represent the 102 dimmers in the system,” he explains. “These are simple on-off switches that let us turn any fixture off without disturbing the dimmer setting, to change a bulb, or to make some other maintenance adjustment. This method of low voltage control, with a dimmer per fixture, replaces the old patch panel approach and gives the lighting man total control from the console.

“Below each of these 102 switches is a 24-position slide switch that lets us assign any of the 102 lights to any of our 24 control channels.”

Steeb says that because of the low-voltage control, more than one fixture (dimmer) can be assigned to the same control channel. Theoretically, he points out, all 102 could be put on a single control channel. However, he adds, the main circuit breaker of the studio is not set up to handle all 102 lights at once. No more than 25 are used for any one show, and the circuit breaker can accommodate 52.

#### Dimming System Explained

When a lighting setup is planned, lights performing the same function can be assigned to the same control channel—such as having all backlights on control channel #1, and all the key lights on control channel #2. Steeb finds that five fixtures are usually the maximum needed to be handled by one control channel.

“Each of the control channels is also provided with an



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on-off switch, which allows us to turn off power to all the lights controlled by that unit.”

The 24 control channels (48 controllers, two per control channel) themselves can be assigned to three more sets of controls. 24 of them make up scene #1 and 24 scene #2. Thus, lights can be assigned to a scene master for one set, while the same lights or others can be assigned to the other scene master for a second set; and both can be controlled separately by means of the scene 1 and scene 2 controls. This permits setting up for two shows simultaneously, and following one lighting setup with the other by merely activating the scene master controller.

In a still finer breakdown, any of the 24 dimmer control channels can be assigned to subscenes A, B, C, D, or E.

“This allows us to actually set up lighting patterns for five different programs—or lighting setups within one program—at once,” Steeb says.

A grand master switch controls all of the lights, fading in whichever scene or subscene is punched in at the moment, he explains.

Steeb says that the new control board has given WBEN flexibility that they had never before achieved in studio F.

“It’s eliminated 98% of the swinging of lights that we formerly had to do. And, more importantly, it’s made it possible for untrained personnel to set up lighting arrangements by simply following the instructions in our notebooks.”

Steeb says that the use of untrained personnel is made necessary by manpower cutbacks. The next step in the development of studio F’s lighting system is installing a remote control for the grand master, scene masters and subscene master controls in the production control center down the hall from the studio.

“This will allow us to come in at the beginning of the day and set up as many as five lighting arrangements, and then change these from our work station in the production center,” Steeb points out. “Thus one man will be able to control the lights—while he’s doing something else as well.”

Steeb says that with the new lighting system, not only is the patch system now removed from the wall of the studio, but all the dimmers are located out of sight in a balcony behind the big studio. A Colortran power rack

provides 220VAC, three-phase, 600 amps to 17 circuit breakers, which in turn supply 17 Colortran dimmer packs in racks. Each pack controls six lighting fixtures up to 2000 watts each.

“The packs are wired for balance of phases between the 17 units. Up in the balcony, out of sight, they do the job with no noise or bother,” he explains.

Steeb says the installation went smoothly, but he has one second thought, now that he has the benefit of hindsight.

“We chose to do our own wiring, but our supplier would have provided us with pre-wired connecting cords. We probably spent more money in time wiring the dimmers ourselves than the factory-supplied power cords would have cost us,” he notes.

The smaller studio at WBEN, studio D, also benefited from the modernization. A low-voltage control board now handles the lights in that studio, although not with the sophistication of the commercial studio.

The 32 Broads and Fresnels are controlled by 24 dimmers, with doubling up occurring on the key lights, which are used in a broad light pattern. News, sports and weather sets are handled by the new board. For once-a-year projects, such as elections, a little-used portion of studio D is brought into service. This section is controlled by using the original console and dimmer previously used in “F”.

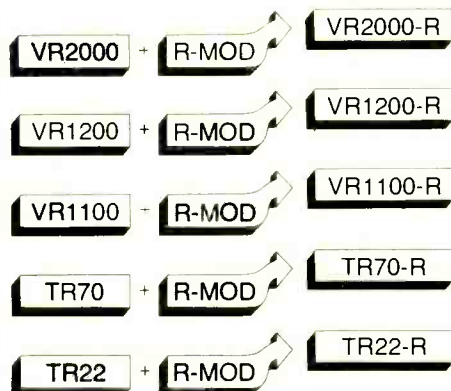
“We never throw anything out,” Steeb laughs. “The dimmers still work, so we kept them, moving them down below the studio. When we need them, we use jumpers to connect them to the old “F” control board, which is now in place above the new one.”

Maser says that the new system has solved most of the problems the station had in controlling its lights.

“It’s not the most sophisticated control system,” Maser says. “Big operations, such as the networks, have infinitely more complex equipment. But for us—an independently-owned station that does a lot of local origination—this lighting arrangement works very well. It provides us with the flexibility we needed to preset and handle our lighting requirements.”

And that is the key to making the most cost-effective use of talent and equipment. Both Steeb and Maser concur that efficient stations have a big head start in the race to remain successful stations.

continued on page 52



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# KTVX Applies Unique Signal Distribution Concept In New Facility

## BEST STATION AWARD CONTEST TELEVISION ENTRY H

*Submitted by Gary Horrocks, Chief Engineer, KTVX-TV, Salt Lake City, Utah*

One day in 1972 the staff at KTVX (until recently KCPX) was surprised to read a newspaper article telling about the sale of the building occupied by the station to a new owner. Soon after, the new landlord paid a visit and announced a 342% raise in rent. For that amount of money, we figured we could move the station into a brand new building in the Salt Lake City suburbs.

A land developer could build the plant to our specifications, we reasoned, then lease it back to us at a cost comparable to what we would soon be forced to pay for use of the old building—which itself was a converted garage.

After some investigation, the management of KTVX agreed that the station could indeed move into a new home for the same rent as before, and the engineering department set to work on the design for the new build-

ing. Our first decision was easy: we wanted a one-story structure, eliminating time spent running up and down stairs and elevators in the old downtown office. The hub of the station, we decided, would be the master control room, which would be surrounded by associated technical areas such as VTR, projection, and maintenance. This entire technical complex would in turn be surrounded by the various station departments: art, traffic, film, production, news, sales, programming, and so on.

In the old building, the news department was in the middle of the accounting area, probably the worst possible mismatch. Our solution was to place the entire news group, complete with dedicated studio, film processing/editing, and administration in an isolated wing of the new station. With a separate parking lot and entrance, the news department would be able to operate almost autonomously.

Next we looked at the location of the sales department, and found that advertisers visiting the present building had to find their way 250 feet inside before reaching the sales staff. That was easily solved in the new design by placing sales up front, just beyond the general manager's office. To further reduce the time

*continued on page 54*



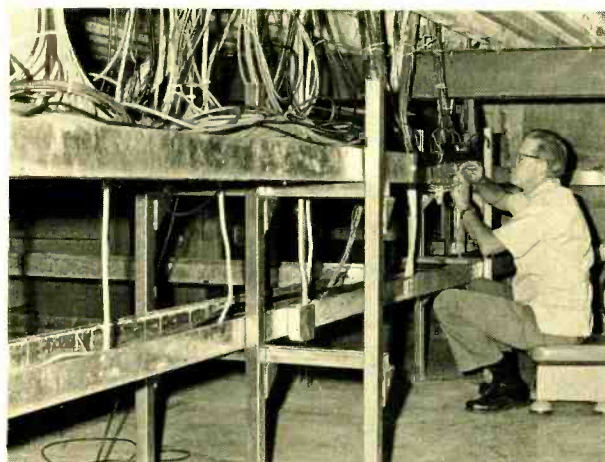
*Equipment racks along rear wall of Master Control room, Assistant Chief Engineer, Leo R. Huber, is shown taking measurements.*



*Back side of equipment racks form one wall of maintenance shop.*



*All wiring is dropped straight down into trap located in cable basement. 24 x 20 AFV distribution switcher is shown in rack above.*



*Bi-level cable tray network extends beneath entire technical area. Working on audio line is Engineering Supervisor, Tom Armstrong.*



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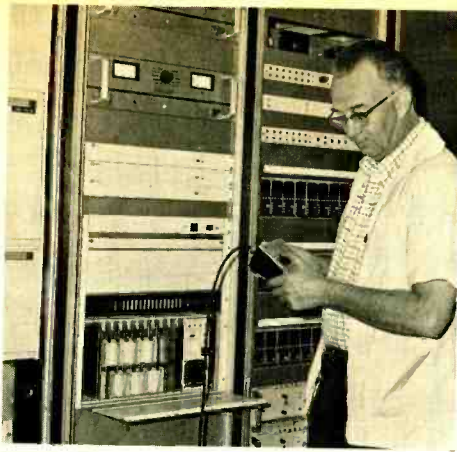
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Studio Supervisor, Doug Pearce, operates desk-top control of distribution switcher.



Signal quality evaluation position manned by Chief Engineer, Gary Horrocks. Any source, including individual cameras, KTVX transmitter, and competition can be selected for display.

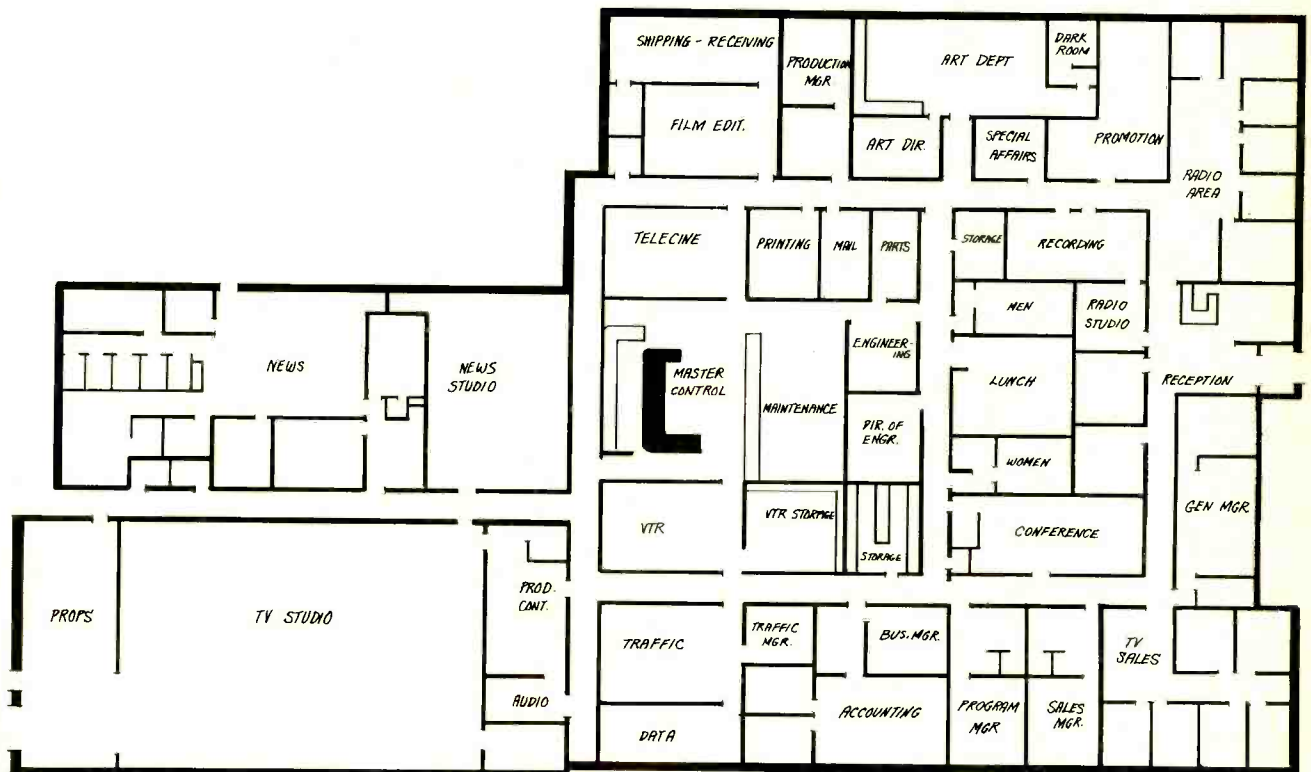
needed for work to move between departments, accounting and traffic would be moved closer together, as would traffic and production.

A ground breaking ceremony was held in September, 1973, and we moved into our new quarters in December, 1974. The new building incorporates a number of system layout ideas that had been developed by members of the engineering staff since our first television transmission in 1948. All rack-mounted equipment, for example, is lined up along the back wall of master control, the racks themselves forming a partition between that room and the maintenance shop. The rear door of all the racks are thus only a few feet from our work benches. And beneath this row of racks is a unique space we call a "cable basement."

This basement saved us a lot of time during initial installation, and is a good answer to the future problem of pulling cable for new equipment. For example, when we converted to color in the old building, it was impossible to squeeze the new cable alongside the old, forcing us to run it instead along the tops of the racks. Some stations have attempted to solve this particular problem by installing a computer floor, but even that idea has its drawbacks. Our solution was to build a four and a half foot deep basement under the whole technical area, run all cables straight down from the racks, through the floor, and into a bi-level network of cable trays. This network extends beneath master control, VTR, projection, and production control. We have stairway access to the basement from our maintenance room, and even have special little roll-around chairs for use in that area.

As another benefit, the cable basement is used as an air conditioning plenum, with air being forced into the basement, up through the floor, past the equipment, and

continued on page 56



Layout and design of station KTVX.



# AKAI RELIEVES BACK PAIN.

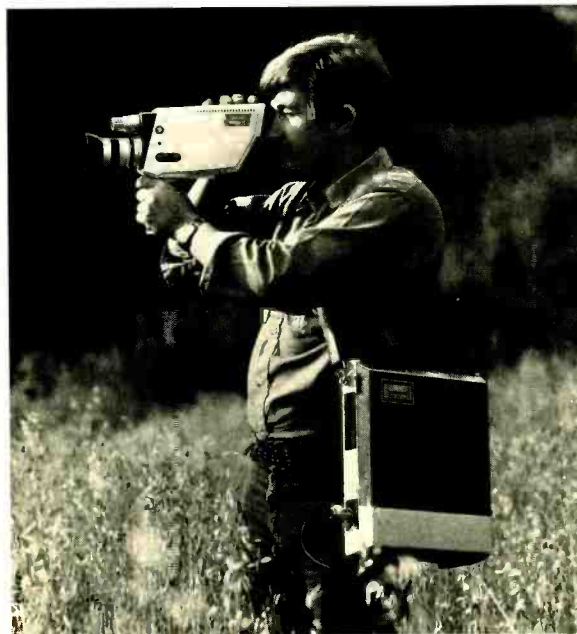
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up to the roof-mounted air conditioner. In effect, the building's air conditioning becomes a giant cooling fan for the equipment—without the need for special ductwork.

In addition to the physical layout of the cable system, we gave considerable attention to the problem of signal switching. And, since the building would be wired from scratch, the time was right to install a central distribution switcher that could signal to any location in the plant. Accordingly, a Telemation TVS/TAS-1000 video/audio distribution switcher is installed in master control; inputs are taken from the production studio, news studio, both control rooms, both film chains, all four quads, ABC net, and program. In addition, the switcher is fed off-air signals from other Salt Lake stations. The switcher's audio-follow-video output was then cabled into each VTR, both studios, the station conference room, several offices, and a signal quality evaluation position in master control. A switcher control unit, located at each of these destinations, allows push-button selection of any source. Thus, for example, a VTR operator can select his audio and video input from either control room, or from network, without patching. At the same time, he can switch any source to the VTR room monitor. As another example, a person in the news department can, by pushing a button on his desk, evaluate each competitive news program. In short, routine engineering patching duties have been eliminated.

Early in the design of the new building, we found that we would be held closely to the original budget concept, which was to move into a new building renting for the same amount of money as the old. So, while we weren't able to build the third studio or add the extra film chain and VTR's we wanted, we could at least set aside space for these additions.

These future additions should be much cheaper to install because of our signal distribution system for two reasons. First, our cable basement will make it easy to pull cable to the new equipment. We even used cinder block rather than concrete construction at the exact spot in the foundation where the wiring to the new studio and control room will run. When necessary, we can knock out the cinder blocks and build a tunnel. Second, our distribution switcher is already wired to accept some of the new inputs and outputs and is easily expandable if necessary. When KTVX is ready to grow, we'll be ready.

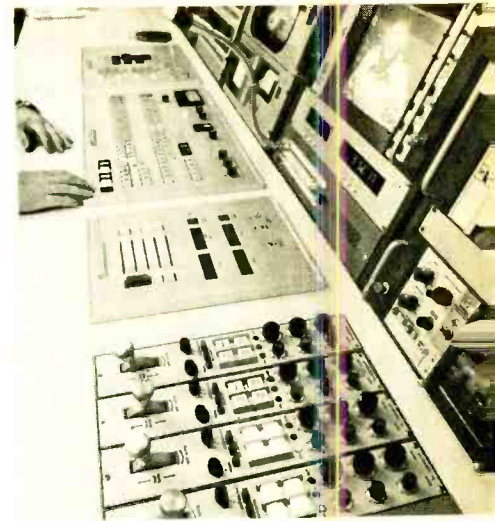
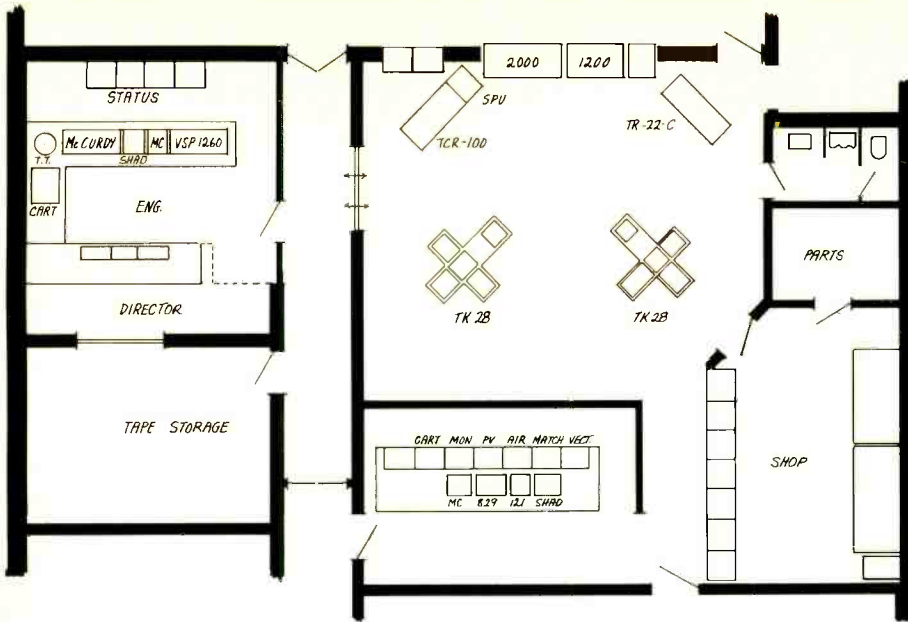
## TV Switching, Monitoring, And Layout For Highest Efficiency And Quality (One Operator In Light Periods, Four In Heavy)

### BEST STATION AWARD CONTEST TELEVISION ENTRY I

*Submitted by Ray Benedict, TV Engineering  
Manager, WKBN, Youngstown, Ohio*

Beginning in 1926 with the first radio station in the area and in 1953 with UHF Channel 27, WKBN Broadcasting Corp. has maintained a history of combining the latest in





Master control operator can watch telecine/tape operations while supervising on-air quality.

View of master control lineup showing 20-input pre-set/take-a-v switcher and 17-event memory (two center panels).

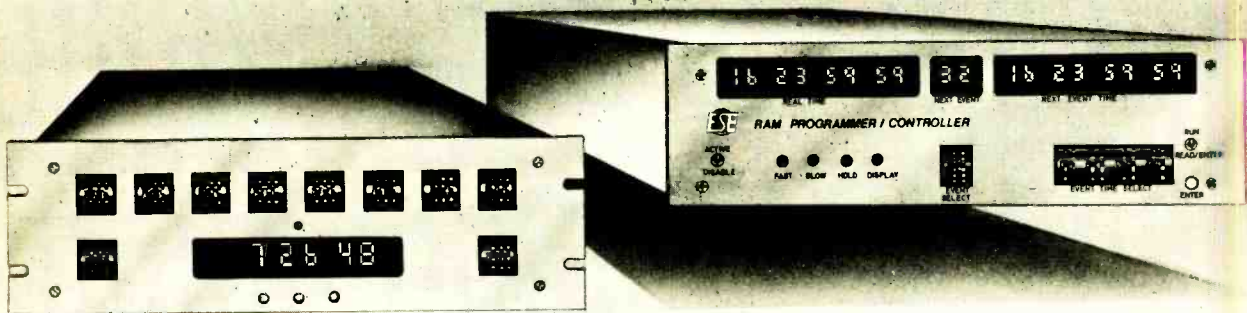
broadcasting technology with the finest in plant layout and design. In our effort to increase efficiency and maintain the highest possible standards in broadcasting, the management of WKBN recently decided to modernize their television facilities with the latest, state-of-the-art equipment.

ductivity of the present staff and improve WKBN's on-the-air image. A systems approach was utilized in the selection of equipment, floor plan layout, and equipment installation with all planning based on how each item would integrate into the system as a whole. The design of the TV operations are provided for the facility to be

Increasing operational efficiency would increase pro-

continued on page 58

# PERFECT TIMING



## Programmer/Comparators and Controllers

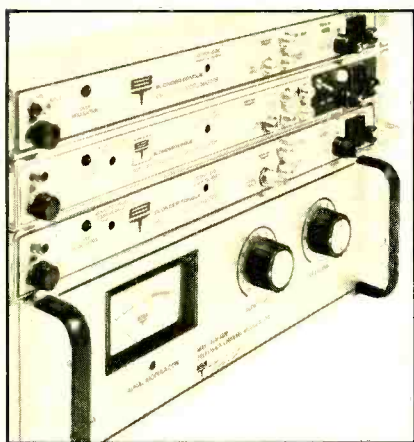
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When you want to program more than ten events, consider the ES 780 Series of Programmer/Controllers: A Solid State Random Access Memory united with an ESE clock or timer to provide 32 user-programmed outputs. Ten minutes is all you need to program all 32 events. Manual override and ten second re-programming provide maximum flexibility. All this in 5¼ inches of rack space! Internal crystal time-base and battery pack are standard features. Four digit, 32 event units are \$1,200. and Eight digit, 32 event units are \$1,500. Custom options and special orders are available. Inglewood, California 90302 • (213) 647 3021

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operated by one man during the early morning and late evening hours, or by four people during peak production and local programming periods.

Gerald Olney, M.S.E.E., a local design engineer, developed two devices which aid the tape operator in eliminating "panic" situations during news and other local programming. The first is an auto-record unit that will place a VTR in record mode at a pre-set time. This unit was constructed using two, 12-bit comparator chips and a relay driver. When the time on the Master Control clock equals the time set on the thumbwheels, a relay closes, starting the VTR in record mode. The second unit is an eight-KHz tone generator and three, eight-KHz tone sensors. The sensors use a computer-designed active filter.

With this, a tone is recorded on the cue track of a video tape at the point where a tape should stop. This auto stop feature is used on all three VTR's during news shows, and is combined with cue stops on the projectors. This permits the tape operator to be free to identify and respond to problems such as broken film, etc.

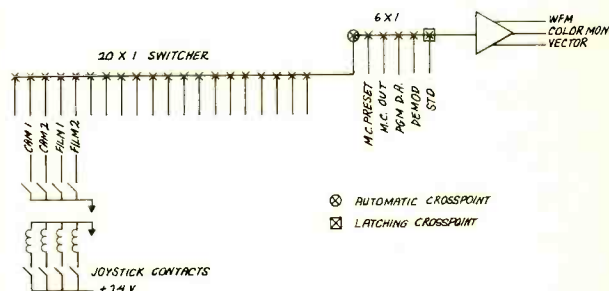
The new production control room is adjacent to the telecine/tape room to allow control room operators and directors free access to Telecine and Master Control. (Fig. 1)

Placement of the Master Control permits the operator to observe and monitor telecine/tape operations while supervising quality control for the on-air and production operations. The glass wall between Master Control and Telecine and the low profile consoles allow the Master Control operator full view of the telecine/tape room which is designed for a one-man operation, but provides room for two operators during peak periods.

The heart of Master Control is a Central Dynamics Ltd., MCS 829B, 20-input pre-set/take, audio/video switcher with an optional PTS 121, 17-event memory. This MCS package was the only unit available that fulfilled our requirements without sacrificing flexibility.

The MCS 829B has two additional busses added for use in the monitor system. Without a quick and easy method of checking system phase and video levels it would not be possible to maintain a high quality product on a day-to-day basis. Furthermore, the monitoring system had to have specifications equal to or better than the equipment being monitored. For this purpose, the two additional busses on the switcher and CDL 6 x 1 crosspoint switchers were selected. The fewer waveform and picture monitors used in the system the easier to eliminate level and phase differences due to variations in calibration.

Monitor switcher number one is controlled at Master Control and is used by the Master Control operator for



The monitor switcher bus which cuts down on number of waveform and picture monitors needed. A second bus, not shown, is part of the terminal rack monitor systems.



level and phase checking and also for camera shading; Fig. 2 is a block diagram of this switching unit. The 20 × 1 bus selects all sources in the station and as a part of the Master Control switcher, assures that phase and levels will be correct. All inputs on the 20 × 1 are selected by a push-button control unit, except the two studio cameras, and two film chains. These four cross-points are selected by a micro switch on the shading joystick.

**The output of the 20 × 1 feeds input #1 on the 6 × 1.**

Input #1 is an automatic crosspoint that operates whenever one of the primaries is selected. Input #6, Studio, on the 6 × 1 can be latched on by an alternate action switch on the control panel. The output of the 6 × 1 feeds a video DA and three outputs of the video DA feed a Vectorscope, Tektronix 650 monitor, and a 1480 R waveform monitor. The control panel is mounted next to the Vectorscope and the four joysticks used for shading are mounted on the console desk. The monitoring switcher allows the operator to monitor all critical levels in the system and, in the event of program loss, to locate the source of the problem almost instantly.

To use the switcher for camera shading, the operator selects the right "latch" button that latches studio on his waveform, picture, and vector monitors. To shade a camera the operator pushes down on the joystick and sees the source on his monitors. When the joystick is released, the monitors return to Studio. There is a duplicate set of joysticks in the Studio Control to permit shading from this location during many shows. The Studio Control joystick microswitches are in parallel with the



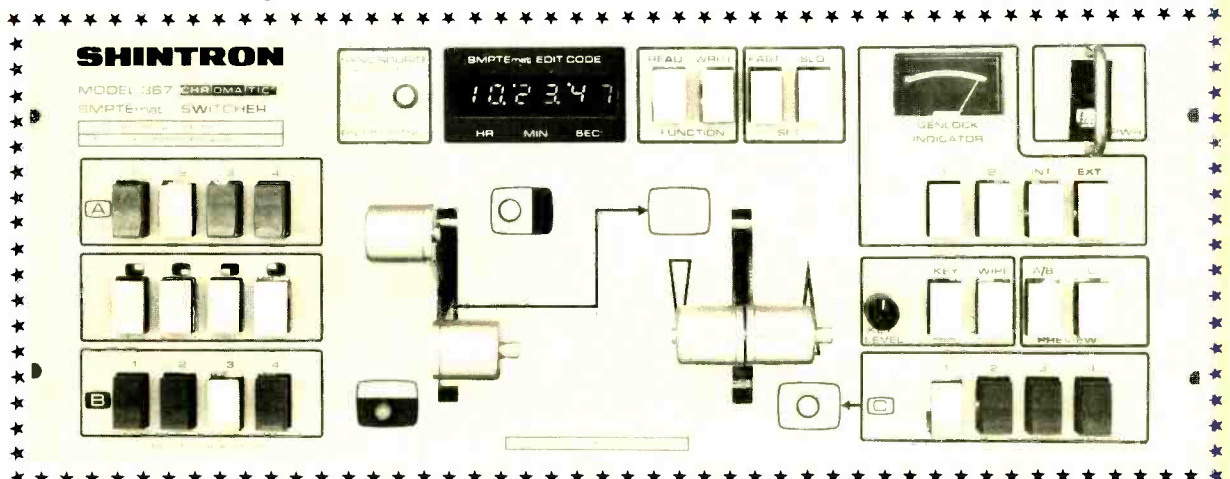
Photo of Vectorscope, picture monitor and Tektronix 1480 R waveform monitor described in opposite column.

Master Control units and an output from the monitor switches DA feeds a waveform monitor in Studio Control. The Master Control operator has a remote control  
continued on page 60

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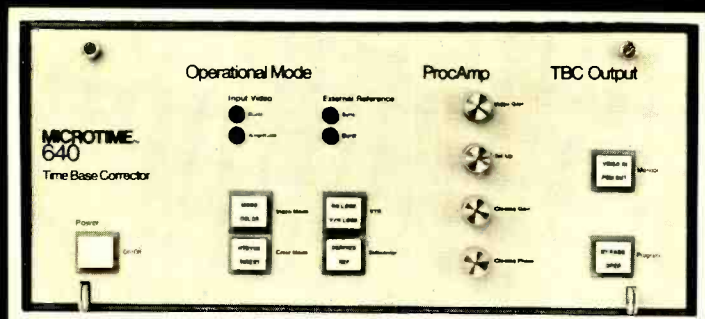
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panel to transfer shading controls from Master Control to Studio.

The "joystick, one-picture-monitor" method has proven to be faster than the "one-monitor-per-source" method. It is more economical, as only two waveform monitors are used in Master Control instead of the six needed under the old system. Furthermore, the use of one monitor eliminates errors in levels caused by the difference in calibration of the individual waveform monitors. The color monitor switching also allows the operator to be faster and more accurate in his shading as he is always looking at the source on a color monitor.

The second bus on the 829B is part of the Monitoring Switcher in the terminal racks. The control panel of this unit is located in a rack between those housing the studio camera and film chain auxiliaries. (see Fig. 3)

The output of the switcher bus feeds a  $2 \times 1$  that selects between the switcher bus or the output of  $6 \times 1$ . The  $6 \times 1$  is used to select camera or film chain waveform monitor outputs. The  $2 \times 1$  follows the push-buttons on the  $20 \times 1$  or  $6 \times 1$  switchers. The  $6 \times 1$  control lines are wired in parallel and are operated by relays. Contacts are wired on the relays to provide sequential control, stair step, and external sync to the waveform monitor which in turn allows the operator to set video levels directly out of the source and to set DA levels and phase at the input to the Master Control switcher, using one set of monitors. One waveform monitor holds the system to tighter tolerances than separate monitors. A vectorscope used to adjust the camera encoders gives better results than the manufacturer's set-up signals.

By providing convenient monitoring and test facilities we have found that most of our phase and level discrepancies have disappeared.

Bob Faulkner, Central Dynamics Ltd., and Pete Ford, Director of Engineering at WKBN, developed a unique pulse assignment system using CDL's new VG 221OP Digital Sync Decoder. The Sync Decoder derives all system pulses using either black burst or composite video for an input (and has a thumbwheel advance or delay feature). Each source in the station including the production and Master Control switchers is fed by a Sync Decoder. Each Sync Decoder is fed by a  $2 \times 1$  switch. The  $2 \times 1$ 's are mounted in the racks and are controlled from the Master Control machine panel. If a machine is assigned to Studio, black burst from the Studio DA is fed to that machine's Sync Decoder. Studio and Master Control can select either Sync gen. #1 or Sync gen. #2 independently.

Sync gen. #1 is always locked to network. This system allows Master Control to lock to network with one film chain for supers without glitching any machines used by Studio. Studio can lock to remote with its machines without upsetting on-air operations. The Sync Decoder delays are adjusted in conjunction with the Master Control studio re-entry option so that Studio is always in time with Master Control when they are on the same generator. This permits Master Control to *dissolve to and from Studio* or to super over Studio. The system does not have delay lines since all timing is done with the thumbwheels on the Sync Decoders. Phasing, level setting and system timing can be done in five minutes and the System Monitoring Center permits constant checks.



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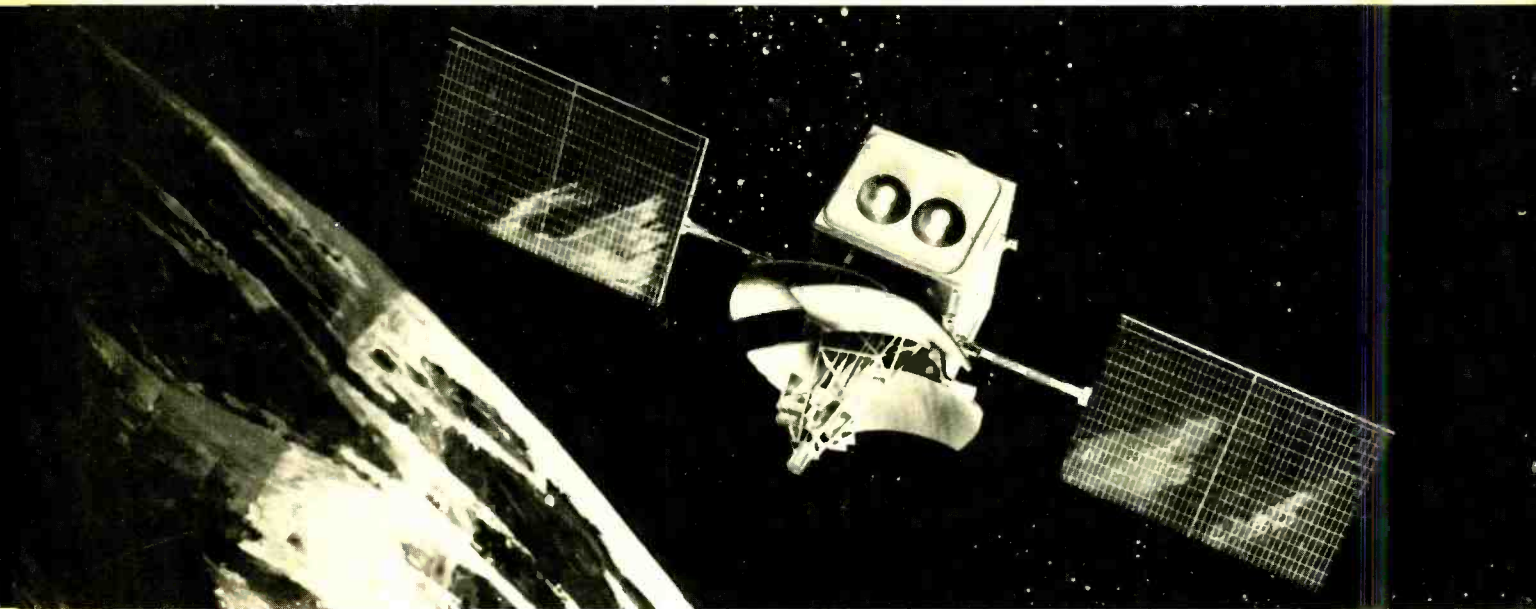
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363-3986.

**RCA** Global  
Communications

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## GREAT IDEAS

logic lows appear at the other 11. All 12 channels are toggled one position. When the next pushbutton is pressed, a logic high signal is stored in its channel and lows in all the rest. Thus 40 events can be stored in the 2519's. When the system has played the 40 events, the memory can then be re-programmed. Or, if the recirculate switch is turned on when the programming is finished, it will repeat the 40 events indefinitely. Since this is not a random select system, the Instacarts are switched to the sequential mode and loaded in the order desired for the commercials to play.

When the brain is running the system, and a song finishes playing, a toggle pulse is received from card 67, pin 22, which advances the memory one position. The light emitting diodes show which channel will play next. One LED is used to indicate when power is on. It is connected to the +5 Vdc supply via a current-limiting resistor.

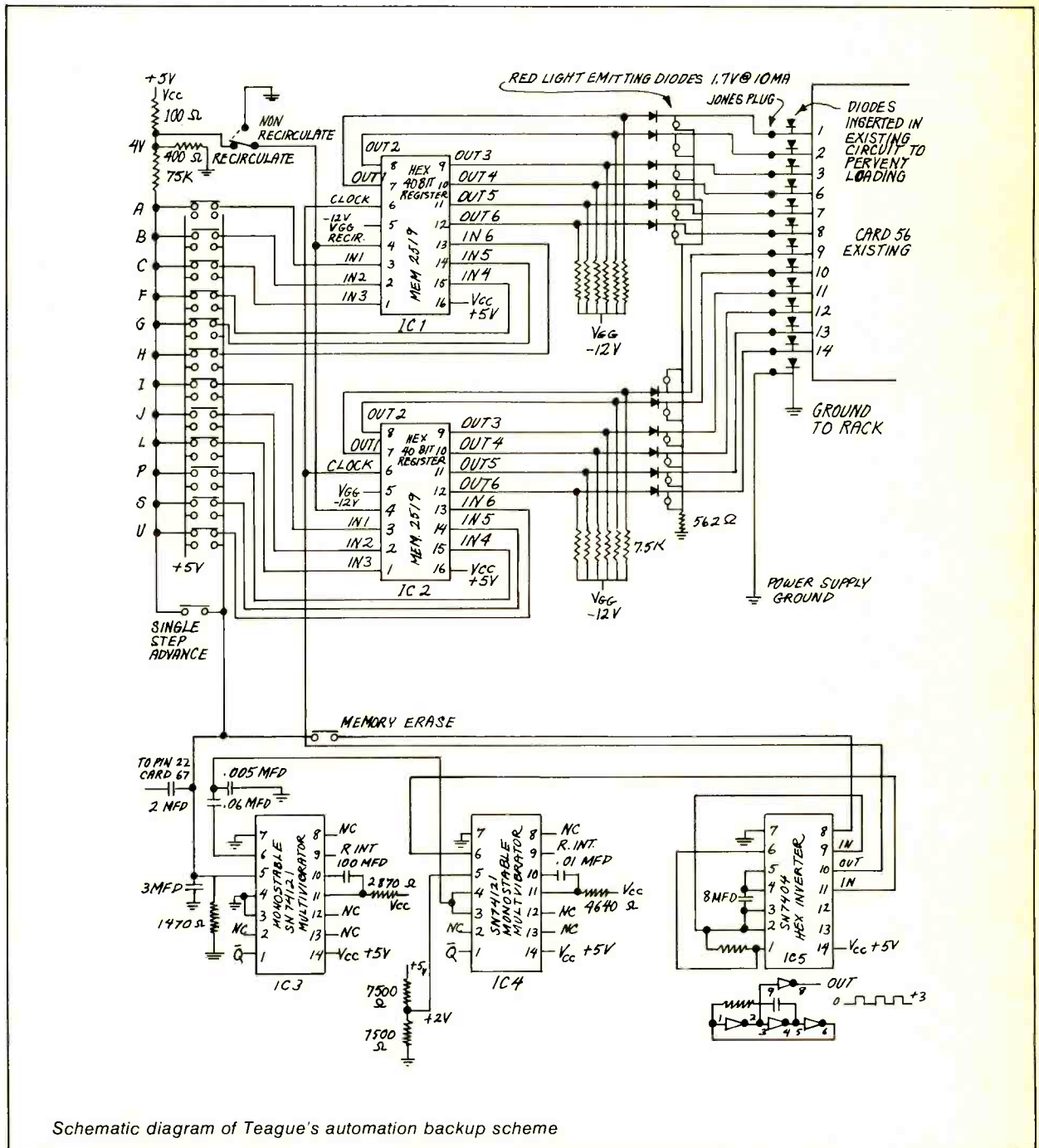
The Memory Erase switch applies multivibrator pulses to the clock input of the memory to rapidly toggle the data through the chips. The Single Step Advance switch toggles the memory one position without putting anything into the input. Circuits IC3 and IC4 shape the clock pulse to be used to toggle the memory.

## 42. Telephone Dialer Eliminates Need For Separate Phone at Remote

Steven Terhaar, Chief Engineer, KVOX-AM, Moorhead, Minn.

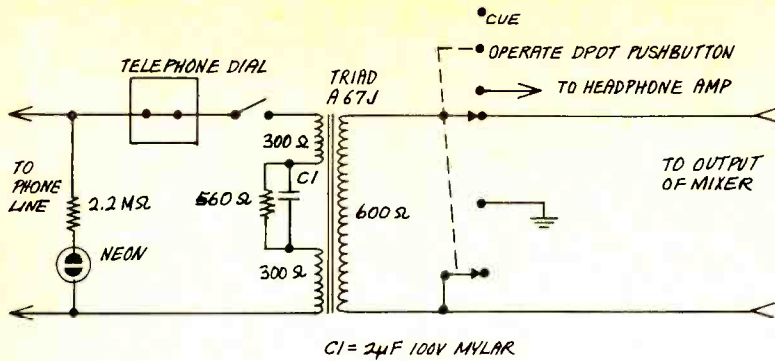
**Problem:** To carry a telephone alone with remote mixer, and interconnect when using regular dial-out phone lines for remote broadcasts.

**Solution:** We eliminated the need to lease a telephone coupler and telephone by just building the telephone into (or, in this case, onto) the microphone mixer. The mixer is used for two-way conversation before and



Schematic diagram of Teague's automation backup scheme





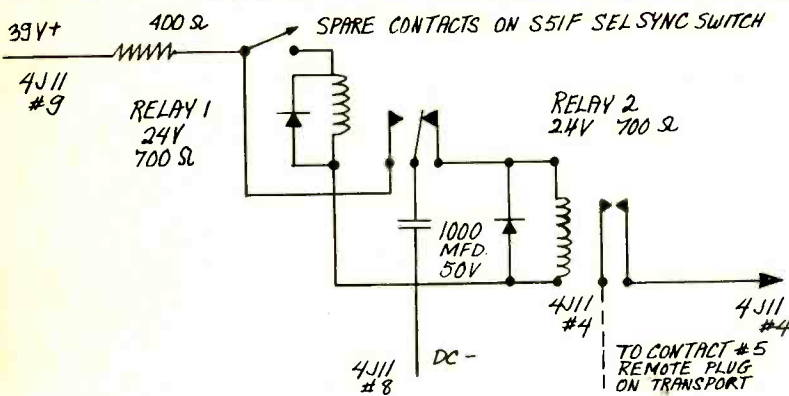
Terhaar's telephone dialer circuit



Terhaar's completed instrument

switch to Sel Sync. Playback is now available from the record head. Start the tape, listen to the audio. At the cue point, switch Sel Sync to Ready. Continue with your recording.

Upon switching to Sel Sync, the 1000  $\mu$ F electrolytic capacitor is latched to the 39 volt bus via Relay 1. When you switch to Ready, the capacitor is switched across Relay 2 which then operates momentarily. Since the contacts of Relay 2 are wired across the Record button, the machine goes into the Record mode. A little practice with timing gives a smooth, quiet pick-up at the right spot on the track.



Hutchinson's sel sync modification on an Ampex AG440B

#### 44. Sounding End-Of-Reel Panic Alarms.

John Rohwer, Jr., Program Director, WJVM-FM, Sterling, Ill.

**Problem:** Like many small FM operators, we dub our music (rock)

during the remote broadcast. The talk-back is amplified by the headphone amplifier in the mixer by pushing a DPDT momentary-action switch. In this case, a Sparta RA-4 was used because it has a separate headphone amplifier. A neon lamp, placed across the phone line, works as a ring indicator. The coupler and telephone holding coil is made from a Triad A67J transformer, which gives much better quality than a telephone in parallel with the line used for broadcast. The dial is taken from an old phone and the normally-closed contacts are used.

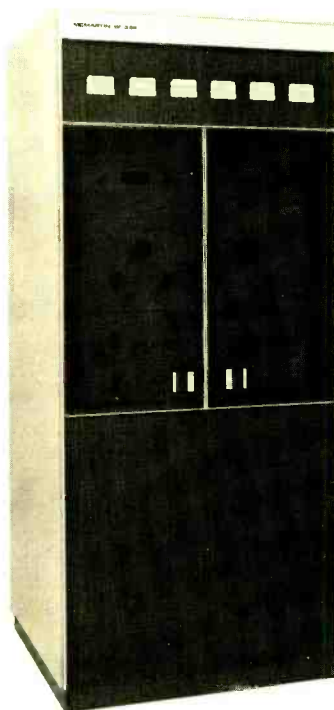
#### 43. Sel Sync Modification on an Ampex AG440B

Jack Hutchinson, Chief Engineer, CFDR, Dartmouth, Nova Scotia, Canada

**Problem:** To "pick up" a recording tightly after a mistake has been made especially if live voice is being recorded without an operator.

**Solution:** The Sel Sync feature on the Ampex AG440B, which normally is not of much use on a single-track machine, can be modified to make the pick-up nice and tight. Roll the tape back beyond the recording end and

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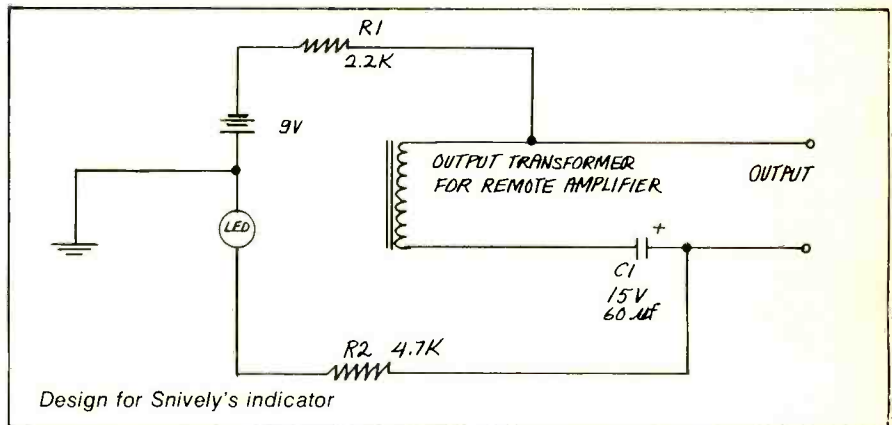
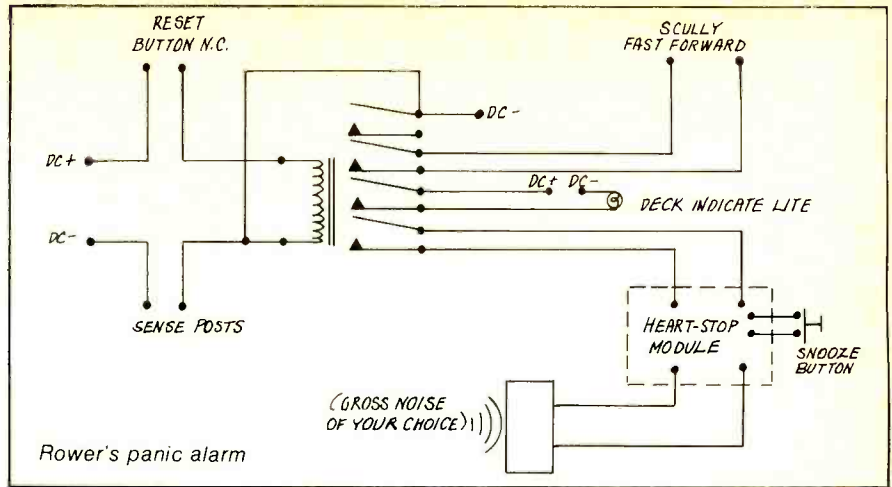
onto reels of tape for play on our rather simple automation system. Unfortunately, one music selection seems to sound like the next one, and *no one*, from management on down to part timers, can identify the last selection on a reel which means that the reel must be changed. There is always real danger that the system will be playing "dead air."

**Solution:** One day we spotted several sensing posts on our Scully tape machines and an alert DJ suggested several things that those tape machines might be made to do with just a piece of metallic tape and some relays. The simple circuit is attached.

At present, we have installed the thing on our automation system's silence-sense trigger. We found that the sound of the silence alarm was just the thing to panic most of our operators to take action.

With some slight revisions the alarm can do just about anything. Other variations might include hooking the thing up to the coffee lounge lights, the outside telephone lines, or the seat in the station's restroom, depending on how serious a problem reel changing is in any particular station.

This, of course, is far from the



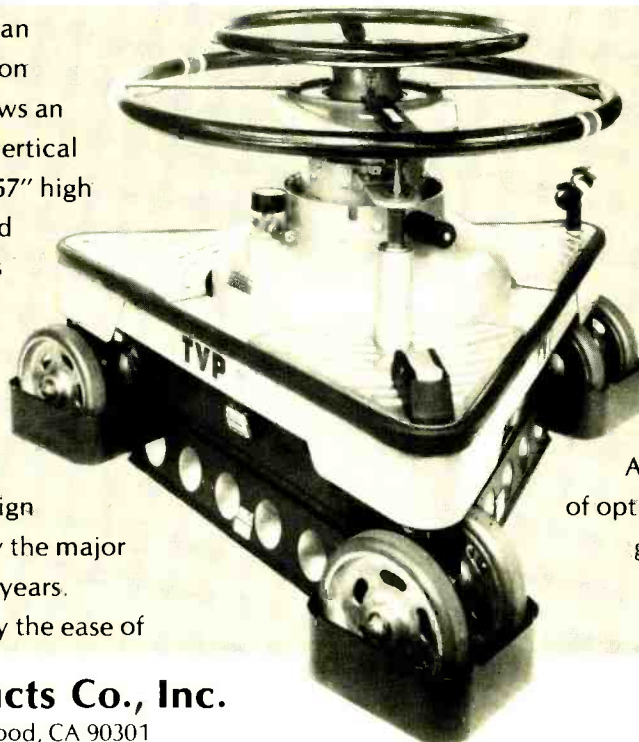
# The End Of Pedestal Problems



The P-50 shown here is an extremely flexible television camera pedestal that allows an unprecedented range of vertical motion. From 21" low to 57" high (measured at the pan head mount), the P-50 provides 36" of height range.

This superior range is achieved by the use of a patented pneumatic counterbalance system. The principal design has been proven in use by the major networks for over twenty years.

Camera operators enjoy the ease of



operation made possible by dual eight inch wheels, overall light weight and smooth camera balance. Maintenance people enjoy the sealed ball bearings, permanently lubricated wheels and low maintenance requirements of the annual, one-point lubrication.

Available with a wide variety of options (shown here with cable guard side skirts), the P-50 is the ideal instrument for the modern television studio.

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DECEMBER, 1975—BM/E

"Great Idea of the Year" but I'll bet it has a certain appeal to a lot of warped automation program directors who get a kick out of watching sleeping operator's hearts stop!

### 45. Simple LED Broken Line Indicator.

Chris Snively, Chief Engineer, WCHA, Chambersburg, Pa.

**Problem:** One thing we have experienced from time to time on remote broadcasts is a wire breaking or coming loose from its terminal—either at the remote amplifier, or at the telephone company terminal block. Anyone who has ever experienced that little phenomenon can tell you that it is quite frustrating to return to the studio only to hear that "the line cut-out in the middle of the second quarter and we missed the rest of the game."

**Solution:** There is a very simple and inexpensive circuit (see sketch) that will continuously monitor the DC continuity of the line without drawing appreciable power from the remote unit's battery.

As you can see, the circuit consists of an LED, two resistors, and a condenser. The battery can be the one used in the remote unit for its power supply. The total resistance ( $R1 + R2$ ) should be sufficient to illuminate the LED without exceeding its maximum rating.

The total resistance was split between the leads of the LED, the line, and the battery connection for protection of the LED and isolation of the battery from the telephone line. Capacitor C1 is to prevent the LED current from flowing through the remote amplifier's internal transformer. It can be of any value above 10 MFD, and a voltage rating at least as high as the battery.

On a "local loop," continuity is generally indicated directly to the line transformer of the station's audio console.

On a long distance loop (where the phone company sends the signal via carrier circuit), continuity is generally indicated to the input of the phone company's carrier equipment.

When using the voice coupler, only the short section of wire between the remote box and the coupler will be monitored. If the announcers develop a habit of glancing at the LED indicator frequently, it may prevent the loss of a game and the resulting loss of revenue. If its simply a broken wire within a two-foot reach of the sportscaster, there's no need to roust out the phone company's man on call.

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**Model 6400-Monaural**      **Model 6401-Stereo**  
**Gain:** 44 dB at 1000 Hz. Adjustable (5 mV input provides 0 dBm output).  
**Frequency Response:** Three selectable curves RIAA NAB, +5 dB at 15K Hz. For brilliance. -5 dB at 15K Hz. For scratch filtering. (See curves on previous page).  
**Total Harmonic Distortion:** Less than 0.5% at 0 dBm output.  
**Signal to Noise Ratio:** Better than 60 dB (equivalent to -104 dBm input noise).  
**Input Impedance:** 47,000 OHMS unbalanced.  
**Output Impedance:** 600 OHM balanced or unbalanced. (As supplied) 150 OHMS balanced or unbalanced internally selectable.  
**Output Level:** 0 dBm adjustable +15 dBm maximum.  
**Power Requirements:** 115 VAC 50/60 Hz 2 watts.  
**Dimensions:** 4 3/4" depth x 2 1/4" width x 6" high.  
**Terminations:** Input — RCA style phono jacks  
 Output — barrier type screw terminal strip.  
**Mounting:** May be face mounted on turntable, panel or cabinet. May be bracket mounted to side wall or floor of cabinet. Brackets provided.  
**Weight:** 3 lbs.

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 HOLYOKE, MASSACHUSETTS 01040 U.S.A.

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# BROADCAST EQUIPMENT

For more information circle bold face numbers on reader service card.

**High colorimetry hand portable color TV camera** gets excellent color fidelity from a new Tri-Electrode Color Tube. Fully self-contained, the FP-3030 has no CCU yet weighs only 6.6 lbs. with lens and viewfinder. Built in



positive color sync generator and various automatic controls offers a stable output. **HITACHI SHIBADEN 300**

**Headphone** uses 8-ohm dynamic drivers that can closely approximate original signal levels. Specifications of Model HP-100—output SPL: 90 dB ±3 dB/mW at 1 kHz; maximum input power: 500 mW; channel balance of output SPL is less than 3 dB at 1 kHz. \$50. **NAKAMICHI RESEARCH 301**

**TV vectorscope**, Model VM3, is a NTSC-compatible vector monitor for industrial-grade color TV studios. Fea-

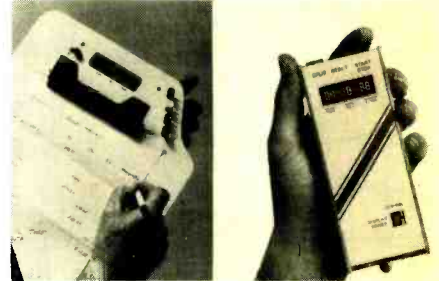


tures are A-B source selection, test circle, phase control and internal/external phase referencing. \$995. **ULTRA AUDIO PIXTEC 302**

**Test record series** has recently been revised and reissued. Recording titles

available include: Square Wave, Tracking and Intermodulation (STR-112); Pickup Response (STR-120); RIAA Pink Noise (STR-140); Broadcast Test (STR-151); 318 Microsecond Frequency Response (STR-170); SQ Quadrasonic Test (STR-1100). **COLUMBIA (CBS) SPECIAL PRODUCTS 303**

**Electronic digital stop watch/clipboard** and hand-held split timer



are capable of timing 0.01 second intervals up to 59 minutes and 59.99 seconds. Model BT201 is a contoured clipboard with a built-in-four-function timer. Model HT101 functions as a straight timer, addition timer and split timer. **QUARTZ TIMING 304**

**Downstream chroma keyer** produces a chroma-keyed output from two encoded video input signals. A separate insert keyer for the Model 7200 is not required. The unit is capable of keying on any color in the NTSC spectrum. Both A and B inputs may be either composite or non-composite video. Zero chroma delay of the keyed output signal is provided. **DYNASCIENCES VIDEO PRODUCTS 305**

**Multiple-deck tape cartridge** machines, designated the Series 5000, features a fold-down front panel, slide-out decks, ribbon cable harnesses, and a completely removable electronic package. The machines are available in 3-deck and 5-deck configurations, mono or stereo, with options including record function, secondary cue tones, tertiary cue tones and remote control panels. All machines accept size A or B cartridges. **BROADCAST ELECTRONICS 306**

**Parametric audio equalizer**, the model SC-6, covers four bands from 16 Hz to 25 kHz. Frequency, gain, and curve shape (Q) are adjustable. Distortion is rated at less than 0.01% THD; noise is -95 dB eq. out, -85 dB eq. in. \$375. **ASHLY AUDIO 307**

**Warning light series** uses standard incandescent lamps. Wattage range of

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lamps is from 7½ watts to 100 watts; color and brightness are determined by lamp used. Globe lettering is visible only when lamp is on. Units are supplied with weathertight gasket. Custom lettering and flashing unit is available option. ALERTLITE 308

**Low-level camera** the TC1005/S01, uses a low-light-level, low-bloom silicon target vidicon tube. Features include: 0.025 fc sensitivity; 650-line resolution; f/1.5 to f/360 auto-iris lens; 12 MHz bandwidth with automatic gain control (AGC); temperature range of from 5°F to 140°F at 95% relative humidity. \$1190. RCA CLOSED CIRCUIT VIDEO EQUIPMENT 309

**Upgraded version of the TC1000 CCTV camera** has all of the features of the original, plus higher resolution, improved SNR, fewer controls, average or peak automatic light control (ALC) \$280. RCA CLOSED CIRCUIT VIDEO EQUIPMENT 310

**CCTV camera**, the model TC1030, is equipped with a low-bloom silicon intensifier target (SIT) camera tube. It extends the light sensitivity down to 0.0001 fc of scene illumination. Other features include a 24,000,000:1 automatic light control (ALC), 0.81 auto-iris lens, 12MHz peak bandwidth, 600-line resolution, 10-step gray scale. \$6,000. RCA CLOSED CIRCUIT VIDEO EQUIPMENT 311

**Studio omnidirectional dynamic microphone**, the model DM-1525, has a shock-mounted and wind-protected cartridge for minimum handling noise and minimum breath noise. The mic is offered with a 200-ohm balanced output impedance and is supplied with a standard 3-pin audio connector. Response is from 50 to 15,000 Hz. A cable, stand adapter, and vinyl carrying case is supplied. PRIMO MICROPHONES 312

**Compact audio control console**, the model 6440 has been designed to meet the standards and demanding environment of broadcast and discotheque installations. It is a full stereo



board handling input from two turntables, one mike, three auxiliary inputs such as tape decks and one auxiliary mic. Console has large meters and large easy to use controls. MICRO-TRAK 313

**Portable battery-powered dB meter** measures tone signals or noise over the range from 10 Hz to 6000 Hz at levels of -55 dBm to +23 dBm. Model 517 contains a 5-in. mirror-scale taut-band meter, 600-ohm and 900-ohm input terminations and a bridging input. Output connections are provided for headphones to monitor the input signal

after amplification or attenuation. Current drain of the two 9-volt batteries is 4 mA. TM SYSTEMS 314

**Concentric twinax/triax components** include connectors, jacks, plugs and receptacles for high-density installations. They are designed for digital, video pair, carrier baseband and noise-free guarded circuits where required. A standard 3½-in. × 19-in. patch panel holds 128 jacks on ¼-in. centers. TROMPETER ELECTRONICS 315

**Display driver**, Model S105, displays continued on page 70

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graphic and alphanumeric data on conventional TV monitors in b&w or color. Features include video outputs for both b&w and RGB-color monitors. Graphics resolution is 80 points horizontal by 240 points vertical. Up to 1920 alphanumeric characters may be displayed in an 80-character by 24-line format. Data input is 16-bit parallel, asynchronous. \$1490. ANN ARBOR TERMINALS **316**

**Background effects spotlight** contains a 1 kW quartz halogen lamp. Dubbed the Great American Scene Machine, the spot is said to output three times the light energy of other effects units. Accessories include disc, film and spiral machines, and a slide carrier. Nearly 200 effect mats, discs and film patterns are available. Interchangeable objective lenses include 4-in., 6-in., and 8-in. focal lengths. GREAT AMERICAN MARKET **317**

**Audio console input modules** are available in two models, the STM-22 stereo mic input module and the STL-22 stereo line input module. The modules feature independent input-to-output selection which allows left and right inputs to be separately routed to left, right or both bus-assign switches.

Other features include: independent left and right mic trim controls, a separate channel on/off switch with provisions for mating logic and on-air light control. Each module measures 12¼ × 1½ × 6-in. \$336. (STM-22); \$316. (STL-22). MODULAR AUDIO PRODUCTS **318**

**Silver recovery/pollution control system**, the SPC-100, offers silver recovery from b&w film emulsion via an electrolytic process. Recovery rate range is up to 7½ troy oz./day. Ozone from a generator is used to destroy fixer and developer solutions prior to discharge. TECHNOLOGY INC. **319**

**Zoom lens** for 16mm camera, the Cooke Varo-Kinetal, shoots any focal length between 9 and 50 mm. The lens achieves 100 line pairs per mm on axis and in the corners of the picture. The lens has a maximum angular view field of 60 degrees at a constant aperture of f/2.2 and T/2.5. The lens resolution and contrast matches the modulation transfer function of new emulsions such as the Kodak type 7247. The lens weighs 2.3 lbs and is 8.7 inches long. RANK PRECISION INDUSTRIES **320**

**Video production switcher**, the Model RVS16-6, features 16 inputs, 6 busses, built-in color, black and background generator, downstream keyer, two independent effects groups each

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with 96 wipe patterns, soft wipe, soft key, bordered wipe and chroma keyer. \$31,000. ROSS BROADCAST PRODUCTS, LTD. **321**

**Video titler**, the Model TCG-1432A, has a 120-element line-stroke character matrix. Characters are matted into the composite video signal and are right-hand edged. The character generator sync locks to any RS-170 source via a built-in broadcast sync generator with genlock. Options include an eight-page, random access, solid-state memory with 16 lines per page; a 250-page audio-tape memory; a clock display; temperature readout; page-change newswire service; and a weather forecast crawl. \$3190. TELE-MATION **322**

**Editor/programmer**, the Model JBT-104, includes a digital insert memory and preview system at no extra cost. The digital backspacer is compatible with most EIAJ-type VTR's. SPECTRA-VISION **323**

**Cassette-format videotape** is offered in helical-scan 3/4-in. widths in lengths of 10 minutes, 30 minutes and 60 minutes. The videocassettes are compatible with all standard U-Matic systems. AUDIO MAGNETICS **324**

**Dual-cue VTR controller** has a "chase" feature. The BE460 uses a



4-bit microprocessor which allows the user to select either one of two tape transports to chase the other during fast forward and rewind operations. This feature is in addition to the capability of cueing two transports (master and slave) automatically to any selected point. EECO **325**

**Color disc recorder** enables jitter-free forward and reverse slow-motion as well as freeze-frame. Time capacity is 10 seconds; the range of record/play rates from 60 fields/sec. to still image. The SNR is greater than 46 dB. The recorder uses standard video inputs and the output can be used directly in a non-broadcast application, or time-base-corrected for broadcast use. The recorder locks to station vertical sync. \$10,000. EIGEN VIDEO **326**

**Television headphone**, the Model DT303, weighs 2 1/2 oz. A cable in-line level control allows volume adjustment. Cable length is 22 ft. Impedance is rated at 2 x 200 ohms parallel. \$37.50 BEYER **327**

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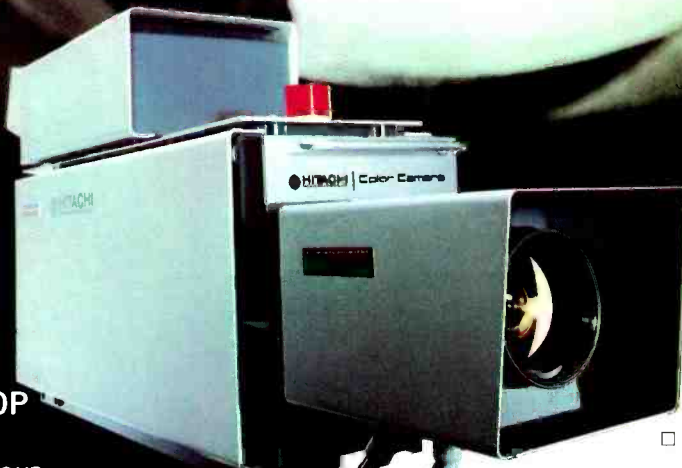
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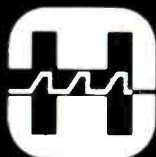
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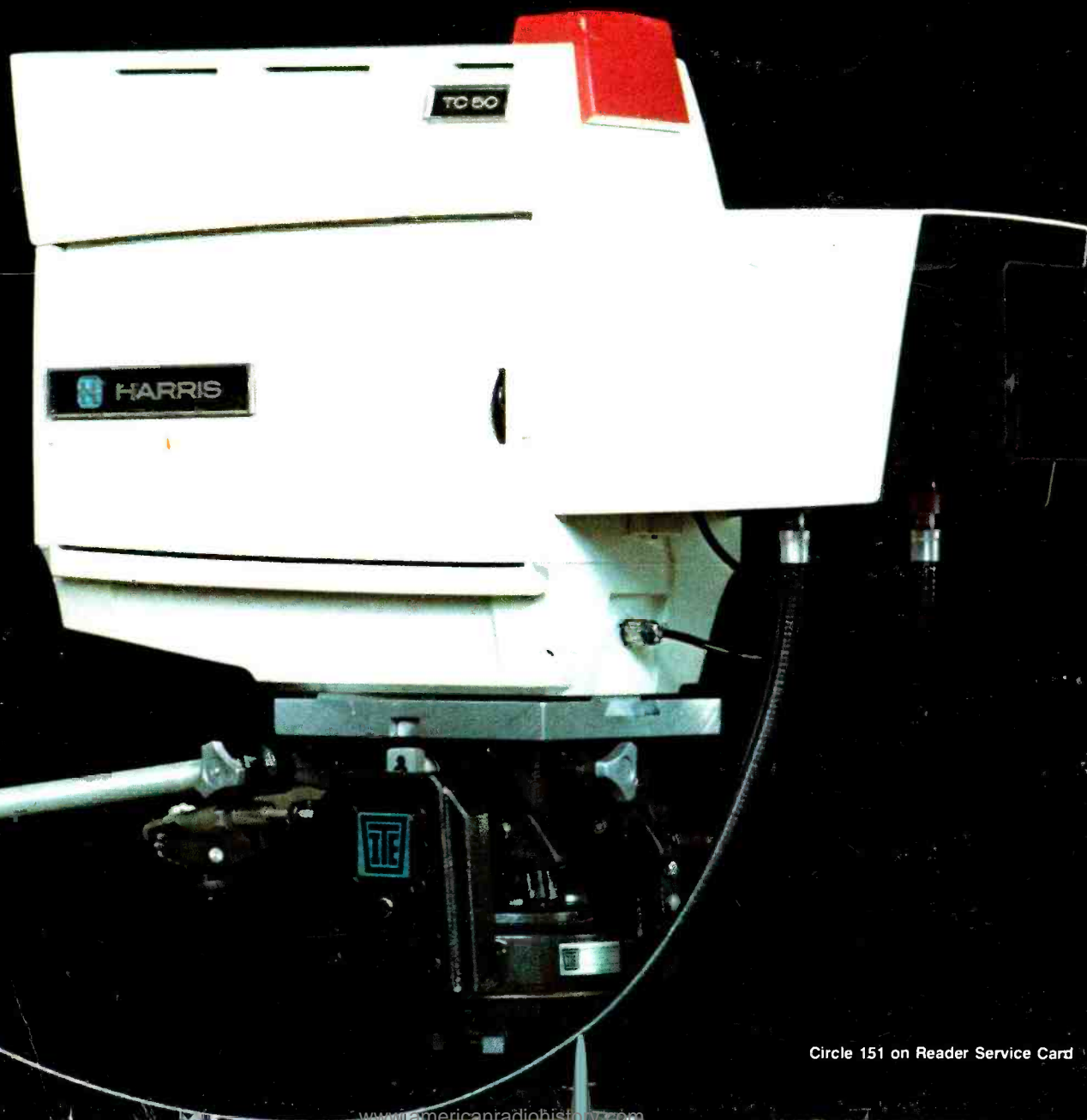
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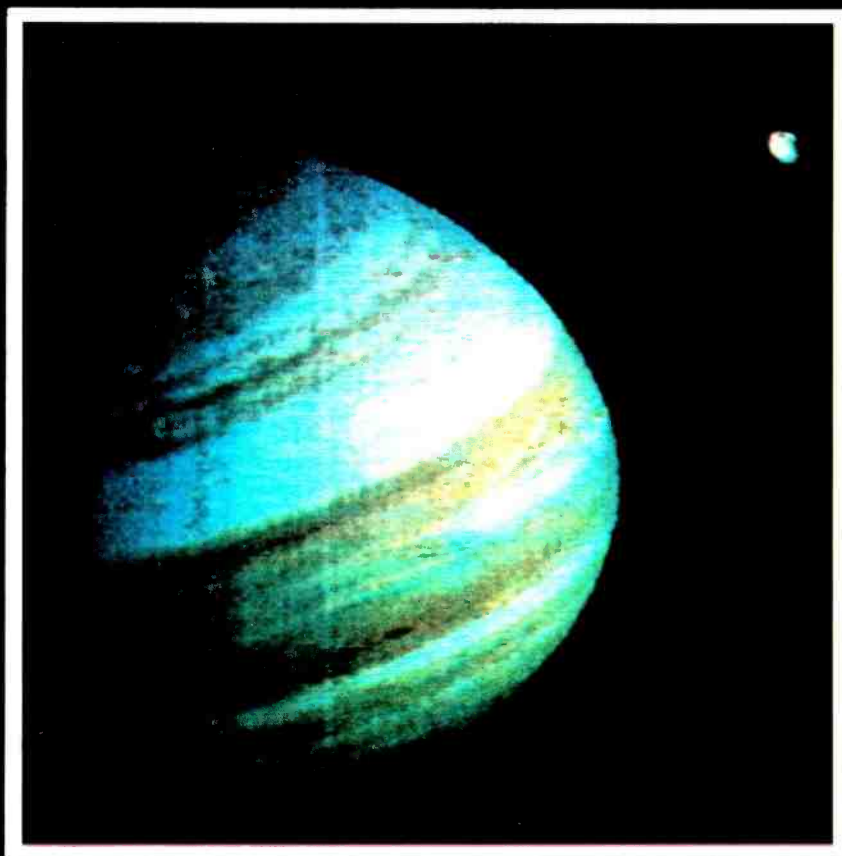
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